Planning Practices for the Public Mental Health

The Interrelationships Between Our Urban Environment, Planning Practices, & The Public Mental Health.

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Abstract

The rapid urbanization taking place in the 21st century poses its own unique set of public health concerns. In addition to changing lifestyles around the world, mental illness rates are higher in our cities.

While the conversations surrounding public health usually focus on the physical, mental health has an equal impact on the overall wellbeing of individuals and populations. Just as the planning profession finds it crucial to be involved in efforts to improve the physical public health in cities, we must do the same for the public mental health.

Like most professions, planning is guided by our theories. These are traditionally referred to as paradigms, and many of these are framed around idealized city concepts as a goal. However, our existing paradigms and ideal cities pay insufficient attention to the mental health issues facing us today. In order to better discuss the mental health issues facing urban planning in a rapidly urbanizing world, it is possible a new paradigm concept is needed to guide discussion in the planning profession.

To assist in developing a new discussion framework, the biopsychosocial model of psychology is suggested. This perspective involves not only the social demographics of a population, but also the psychological needs and biological realities of humans, allowing urban planning to achieve a more complete picture of human perceptions and behaviors in our designs and public policies.

When viewed through this lens, common urban design issues such as outdoor lighting, green spaces, and the design standards for built forms offer different strategies for designs that help mitigate risk factors for poor levels of public mental health.

To better understand the current awareness of this issue, a survey was undertaken involving professional planners, professionals working in public health both physical and mental, and those in light pollution. The data from this survey measured planning's awareness and understanding of the issues of public mental health and which further actions could potentially be taken first. In general, urban planners were found to be aware of mental health's importance but discussed the topic infrequently and were unsure where to start.

While planning cannot offer cures for mental illness through improvements to the built environment, changes can be made by planning to mitigate the city's role as a risk factor contributing to high rates of mental illness.

Introduction

The different relationships that exist between the urban environment we build, the planning policies we write, & the public mental health issues we live with is an important topic for the planning profession to revisit due to present trends in our society.

More of the world's population is living in cities than ever before, and that trend towards urbanization is only predicted to continue. In the last century, America has gone from an urban population of approximately 51% to one that is just over 81%. By 2050 we are anticipated to be at around 89% urban and suburban residents, with little of our population remaining in rural towns (Ritchie & Roser, 2018).

Figure 1 - NAMI infographic showing mental illness rates in America.

1 in 5 people in America will struggle with mental health problems in their lifetime as per Figure 1, whether acute in response to a trauma or as a chronic condition. 1 in 20 adult residents in our cities lives with a serious and possibly chronic mental health condition (NAMI, 2017). A full quarter of our homeless population is struggling with a mental illness. Mental illness affects millions, but every year around 60% of these individuals will not have received any treatment or any form of counseling by a health professional (NAMI, 2017).

The planning profession discusses public health frequently. Improving walkability for personal health and transportation is one of the key topics in many of our cities right now. Food deserts and how they negatively impact nutrition,

especially in areas already lacking other services, is another frequent planning topic. These topics and similar ones are critical, but they are not the complete picture of where planning and public health overlap.

In the past, the public health and urban planning fields have been almost synonymous. Many of the efforts made in 19th century New York City housing innovation and the standards that set for the nation took place with no particular distinction made between these two fields. Over time as these fields have specialized and developed new professional identities, that overlap shifted and in some ways that close collaboration faded (Chepesiuk, 2009). The urban design trends of the 20th century and the many advances in microbiological science further supported the widening of this divide. As greater amounts of specialization became needed in both areas, these professions developed more distinct roles and identities.

In many ways, although our training has more opportunities to specialize, many urban planners continue to function as generalists, frequently working with physical design, public engagement, data collection and analysis, and public policy. The profession is at its best when city and regional planning can serve to bring different groups of people together to collaborate and build something better. Public health is one of these areas.

But what exactly is the planning profession's current involvement in the public mental health? Public physical health issues are discussed frequently, but what strategies are we using in planning to address mental health in our communities? We collaborate with health professionals and policy makers, advocates and design professionals but are we actually taking the actions that would best support their efforts?

Even before implementation of public health interventions enters the picture, the planning profession appears to prioritize discussions of addressing physical health in cities over those of public mental health levels in our communities.

It is difficult to address a problem without discussing it. I question whether planning is truly involved enough in being part of the solution for the public mental health.

While planning frequently discusses population demographics and their sociological effects, we rarely mention anything from the science of psychology. The biopsychosocial perspective of modern psychology could be said to be the dominant paradigm in the field of psychology today, taking the biological, psychological, and sociocultural factors into account in any analysis of behavior or mental illness (Straub, 2014). When the planning profession wants to take on a public health issue but is only able to discuss the sociocultural levels involved, we are missing the complete picture.

The typical student of planning is not introduced to any of these concepts of human psychology. While most planners shouldn't be expected to be conversational in the biological details, the psychological study of how we perceive and interact with our physical environment is a main focus of multiple fields of human psychology. This information has many applications for professional planners.

The real level of inter-relation between our mental and physical health often seems to be being overlooked. The relationship between the urban environment we build and how that environment affects our mental state is usually discussed only in vague, subjective terms of happiness or life satisfaction.

In the planning profession there have been periods of backlash against the idea of the urban environment having an impact upon behavior at all. During the heyday of Modernism in urban design, there were multiple viewpoints that stated human behavior could be directed or even controlled through spatial design choices. This belief was shared in many other portions of the Rational planning paradigm. Following this period, a strong disdain developed for the idea of this 'physical determinism', a term best known from the writings of

Herbert Gans and collected in his book *People, Plans, and Policies* (Gans, 1991). Physical determinism critiques the Modernist assumption of control over behavior through spatial design, but it also rejects the concept that the built environment has any fundamental effect on human behavior at all.

The planning paradigms in our profession's history affect the discussions that we have about planning long after other paradigms have entered the spotlight. While it has been decades since the peak of this kind of rational perspective, certain viewpoints and assumptions linger.

There is far more to the relationships between our urban environment and our psychological health than mono-directional causality or physical determinism. Yet, planning seems reluctant to discuss it. Or perhaps some of us just aren't sure of the best place to start. With so much of the world's population now living in cities, it is crucial for planners and policymakers to be aware of the urban environmental risk factors for mental illnesses and what steps can be taken by the planning profession to help mitigate them.

In the course of this report I will specifically examine the effects of light pollution, urban green exposure, and the physical forms in our urban environment and how these three planning topics interact with the public mental health risk factors of chronic stress, sleep quality, and crowding & isolation.

This research will take place through the mediums of established planning literature, recent topical research, and an original survey that will attempt to gather a sense of the awareness and opinions about these urban issues from planners, public health, mental health, and dark sky professionals.

Ultimately, I am examining the planning profession's awareness of these issues as things stand today and how we either already are or perhaps should be taking a sufficiently active role in improving public mental health through supportive urban design decisions and planning policies.

Our future is urban. The rates of mental health problems in our cities are rising. If there is more that urban planning can be doing to mitigate problems with our public mental health, than we must be both well-informed and proactive.

A Framework for Discussion

What we discuss professionally or academically or even personally, is shaped by our beliefs about how the world works: what we've experienced and which taboos our culture carries around with us, knowingly or not.

In psychology, this way of organizing our thoughts and beliefs into a cognitive framework is called a *schema* (Robinson-Riegler, 2012). In urban planning academia, we frequently frame our discussions of planning eras, issues, and theories through *paradigms*. This choice of words stems from the writings of Thomas Kuhn in 1962, who used the term to describe how theories do not develop in a linear pattern, but are instead defined by long periods of little change and shorter periods of rapid change (Taylor, 1988). A paradigm in planning generally refers to the discussion of two factors: first, the procedures of planning, how they are being done and how they should be done, and second the ideologies behind the procedures, why these procedures are taking place and who they are meant to benefit (Levy, 2013).

Whether we intend to have this result or not, all of this terminology frames which issues are seen as priorities and which are discussed by planners at all. If there is little theoretical framework to start with, it can be difficult to consciously navigate a topic, or even to converse about it.

Right now in planning we are experiencing something of a return towards greater involvement in the physical design of cities and we are also embracing new, more
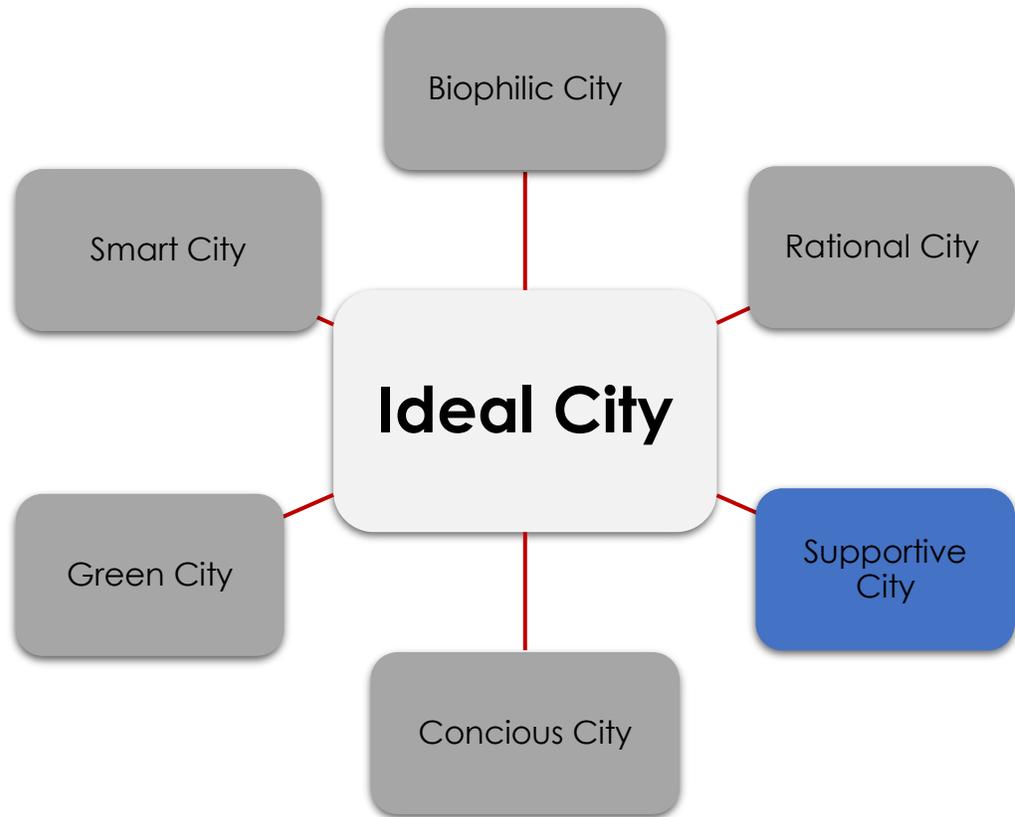
Figure 2 - Infographic showing how different city paradigms lead back to the same concept of an ideal city.

interactive methods of public engagement. Technology is changing rapidly: how we map our environment and gather data for planning projects gives us far more information in less time than we could previously hope for. This shapes the modern planning process

The planning profession, whether planners are always conscious of it or not, works through our individual schemas of what a city is, what it should be, and what we believe it is feasible to expect it to become. Most of our schemas of a city are shaped by different paradigms, but as seen in Figure 2, all are essentially ideal city concepts (Levy, 2013).

There is little about our current era that seems to lend itself to any strong paradigm, though it is possible one might emerge someday with the benefit of hindsight. In *Urban Planning Theory Since 1945*, the author Nigel Taylor asserts we

might be operating our day-to-day planning efforts under a combined Rational-Communicative procedural approach (Taylor, 1998). While this theory lacks some of the overt idealism and loftier goals of other paradigms, this combined method does sound reflective of how many planners operate professionally today.

Today our ideal city conversations mostly revolve around the concepts of a Smart City or a Green City, on whether we are best served by working alongside the cutting edge of technological advancement or sustainable practices and whether these two topics are really that different at all.

Lots of us, planners and non-planners, are picturing better cities - greener, more walkable and friendlier, but there is more division in these visions of the future right now than there is coherency, more questions than solid answers.

There is a long history of ideal cities in urban planning and its related fields: from early Greek
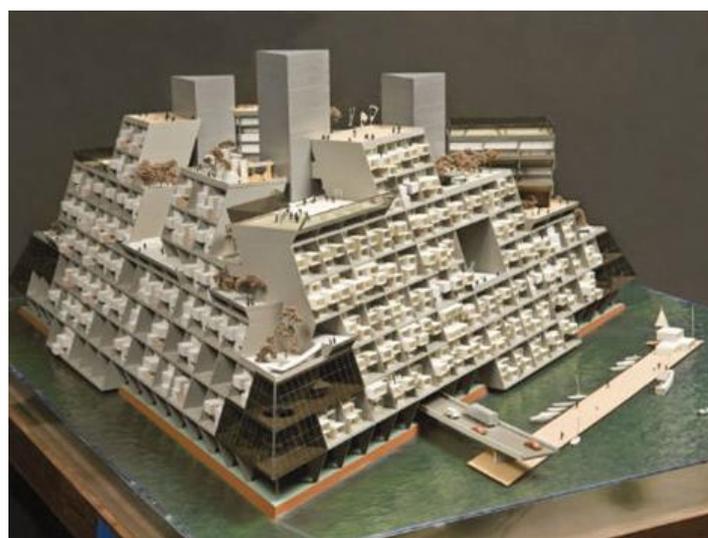
Figure 3 - Triton City by Buckminster Fuller, a 1960s theoretical floating megastructure city.

writings to 20th century megastructures from minds like Buckminster Fuller as seen in Figure 3 and of course the (in)famous Broadacre City by Frank Lloyd Wright. Figure 2 showed only a small fraction of the ideal city concepts in planning theory.

Another concept shown in Figure 2 is the ideal of the Rational City, which shaped much of late 19th century to mid-century 20th century planning. It was driven by what is now known as the Rational Comprehensive approach, the dominant planning paradigm of the era. The planner was considered an

apolitical figure, a scientifically minded professional seeking only the most optimized planning solution (Taylor, 1988). On paper this all sounds quite fair and practical. In many cases this led to both intended and unintended disaster.

The urban redevelopment of this era paid no attention to the desires of existing communities or their priorities of needs. The assumption was the professional planner would be impartial, free from political machinations, and the best informed to make a decision for everyone involved. It is a top-down method that in most ways sounds alien to modern western city planning, where a period of community input is now expected and often integrated right into the design process.

The Biophilic City was conceptualized by Timothy Beatley in 2011 based upon the concept of biophilia from the writings of E. O. Wilson, a well-known biologist. Beatley states that the Biophillic City, "recognizes the essential need for daily human contact with nature as well as the many environmental and economic values provided by nature and natural systems (Beatley & Wheeler, 2014). Where the Green City might focus on renewable energy and multimodal transit to improve air quality, the Biophilic City concept asserts that cities should actually be as physically green as possible for both human health and enjoyment and the preservation of biodiversity.

The newest of these ideals is the Conscious City. This concept was developed through collaboration between architecture and planning and a manifesto was co-written by Itai Palti and Moshe Bar and published in *The Guardian* in 2015. The focus of the Conscious City is on user-aware urban design, on planning spaces that cater to the entire eventual user group at all ages and abilities (Palti & Bar, 2019). There is a focus on responsiveness in the urban environment to changing user needs rather than spaces that are planned to be static in purpose. It could be said to be a resurgence of humanism in architectural and urban design. There is no doubt this work is needed.

While no ideal city concept has ever been truly achieved, nor are many of them remotely feasible or desirable as universal ideals, having a strong concept to strive for provides a framework for discussion of a better city by professionals, students, and academics that is badly needed. They shape our professional literature and fuel the dreams and arguments that lead to innovation. Whether they were ultimately successful or abhorred, every one of these idealized city concepts throughout planning history have had their role to play.

Even with so many varied paradigms and theories to look over, there can be gaps in the content of these paradigms that lead to parts of the discussion being overlooked. So, to better frame the discussion taking place in this report, a new paradigm concept of planning is being proposed.

The Supportive City

While most of the paradigms discussed have mentioned human health and usually happiness as well, there is almost never any mention of actual mental health issues, let alone one made from a contemporary biopsychosocial perspective with the benefit of half a century of measurable, cognitive science behind it.

As a potential remedy for this gap and to provide a framework to better facilitate the discussion taking place in this paper, I am proposing the concept of a Supportive City.

The Supportive City in planning and urban design would represent an expanded set of biopsychosocial best practices in urban design and urban policies that specifically work towards mitigating the common risk factors that lead to low mental wellbeing and then for many millions of people, eventually mental illness.

But urban planning and our urban environment does not exist in a vacuum. The Supportive City also represents the achievement of efficient collaboration

between local government, planning firms and departments, a community's mental health services, and sufficient training of all kinds of first responders in responding to mental health crises.

Figure 4 - Infographic of the six main factors that can make a city supportive.

The factors shown in grey in Figure 4 represent the more public policy and public health-oriented needs of a Supportive City. Each city needs a variety of mental health care facilities distributed throughout it, from group homes and outpatient facilities to medical offices and crisis centers. This is a very different picture of mental health infrastructure than was common throughout the 20th century. City policies would support this need for distribution of services throughout a community, including through the use of more inclusive zoning strategies. More advanced training for medical and non-medical first responders in handling individuals in mental crisis, both members of our homeless population and not, would also be standard practice.

The main focus of the literature review of this report will be on the physical side of planning, specifically the issues shown in green in Figure 4. These represent three common environmental risk factors for poor mental wellbeing in the

physical urban environment. But it is important to note that there is no requirement this framework always be three-and-three. Other urban environment risk factors might be urban noise or access to water such as ponds or fountains. Cities have different needs depending on their unique situation. This will be discussed in more detail later on with the City of San Antonio.

The Supportive City supports the public mental wellbeing and our psychosocial health at a fundamental level, acting to mitigate exposure to many of the risk factors that contribute to individuals developing mental illness and poor overall health. Greenspace and street trees are well distributed throughout the city. Lighting is regulated and installed for the highest economic efficiency and health of people and the environment. The forms of our streets, neighborhoods, and facades create an environment centered around human scale with various opportunities for different kinds of social interaction using design factors not dependent on subjective aesthetics and material choices. These items are not just held up as ideals but are incorporated realistically into each planning policy and all the design standards to suit the needs of each city.

The Supportive City becomes a more content and less disruptive place for those who live in it. The urban environment we have built is no longer a major contributing stressor in day to day life. Seeking mental healthcare is not prohibitive based on our city or access from our neighborhood. When crises arise, systems are in place to address them. While neither of these things solve other major systemic issues we face in cities, together they can mitigate many other factors contributing to poor mental health.

It is difficult to measure this topic in cities. Rates of mental illness can be calculated. Surveys of the mood of a population can be done. What else makes a city supportive of mental health? Quality of life, 'happiness', and especially prosperity tends to be discussed and measured more. A recent study by Wallethub made a stir in the DFW area when they announced Plano, Texas

was the happiest city in America, followed by Irvine, California. While they looked at multiple factors, employment and financial security was a large part of their metric (McCann, 2019). A National Geographic study with Gallup's Index of Wellbeing took a different tactic and looked more heavily at community activities and the natural attractions of a city. Their top city was Boulder, Colorado (National Geographic & Gallup, 2017).

Neither of these tactics give urban planners much of a place to start with evaluating the public mental health in their own cities, especially in regards to the potential effects of various planning efforts in their communities.

While most planning paradigms lend themselves well to an accompanying Ideal City concept, not all Ideal City concepts are in turn professional paradigms. The Supportive City is meant to serve as both, procedures to incorporate into planning and an ideology to pursue. While the Supportive City concept is not on its own the complete picture of mental health in cities, it could provide a needed framework for more discussion of the public mental health and where our professional role in addressing problems might be.

Prioritization - A Hierarchy of Needs

The idea of creating a Supportive City is a goal that can be discussed and striven towards and a paradigm that can be further developed through debate and further study, but for most looking at the characteristics and goals outlined in the theory the first question is likely to be *is this really a priority*? With planning facing critical issues like housing shortages and an anticipated upheaval in transportation technologies and their design in the next few decades it's tempting to think that those must surely be solved first.

There is a widespread theory of human motivation known as Maslow's Hierarchy of Needs, that refers to the urgency of different needs in a human life (McLeod, 2017). The traditional pyramid demonstrating this concept has been

reconstructed in Figure 5. The two blue levels represent what Maslow called basic needs. The two green levels show what he termed psychological needs. The highest level shown here represents self-fulfillment needs.

Urban planning and similar fields usually seek to support the basic needs of a population, working towards adequate housing, sanitary infrastructure, and safer streets. Sometimes we are able to work to foster feelings of belongingness within our communities through placemaking and similar strategies.

But when all those needs have been thoroughly met, someday, what is there left for us to do as a profession? Will we in fact become (or have already become) irrelevant to the greater needs of

Self-actualization
achieving one's full potential, including creative activities

Esteem Needs
prestige and feeling of accomplishment

Belongingness & Love Needs
intimate relationships, friends

Safety Needs
security, safety

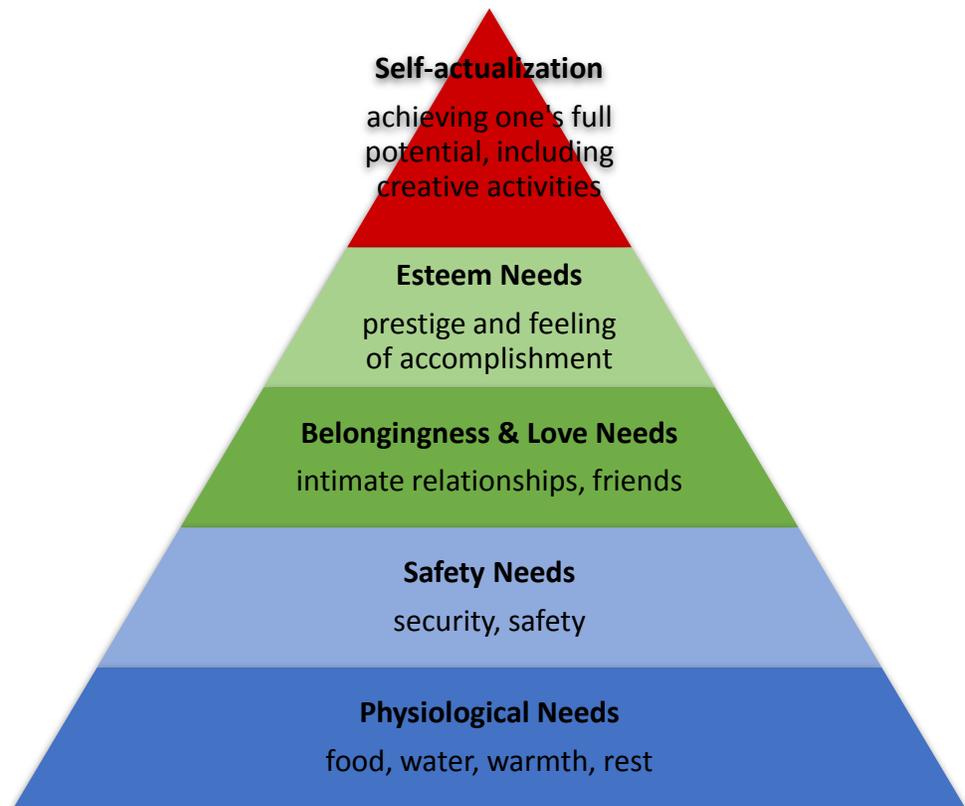**Physiological Needs**
food, water, warmth, rest

Figure 5 - Infographic of Abraham Maslow's traditional five-level hierarchy of needs.

society as authors like Herbert Gans have claimed? Will we accidentally become the enemy of quality neighborhood life due to overly-prescriptive planning like Jane Jacobs worried we might? Or could we instead take another look at the concept of these levels of needs.

Abraham Maslow throughout his life and along with other researchers continued to work on this concept, eventually expanding the pyramid from five to eight levels, adding three more levels of higher cognitive concepts over this original peak of self-actualization. The four base levels become the basic needs and the upper four the advanced needs as shown in Figure 6.

The book *Functionalism Revisited*, a text focused mainly on architecture and the behavioral sciences, states that, "Much architectural theorizing is based on the proposition that the built environment is created to fulfill human needs," (Lang & Moleski, 2010, pg. 55). It is of no surprise that many urban planning theories work essentially the same.

Lang and Moleski also assert that any structure functions on multiple levels of this ladder in order to function well, serving basic shelter needs and the more advanced cognitive needs to think about our environment and perceive aesthetic beauty (Lang & Moleski, 2010). This perspective applies just as well to our streets, parks, and public spaces.

Maslow stated repeatedly throughout his career that these levels were never meant to imply that each one must be 100% satisfied before another could be worked on. The theory was each level must achieve a "satisficing" level, a good-enough state before an individual mind would start to consider the next set of needs (Lang & Moleski, 2010).

From this perspective, the fact that the issues focused on in the Supportive City concept span multiple levels and skip over several entirely is not a problem.

Even in the best of our cities, in our future cities when technology and humanity's lifestyle has changed profoundly yet again, when basic needs are satisfied there will still be work for urban planners to do.

Figure 6 - Maslow's expanded hierarchy of needs, which makes more distinctions between different human cognitive needs.
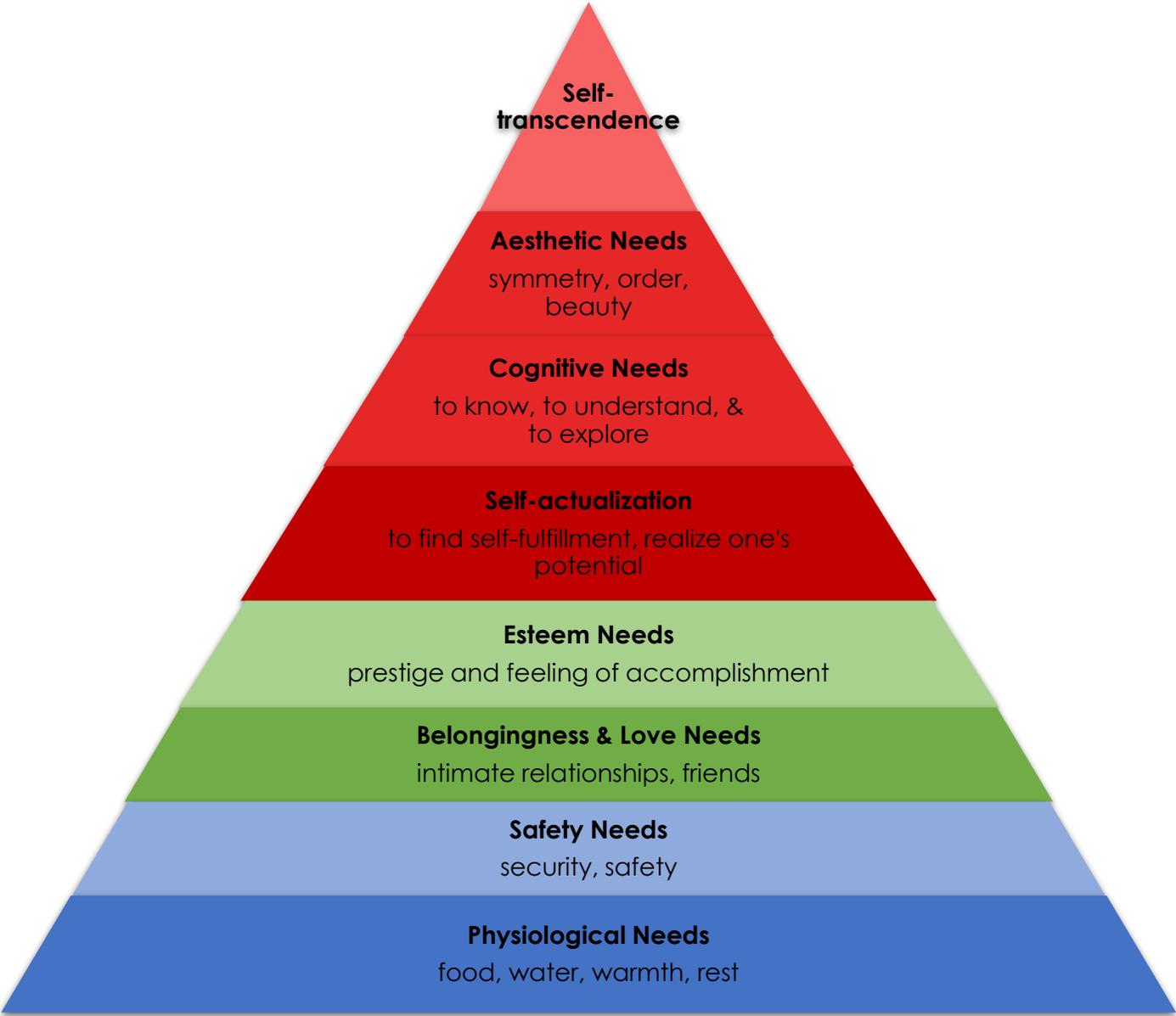
The Public Mental Health

Throughout this document we will be referring often to the concept of public mental health. This term is being used in favor of mental health, mental wellbeing, or mental illness because on several levels it better encompasses the specific issues being addressed in this report: the common risk factors that contribute negatively to the mental health of a general population rather than the wellbeing of individuals.

It is now generally accepted in the health professions that physical and mental health are interrelated, that they affect each other in a variety of ways. The World Health Organization defines health as simply, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," a definition they have used to guide their efforts since 1948 (WHO, 2019). There is even study dedicated specifically to this interrelationship. Health psychology is a specific focus within the field of psychology and defined as "the application of psychological principles and research to the enhancement of health and the prevention and treatment of illness" (Straub, 2014, pg. 3).

Outside of these professions, lack of awareness of this strong interrelationship increases quickly. The concept of mental health and physical health being separate issues that function completely differently lingers.

The concept of physical health is generally considered obvious, though someone's personal state of good physical health can take many forms. If an individual is able to meet all their personal activity needs, is not struggling with unmanaged physical symptoms, and can expect to maintain their desired lifestyle throughout their old age, then we are likely to consider them physically healthy. The CDC refers to physical wellbeing as a state of "feeling very healthy and full of energy" (CDC, 2018).

Most of these definitions and expectations in how we think about health look at individuals and their immediate social groups, close friends and families. Public health instead works with the larger picture of communities, cities, and nations.

Public health is explained by the American Public Health Association (APHA) as promoting and protecting "the health of people and the communities where they live, learn, work and play." Public health professionals work to "prevent people from getting sick or injured in the first place" and to find "science-based solutions to problems" (APHA, n.d.).

For the purposes of the survey performed for this research, the definition used defined public health as preventing disease, prolonging life, and promoting human health through improved organization and informed choice.

Like physical health, most of our society also has a distinct concept of what mental illness means, though the

Prevalence of Mental Illness by Diagnosis

1.1%	2.6%	6.9%	18.1%
1 in 100 (2.4 million) American adults live with schizophrenia.[1]	2.6% (6.1 million) of American adults live with bipolar disorder.[1]	6.9% (16 million) of American adults live with major depression.[1]	18.1% (42 million) of American adults live with anxiety disorders.[1]
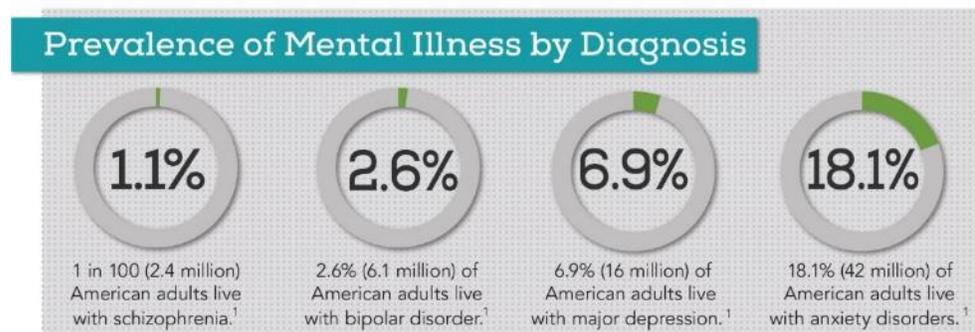
Figure 7 - Infographic showing percentages of adult Americans diagnosed with schizophrenia, bipolar disorder, depression, and anxiety disorders.

accuracy of what is being pictured can vary widely. Common symptoms are frequently oversimplified or misunderstood entirely and the rates of those around us who are afflicted underestimated. Almost 67 million people living in America are represented by just the four mental illnesses listed in the graphic above (NAMI, 2019).

Mental illness is defined by NAMI as, "a condition that affects a person's thinking, feeling or mood". The organization further explains this as conditions that can affect the ability to function each day and that likely have multiple overlapping causes such as genetics, environment, and lifestyle (NAMI, 2019).

The opposite state of mental illness would be mental wellbeing. There is no singular or formal definition of mental wellbeing, but the CDC considers that at a minimum, mental wellbeing includes the presence of positive emotions and a general sense of satisfaction with life (CDC, 2018).

But this analysis is intended for those working in urban planning, public policy, and urban design: professionals who are not psychologists or those who work directly with many public health issues. Illness and wellbeing are again very individual concepts, but community engagement, education, and awareness efforts are all familiar to planning.

All of these distinct health and wellness topics have areas of broad overlap, especially in their ultimate goals of overall wellbeing for everyone, but those dealing with physical public health issues and the public mental health share the most methodology - information and prevention over direct treatment.

With this is mind and for planning's purposes, the best definition of public mental health might be, "Public mental health is the art and science of improving mental health and wellbeing and preventing mental illness through the organized efforts and informed choices of society, organizations, public and private, communities and individuals," an explanation used by the Faculty of Public Health professional organization, a nonprofit group based in the UK (FPH, n.d.).

This is the definition that was used to generate the simplified version used in the survey, defining public mental health as "improving mental health and well-being and preventing mental illness through organization and informed choice."

While our mental wellbeing is a conversation that we as individuals need to become more comfortable with having in our lives, for ourselves and each other, the issues of public mental health are a better fit for the conversations urban planning needs to have in order to achieve a more Supportive City.

The Biopsychosocial Perspective

Just as the planning profession has undergone several paradigm shifts throughout the 20th century, so has the field of human psychology. Where planning paradigms have gaps, modern psychology has its own framework that can be integrated into planning discussions.

Beginning around the era of the Renaissance (considered the 1300's through to the 1600s), the dominant theory of human psychology was mind-body dualism, the idea that "mind and body are separate entities that do not interact" (Straub, 2014, pg. 12). Even as great strides were made in anatomy and many of the key discoveries surrounding cells and germs took place, this concept of strict separation lingered in many health fields.

During much of planning's Rational-Comprehensive era, psychology was dominated by the Behaviorist movement. This theory asserted that all behavior came from a cycle of stimulus and responses, a simple input-output relationship, and that no knowledge of what happened within the brain itself was needed (McLeod, 2017). All human behaviors could be controlled through stimuli and the brain with all its thoughts and feelings could be treated as an inscrutable black-box while the resulting behaviors were observed. It is from this viewpoint we have the classic study of behavioral conditioning - Pavlov and his dogs (McLeod, 2017).

Treating the brain as inscrutable and the existence of thoughts as not worth studying sounds strange to most of us today, but the Behaviorist era did not have EEGs (electroencephalograms) to study the brain or the incredible fMRI (functional magnetic resonance imaging) we have with modern technology to literally watch the brain at work.

With advanced technology with which to reliably study the brain, modern psychology focuses on the biopsychosocial perspective of human psychology and mental health. This theory dictates that all psychological problems and human behaviors must be viewed as the combination and "interaction of biological mechanisms, psychological processes, and sociocultural influences" (Straub, 2014, pg. 17). All three of these things play a role in any behavior or problem an individual is experiencing every time, though the ratios of each may vary. When only one is studied or discussed, valuable information is inevitably missed.

The biological perspective focuses on the functions of the body and brain, how we sense and perceive our environment. The psychological perspective focuses on
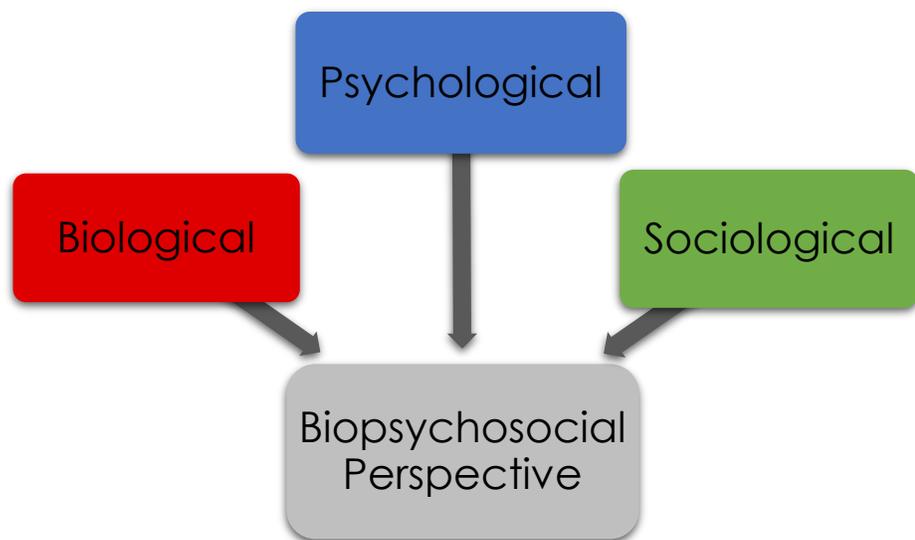
Figure 8 - Illustration of the biopsychosocial perspective

thoughts, feelings, and personalities. The sociological factors are likely the most familiar to urban planners, issues surrounding population demographics and the preferences and values of the many cultures that coexist in cities.

For planners, the biopsychosocial model of human psychology can offer a more complete perspective with which to examine the behaviors of people in an urban environment. Direct observation and self-report methods are the basis for much of planning research. Planning studies are also sometimes under various pressures to place public engagement and ease of use over increased scientific

rigor. Cross-comparing planner's gathered information such as self-reported moods in an urban space with scientific data such as how the human eye processes its surroundings and then communicates them to our brains provides an increased depth of understanding of a place.

This is no different to how planning studies already incorporate various governmental statics on demographics and physical health issues, or even how data from environmental studies is applied. The information is available, and in our ever more data-driven society multidisciplinary studies are both more achievable and important.

Utilizing more of the biological and psychological information from psychology on how people interact with urban space, in addition to the sociological factors most planners are familiar with working with, allows the planning profession to make better decisions about our designs and policies.

Ounce of Prevention

Integrating more of the modern biopsychosocial perspective into planning research comes back to the public health strategies of engagement, education, and prevention. Poor mental health is no different than poor physical health in many ways, one of which is it is far better to work to prevent illness developing in the first place than it is to treat it once it has already arrived.

Many things contribute to someone developing a mental illness. Major negative life events, addiction issues, individual personalities, or a genetic component can all affect whether someone develops from a state of poor mental health into having a mental illness (CDC, 2018). When wellbeing is studied and a population shows high stress levels, low feelings of life satisfaction, infrequent days where they felt calm and content, and low levels of days where they feel energetic, that population is showing poor public mental health rates. When

there are high levels of poor public mental health in a population, the rates of mental illness also increase.

All of these things are considered *risk factors*, from addiction issues and genetics to high stress levels and low contentment. The term risk factor originates with the field of epidemiology but can be explained as a factor that when present carries a likely risk of unfavorable health outcomes (Straub, 2014).

Many of these particular risk factors overlap. Crowding can increase stress and stress can cause people to self-isolate. Poor sleep increases stress and makes us less adaptable to changes in the amounts of people around us.

Avoiding common risk factors is considered an important part of primary prevention, the first step in avoiding illness. Poor mental health does not have to develop further into mental illness. Prevention is the better option over human suffering and the expense and hassle of treatment.

Figure 9 - Infographic showing relationships between psychological risk factors and urban environment risk factors

What about when the structure of a city adds its own risks to the public mental health? When

the urban environment itself is creating environmental risk factors for poor mental health, then planning can have a measurable positive impact on the issue by removing them or mitigating their effects on urban spaces.

The following analysis examines three of the risk factors often associated with negative impacts of an urban lifestyle in greater depth: chronic stress, poor sleep, and the balance between crowding and isolation. Their effects on the body will be examined through the biopsychosocial perspective and how the urban environment contributes to their frequency and severity will be introduced for further discussion.

Stress

Some amount of stress is a normal part of daily life, but everyone is familiar with the concept of being stressed out. Many times a person is able to quickly point out what is weighing on them. For others the stress seems everywhere.

Figure 10 - Stressed individual with head in hands. Stock photo courtesy of Pexels.

When the stress can be identified this is generally an acute stress, meaning stress resulting from specific events or situations such the sensation of being put on the spot (CSHS, n.d.).

Psychology discusses stress in terms of stressors, an event or situation the triggers coping adjustments in a person, and stress as the processes by which we perceive and respond to these events as threatening, challenging, or overwhelming (Straub, 2014, pg. 108).

Stress is considered 'chronic' when the feeling of high stress is long-term and seems inescapable. When a population self-reports high levels of daily stress or chronic stress the quality of a community suffers.

Problems with Stress

It's important to remember that not all stress is bad. While people who are discussing their stress level are usually referring to negative life events, some stressors can be strong motivators or can raise our levels of alertness in a tense situation. It can add energy to a stage performance or give our immune system a boost. This useful stress is sometimes referred to as eustress (Straub, 2014, pg. 129).

While situations with high acute stress can be unpleasant, more lengthy or chronic stress can quickly turn into a health problem. It leads to poor resilience to a sudden negative life event and a generally higher level of irritability. The ability to focus is lessened. It takes more and more effort to deal with the stressful situation. Physically, exhaustion sets in. Problems sleeping appear. Appetite changes. There is never enough respite from the elevated levels of stress hormones for the body to recover. When this point is reached, this cumulative effect is known as allostatic load (or allostasis), the long-term toll of a stress load on the human body (Straub, 2014, pg. 139).

High stress levels over time can directly lead to a variety of physical health problems. High stress contributes to inflammation, to chronic pain, and to high blood pressure. Stress also indirectly lowers the functioning of the immune system due to maladaptive behaviors to cope, like skipping sleep or drinking more alcohol.

Physically, when faced with a stressful situation, the brain releases hormones such as adrenaline and cortisol into the body to help it cope. In brief periods, this can make us more alert. Over long periods of time, high levels of these hormones cause the immune system to weaken and the body to produce more of the stress hormones to get the same heightened response (Straub, 2014, pg. 131).

These stress hormone levels can be physically measured, but signs of high stress levels in our society are everywhere. In a summarization of various kinds of wellbeing surveys by the CDC, the 2005 Behavioral Risk Factor Surveillance System, a type of self-report survey, found that "5.6% of US adults reported that they were dissatisfied/very dissatisfied with their lives" (CDC HRQOL, 2018). This small percentage translates into around 12 million people.

Stress in our Cities

Managing stress levels is an important part of maintaining mental wellbeing. Our level of stress is affected by our surroundings, whether increased by a lengthy commute or lowered by a lunchbreak in a tree-shaded plaza.

The urban environment exposes us to the stressors of noise, crowds, bright lights, and traffic. Living with these additional stressors of city life requires additional coping behaviors to ameliorate their affects.

General stress levels can be reduced by quality sleep, positive social interaction, or by spending time in quiet spaces with low activity levels. In contemporary cities, many people can only achieve this inside their own dwellings with the doors and windows closed tight, and sometimes not even then.

Lack of access to parks and other green spaces is a problem for physical health, but it also removes one of the best ways to lower stress. Spending time outside or among nature is one of the first recommendations for improving mental wellbeing. Physical activity of both low intensity like a stroll outside or high intensity like a run through the neighborhood further reduces stress. If there is nowhere available for a pleasant walk, then people will only walk when they absolutely have to. This is no longer a stress-reducing experience.

When the spaces and activities we need to address our stress levels are not available, the urban environment becomes its own stressor. Living in the city by

itself becomes a risk factor, one the population is now constantly required to compensate for just for living in it.

The goal is not to create a stress-free, surprise free existence, but to more consistently and efficiently provide urban design that helps passively alleviate urban stressors and that also makes it easier for the population to individually manage their stress level.

This can be accomplished by items like street greening or by sheltered places to sit in public spaces. These are not new tasks for urban planning, but with additional biopsychosocial knowledge of how humans perceive their urban environment, planning can do more to make sure these items meet fundamental human needs.

Sleep

Everyone needs sleep. A good night's sleep can fix any numbers of ills, and mental wellbeing is frequently one of them. But, what a good night's sleep really is and if we are actually getting one or not can

Figure 11 - A bedroom with light coming inside. Stock photo courtesy of Unsplash.

be more complicated. There is more to quality sleep than 8 hours of perceived unconsciousness.

For the purposes of study and communication, sleep is generally divided into four stages. Stage 1 is also commonly known as REM (rapid eye movement) sleep. Stage 1 is the stage in which many people can recall their dreams and when dreams tend to be more detailed. Stages 2, 3, and 4 are grouped as NREM or non-REM sleep. Stages 3 and 4 are grouped as slow-wave sleep due to

the patterns of brain activity present in those stages (Pinel, 2014, pg. 345). This brain activity is generally measured with an EEG (electroencephalogram).

Getting ones' 8 hours of sleep is frequently discussed, but where that number comes from and what it means for health is less clear. The CDC recommends no less than 7 hours of sleep for adult humans to avoid negative health effects (CDC, 2019). These are frequently recommended numbers, but a longitudinal study performed by Japan and America found no negative physical effects in those who regularly slept between 5 to 8 hours a night. Those adults sleeping more than 8 hours frequently had existing health problems. Those regularly sleeping less than five hours showed an increase in health problems over time (Pinel, 2014, pg. 364).

Problems with Sleep

Around 70 million people in America struggle with some kind of sleep disorder. Insomnia is the most common (CDC, 2017). Most sleep problems are acute, meaning temporary due to an identifiable factor. This accounts for 30% of sleep complaints among adults. Chronic insomnia effects around 10%. Those in areas with higher levels of artificial light have been shown to use more sleeping pills, especially among the elderly (Sandoiu, 2018).

Long-term lack of sleep has many of the same negative effects on the body as chronic stress. If we combine a high stress load with the inability to sleep, the allostatic load increases rapidly.

Even if we can doze off just fine at night, the quality and duration of the sleep we are getting matters just as much. Quality sleep lowers stress, improves alertness, and speeds physical wound healing (Straub, 2014, pg. 138). It affects memory formation, improves resilience, and even lowers self-reported feelings of isolation.

Sleep in our Cities

In today's cities, we are exposed to more light at night than in rural areas or previous centuries and with smart phones and laptops and tablets, discussion of too much harsh light in our faces before sleeping has become common.

But even while some go so far as to install filters on their devices to 'warm' the spectrum of light, discussing what kinds of light are shining in people's faces from outside and why gains little traction.

But this bright light from outside does negatively affect both our safety and our ability to get quality sleep. This is due to how the human eye interprets light and communicates that information to our brains.

There are two types of photoreceptors and currently one type of ganglion cell in the human eyes involved in seeing light. Rods and cones are the photoreceptors in the back of the eye for most mammals active during both day and night. Rods provide our scotopic vision, or night vision. Rods are more sensitive to visual input in low levels of light, but do not perceive color as well as cones. Cone receptors are our photopic vision, which provides highly detailed color vision in bright spaces (Pinel, 2014, pg. 137). Understanding how human night vision and daylight vision see colors differently and function in different levels of brightness is important to understanding the limits of a human's ability to rapidly switch between them.

The third part of the eye involved in light perception is a type of retinal ganglion cell that only perceives blue light (Lok, 2011). Retinal ganglion cells form the optic nerve (Pinel, 2014). This cell may play an important role in communicating brightness to the brain and to regulating our circadian rhythms.

When we sleep and get drowsy is set by our circadian rhythm, essentially an internal hormonal clock (Straub, 2014). Our circadian rhythms are set and altered by the visual input of light, which can delay the beginning of a sleep

cycle (Skene & Arendt, 2006). Once we are asleep, the effects of light exposure continue, through the light falling against our closed eyes. Through EEG monitoring, we know artificial light causes changes mainly in stages 3 and 4 of our sleep (Pinel, 2014, pg. 351).

Discussions of outdoor lighting in cities are usually centered around navigation or security but leave out the design guidance that can be provided through a better understanding of the biology of the human eye. How the lights might affect sleeping or even how exposure to a starry night is another way to reduce stress louds is rarely part of the discussion in urban lighting design.

Planning can do much more with outdoor lighting in cities by applying the additional biopsychosocial knowledge of how humans perceive their urban environment to its design.

Isolation & Crowding

Humans at a basic level are just another kind of fuzzy herd animal. This is not the way most of us usually picture ourselves, but when it comes to our social-spatial needs it remains very true. Whether someone is an 'introvert' or 'extrovert' in their every-day personality, there is a goldilocks zone of social exposure and alone time that each person needs to be healthy and happy.

There is little chance any urban environment is ever built that allows each person to customize their daily social experience and exposure to perfectly suit them, but if there's little opportunity for social encounters in a community or no place to achieve a sense of solitude within a city then it becomes increasingly difficult for people to meet their social needs.

Isolation in Cities

Crowding was the focus throughout much of the late 19th and early 20th centuries as far as public health and planning efforts. Overcrowded tenements

linger in both profession's memories, but isolation is another significant risk factor. Humans are social animals. Our species did not develop to live in isolation.

Figure 12 - Person sitting alone overlooking city. Stock photo courtesy of Unsplash.

The lifestyle in many contemporary American cities has us live far apart from our preferred social spaces, travel to work alone, work in spaces that often severely limit the number and types of people we interact with, and then do this over and over again for decades.

Throughout the novel *Happy Cities - Transforming Our Lives Through Urban Design* by Charles Montgomery, an outer suburb populated by super-commuters is returned to repeatedly as a case study. This suburb has new houses and clean streets and debilitating social problems. Many of these problems stem from the community's isolation from anything around them and from each other. No one knows their neighbors. Feelings of suspicion, distrust, and of being under threat increase quickly in this environment (Montgomery, 2013, pg. 53).

This loneliness can be described as situational, dependent upon the environment surrounding the individual, according to the article "Relationship Between Loneliness, Psychiatric Disorders and Physical Health? A Review on the Psychological Aspects of Loneliness" (Mushtaq, Shoib, Shah, & Mushtaq, 2014).

Levels of self-reported loneliness are an important indicator of overall social wellbeing for individuals and populations (Mushtaq et all, 2014). More people self-report feeling chronically lonely today than they did even 20 years ago

(Entis, 2016). When loneliness is chronic it puts the body into a state of high-threat. This triggers the same response by the nervous system as severe stress.

Loneliness is often divided into internal and external types, internal being something like a maladaptive personality and external being something like a recent move. This is similar to stress where the issue can be acute or chronic. When loneliness is external, it is easier to intervene (Mushtaq et all, 2014).

Not only does isolation raise our stress and lower our resilience to new problems, it raises levels of physical inactivity, increasing the overall detriment to our mental and physical health (Josey, 2018).

Empty, inactive public spaces can increase this sensation of isolation. Gehl noted in *Cities for People* the importance of a, "perception of liveliness and good use. If space is empty of people most of the time it feels like something must be wrong, like maybe we shouldn't be there" (Gehl, 2010, pg. 63).

These factors affect our perception of having "invisible support", the belief that those in our community care about our well-being and would step in to help us if needed (Straub, 2014, pg. 183).

Crowding in Cities

While loneliness is the more acute risk factor for the 21st century when compared to the 20th, crowding is still an important issue in urbanized places.

There is the crowding that takes place in areas said to have hyperdensity. In many ways, hyperdensity is a cultural issue, with many cultures having a different 'personal space bubble' required for comfort. This makes it difficult to find one accurate population density measurement for the threshold for hyperdensity.

Figure 13 - An American subway station. Stock photo courtesy of Unsplash.

That discussion continues around the world. There is also the crowding when poverty or other factors limits choices in housing, when individuals have to have five roommates when they'd prefer two or when they simply cannot avoid something like seeing straight into their neighbors' houses.

The breaking point between functioning density and unpleasant crowding is usually the opportunity for choice and retreat. The article "The urban animal: population density and social pathology in rodents and humans" explains this issue as the, "distinction between "density" as a physical measure and "crowding" as a subjective response" (Ramsden, 2009).

What often gets missed in planning's discussions of overcrowding is psychology defines crowding as the human *perception* of not having enough space to live the way they'd like to, not as a hard number or specific population density (Straub, 2014, pg. 116). We can live completely alone and still feel the crowd closing in if we cannot get away from the sounds of our neighbors or the traffic outside. Crowding in the 21st century is often less a matter of too many people in too small a space and more about people who are trapped living with the sensation of never successfully being able to feel alone and undisturbed.

Unlike the rats in the infamous Rats of NIMH experiment, published by John Calhoun in *Scientific American* in 1962, where rats were enclosed in a 'rat paradise' and then allowed to breed until overcrowding lead to profound devastation, humans have the higher-level cognition to make adjustments to our environments and our own social exposure - to a point (Ramsden, 2009). If

we can retreat to a space and feel we have privacy, feel alone indoors or outdoors than the negative effects of overcrowding are minimized. If a crowded space allows somewhere to retreat from the bustle for a few minutes, even if we are not alone, some valuable reprieve can be achieved.

This is succinctly phrased in *Happy Cities* as, "We tolerate other people more when we know we can escape them" (Montgomery, 2013, pg. 127). Planning has always worked to ensure people in cities have a safe amount of space, but this has usually skewed towards crowding over isolation.

In regards to both issues, the author of The Social Life of Small Urban Spaces states, "There is a rash of studies underway designed to uncover the bad consequences of overcrowding. This is all very well as far as it goes, but it only goes in one direction. What about undercrowding? The researchers would be a lot more objective if they paid as much attention to the possible effects on people of relative isolation and lack of propinquity. Maybe some of those rats they study get lonely too" (Whyte, 1980).

The problems involved in crowding and isolation involve similar social systems, and with additional biopsychosocial knowledge of how humans perceive their urban environment, planning can do more to make sure people can make the choices they need to be comfortable in their urban spaces.

In Summation

These risk factors and others in the urban environments we build can quickly pile up until it becomes too much for most of a population to compensate for. An individual's usual methods to de-stress are no longer sufficient for the problem being faced.

When someone cannot reduce their allostatic load, risk of illness increases and the chance of a long lifespan decreases. Physical health deteriorates. Professional burnout becomes more likely.

Exercise, time outside, and socializing help lighten the load. But for people who are stressed, exhausted, and struggling with other health or social problems, pursuing these health benefits becomes just another task on the overwhelming list (Frakt & Benavidez, 2019).

Ensuring there's a reasonable distance for everyone to reach a park or community center are active benefits. The individual still has to decide to go to these amenities and use them.

The allostatic load of individuals in a population can be increased by passive exposure to the urban environment. There are changes that can be made in how we design that urban environment that can *decrease* it passively as well.

Providing opportunities for people to linger comfortably in commercial and social spaces, creating greener streets, and choosing healthier lighting require no activity from people to benefit from them. These are passive benefits, and when people are struggling, they are much more achievable and more equitable (Frakt & Benavidez, 2019).

If parts of the previous three subsections seemed to overlap, they were meant to. Many of the negative physical effects of these particular mental health risk factors are exactly the same. All of them contribute to each other and the overall load. The effects that urban design meant to mitigate them would have would be similar as well.

Many kinds of urban planning and urban design cannot directly intervene in many of the issues that play a major role in the poor mental health levels of certain populations. Better urban design choices will not correct the economic or social systems that lead to poverty and the negative health effects poverty causes. Healthier planning will not cure mental illnesses. If that is the goal conceptualized behind these interventions and their research, then they will always seem a complete failure.

This utopian overreach in the scope of what planning can accomplish for public mental health was one of the critiques behind Herbert Gans' concept of physical determinism, a term often brought up when planning discusses the potential effects of urban design on the human mind.

Physical design cannot on its own correct or control human behavior. However, through designs and policies backed by the biopsychosocial data from other professions, urban planning can better assist in reducing poor mental health rates through the mitigation of urban environmental risk factors.

Figure 14 - NAMI infographic on the global impact of mental illness.

There is a place for urban planning in prevention efforts for poor mental health in a population and the resulting high rates of mental illness. In addition to the urban environments' effects on our stress levels, sleep, and social lives, we know living in a city long term and especially growing up in one currently changes how our brain's amygdala reacts to stressors. The amygdala structure plays a significant role in the human fear response. In those from cities it responds to a 'threat' much more quickly and erratically than those from rural areas (Benedictus, 2014).

As seen in Figure 14, the impact and human cost of mental illness around the world is very high (NAMI, 2017). If there are changes we can make in the urban environment now or in the future that can lower the load for urban living, then

contemporary physical planning has an additional contribution to make to public health endeavors.

The Urban Environment We Build

With a better understanding of the biology of public mental health and how our physical health is affected by our psychosocial health, we can now reexamine several common planning topics through a slightly different lens.

The three planning topics that have been chosen for discussion and analysis against the biopsychosocial perspective of risk mitigation for poor mental health are outdoor lighting, green space, and the built forms that make up our urban environment.

Figure 15 - A 'porch swing' bench in a Farmers Branch, TX linear park.

Planning discusses walkability for healthier cities, we discuss outdoor spaces to get people moving and socializing for community health. Aesthetic standards are another frequent planning topic. Whether these things have been implemented successfully or not, they are being talked about. This section looks through the literature on these familiar planning items but with the focus instead on how they affect public mental health over physical health or community engagement.

This is not a new conversation in planning, just an infrequent one. In *Environmental Aesthetics*, a collection of articles edited by Jack Nasar, the article, "Towards theory generation in landscape aesthetics," by Fahriye Hazer Sancar proposed using a new concept of the 'psychophyscial' approach for

aesthetic planning (Sancar, 1998). They proposed using broad feedback from the population to collect information on which aesthetic preferences were most crucial and most universal to guide aesthetic planning decisions, thus making aesthetic planning decisions "defensible" by data (Sancar, 1998).

While the term never became widely used, it does offer a precedent for the use of human psychology in planning to guide design decisions. With the amount of biologically verifiable psychological data available, this type of undertaking might be more practical today.

The Green Around Us

How green space is defined varies and defining the intent behind the term for research or in policy documents to eliminate miscommunication is often overlooked (Taylor & Hochuli, 2017). Some definitions consider anything with grass greenspace, whether it is accessible to people and animals or not. Some consider green space and parks synonymous. Two of the most common ways to define greenspace are as a genuine natural area or as specifically urban vegetation (Taylor & Hochuli, 2017).

The definition of greenspace chosen for this research and the survey sent out was, "public green space as freely accessible areas that include natural vegetation such as grass, plants or trees." While private yards and private neighborhood parks provide exposure to green for some, others depend on more public green spaces. This includes spaces like city managed parks or the courtyards common with multifamily housing.

When there is no other greenspace nearby, these courtyards are the main area for time to be spent outdoors. When they are hardscaped instead of green, it changes usership and has measurable behavioral effects on residents. In the book *Happy Cities* by Charles Montgomery, the hardscaped courtyards of a low-rise housing project in Chicago were barren of people while the ragged green courtyards were well used by many groups throughout many times of day

and night (Montgomery, 2013, pg. 109). After further research within the community, it was revealed that those with views of the paved courtyards had higher levels of mental fatigue, were more likely to lose their temper, and lacked the sense of social support felt by those around the greener spaces (Montgomery, 2013, pg. 110). This continues to have implications for the site design of low-income housing, garden apartments, and the "Texas Donut" wrapped apartments that are becoming so pervasive.

Another layer to green space access is exposure to green outside the home neighborhood, in the places we are commuting, working, ducking out for lunch, or meeting friends. If there is green in the residential neighborhood but not a single street tree near the transit stop or around the workplace, then hours of many individuals' days are spent without green exposure.

Figure 16 - The boardwalk in a park in Richardson, Texas.

Green spaces in areas with multiple land uses nearby also frequently see more users. In Jane Jacobs' work The Death and Life of Great American Cities she details the daily life cycle of a public park that sees constant use by different user groups all throughout the day due to their being offices, shops, and residences nearby. Users include "early-bird walkers", commuters both into and out from the area, "errand-goers" of whom some linger, workers on their lunch break, parents with small children, "young people on dates" going for a walk after dining out, and "old people with time on their hands" (Jacobs, 1961, pg. 96).
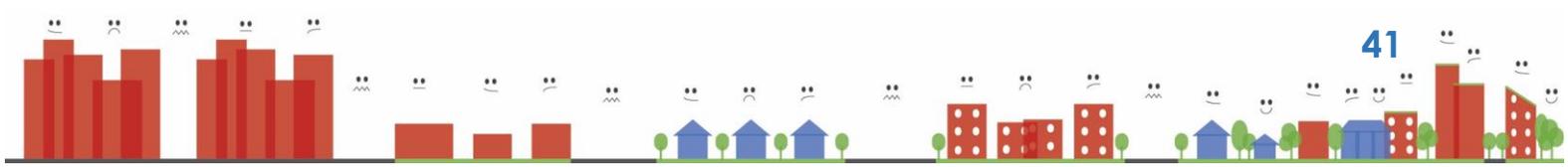
In *Environmental Aesthetics*, the article "Planning concerns relating to urban nature settings: the role of size and other physical features," written by Janet F. Talbot examines residential preferences for green spaces in their area. She makes the assertion that the size of the public green space and even of private yards is of less importance than had been previously assumed in the planning and landscape architecture professions (Talbot, 1988).

By examining three common places city residents are exposed to natural settings - well-established urban neighborhoods, (then) contemporary apartment complexes, and public open spaces - Talbot determined that factors such as presence of trees, paths, and places to sit outdoors that offered a sense of privacy were far preferred by residents regardless of the size of the area that offered them. In fact, areas with these features were frequently described as "spacious" while areas bordered by visible fences or that were mostly open lawn were considered "smaller" (Talbot, 1988).

This identified disconnect in preference self-reporting offers valuable insight for professionals designing outdoor spaces, writing design standards for them, or evaluating land for future use. If spacious is often substituted for pleasant and small for unpleasant when community opinions are being gathered, then planners may not be getting accurate feedback on spaces that would provide the most enjoyment and use for city residents.

The characteristics, placement, and diversity of potential user group all have effects on the success of urban green spaces. This Richardson, Texas park shown in Figure 16 is not small, but it is bracketed by busy roads on three sides. From within the park you would never feel you were in a city. The boardwalk path allows people access into this un-manicured space without disturbing the ecosystem. Shops, residences, offices and a DART station are all in walking distance, yet it provides the experience of being immersed in nature while within the DFW metro.

Effects on the Public Mental Health

Exposure to nature is one of the most common recommendations for lowering stress and improving overall mental well-being (Hunter, Gillespie, & Chen, 2019)

From studies in biological psychology, we know time with the sight of green lowers the cortisol levels in the body, one of the stress hormones that plays a role in allostatic overload (Twohig-Bennett, 2018). Average heartrate also tends to lower with green exposure. Individuals' mood and ability to focus on tasks is improved for several hours after time spent in green spaces (Bakolis, I., Hammoud, R., Smythe, M., et all, 2018).

Whether the individual has a strong preference for the manicured green shown from Farmers Branch in Figure 15, the natural space in Richardson from Figure 16, or the space somewhere in-between from downtown Arlington's green infrastructure shown in Figure 17 may affect the effects on mood slightly, but just beholding living

Figure 17 - A bench in University Park's green detention area and park.

green things frequently throughout the day creates a biologically measurable positive response.

This is a passive benefit to mental wellbeing. It requires the person to do nothing except look at it for a while. That information of being around living green is being shared with the brain whether the person is focusing on it or not.

The verifiable, biological fact that the human body produces less stress hormones after exposure to green lends a different weight to Timothy Beatley's application of E.O. Wilson's concept of biophilia to cities. The article "Biophilic

Figure 18 - Multimodal Gelnna Goodacre Boulevard in Lubbock, Texas.

Cities" discusses the human need for casual contact with nature in their daily life. A biophilic city would be, "a city full of nature, a place where in the normal course of work and play and life residents feel, see, and experience rich nature - plants, trees, animals" (Beatley, 2011, pg. 181). Not only is this a more ecologically friendly and sustainable vision of a city, this constant passive exposure to natural elements has been verified to have lasting positive effects on physical and mental health.

Supportive Strategies

Everyone likes having enjoyable parks in their cities and neighborhoods, but many poorer neighborhoods lack park access, many older areas of cities lack any tree canopy, and a lot more variety and flexibility is needed in how green space is designed, maintained, and distributed.

However, the most crucial point from this literature is that daily, frequent green exposure should be the first priority in greening cities. Being able to see green outside the workplace, or while waiting for a light to change or at a bus stop increases the passive benefit someone can achieve throughout their day.

Street trees are frequently framed as a beautification item only, but more comprehensive requirements for street trees and shrubs in residential and non-residential areas would likely have the most impact. The pedestrian median shown in Figure 18 serves as the only park space in the North Overton neighborhood, but the consistent shade trees throughout the area make it very

pleasant and ensure the residents of the many multifamily and hotel buildings have green in their views.

There are many hardscape-only parks with good design and frequent use, populated by umbrellas for shade, benches, and frequently by colorful play or exercise equipment. When these spaces offer social and physical activity benefits, but no green exposure, they are missing the other passive benefits. With green included, the overall restorative impact of going to the park is increased.

In hardscape areas with ailing street trees or where adding trees would involve planter pits surrounded by hardscape, there are modular products available that can help support a healthy root system below the pavement. In areas that can afford the upfront cost, this is a worthwhile investment. A healthy urban tree canopy is a long-term investment for urban areas that both reduces urban heat island effects, calms traffic, and improves foot traffic to businesses (Bailey & Werle, 2019). Shade trees in a dense urban area have a significant impact on human comfort and mood in the space.

In highly developed urban areas where hardscape is everywhere and space to add green is not, more creative solutions like green walls, roofs, and above-grade planters should be considered as more than just an interesting design feature or gimmick, but as providing essential frequent green exposure.

These are all options to add green to urban spaces when planting street trees is unavailable. A large planter might not be able to support a large tree, but sturdy planters with shrubs can easily double as public seating and as dividers between pedestrians and traffic. Green walls can fit in spaces too narrow for other greening interventions. Green roofs and other elevated green spaces also raise the ambient level of green for a city.

It is also important to remember for green redesigns that not all open space is created equal. When a stubbly patch of turf grass is offered to a community as

a green 'improvement' for their area, it often serves as more of an insult-to-injury situation, a reminder of feeling mislead or their time being wasted (Montgomery, 2013). Greenspaces that become regional attractions, such as the High Line in New York City or other extensive green trail projects often contribute to rapid gentrification (Wolch, Byrne, & Newell, 2014). While those living in the area should have equal access to these amenities, the phasing of their implementation and the City's communication with at-risk neighborhoods needs significant attention (Bailey, Cosima, Kamal, 2019).

If the view from someone's apartment or office transitions from grey hardscape only to a view of some healthily-waving native grasses or tree branches, they might not consciously notice an improvement in mood, but the part of the nervous system regulating their stress hormones based upon what their visual cortex is seeing definitely will.

The Light Around Us

Outdoor nighttime artificial lighting is usually discussed in terms of pedestrian and vehicular safety, designed only for vehicular safety, and not designed for environmental safety at all.

Public lighting began with fire, then gas lamps, then electric bulbs that resembled the decorative filament bulbs popular in interior design right now. When artificial outdoor lighting was that dim, fixtures like the one shown in Figure 19 made sense. That clustering of dim, orange toned bulbs was necessary to achieve lighting goals.

They do not make sense anymore, for either lighting needs or fiscal efficiency. The changes in the technology of outdoor lighting and the research into what is safest for humans, the environment, and communities' rights to not have the natural resource of the night sky stripped from them provides other design guidelines.

Study of Outdoor Night Lighting

All over the country cities are looking into upgrading their aging streetlights with LED systems. LED lights are long-lasting, low maintenance, and generally more energy efficient if used properly.

Most street lighting now is ageing High Pressure Sodium lights, which for a long time were the most efficient and cost-effective option for outdoor lighting. They cast a familiar orange-tinged light. Many of the ones in use have reached the end of their product lifespan. As these bulbs

Figure 19 - Commercial light post in far north Dallas.

and similar products like LPS and Metal Halide age, they light the areas around them less and less efficiently (Kula, 2019).

LED lights do not degrade in output over time in the same way. However, there are several problems with the ongoing conversion to LED lighting in public lighting designs. There are currently several levels on which HPS lights and similar products were safer, but every problem posed by new LEDs can be addressed through more mindful design.

One issue is the color 'temperature' of the LEDs being installed. HPS lights are of a warm yellow spectrum. Many LEDs being sold are given classifications such as warm white (around 3000K), pure white (4000K), or cool light (5000K and frequently higher). The 'temperature' of light is one of the main factors in how lights affect human sleep patterns and nocturnal wildlife. This refers to the light's perceived color, which is determined mainly by the nanometer spectrum of the light.

Daylight from our yellow sun actually has a significant level of blue light in its composition. Red lights affect our night vision and circadian rhythm the very least, but are unsuitable for

Figure 20 - Different light temperatures shown in comparison. Photo courtesy of Dropality.

streetlights and security lights for various reasons. Blue-white outdoor lighting (6000K+) is far more likely to contribute to sleeping problems than warmer amber tones, especially light sources that produce very little blue spectrum light. Pure white lights that most closely resemble daylight are ideal for spaces light art galleries and shops. Even though these 4000K to 6000K light sources may not look very blue, they contain a lot of blue and other shorter nanometer light in their composition. Daylight at night is not recommended.

3000K and below is the most common recommendation for outdoor lighting fixtures when the issues of human sleep safety, light pollution, and ecological preservation are taken into account. Below 3000K is better for most of these issues, 3000K is just the upper limit and its warm white may be more suitable for higher intensity areas at night. For general street, pedestrian, and residential lighting the 2200K to 2800K range is preferred. These are often referred to as amber LEDs.

A question at this point might be how LED lights between 2000K and 3000K are still an improvement for outdoor lighting over older bulbs. LEDs require less maintenance and last longer, but how is the usual yellow-orange light converted to gold or amber LED lights that much of a lighting improvement?

Although at first glance the golden light from these LEDs might look very similar, most LED bulbs are producing a wider spectrum of light than many older kinds of outdoor lighting. This gives them a higher score for color rendering with current CRI standards. Most human eyes will be able to pick up on more coloration of objects with amber LED lighting than with older bulb types like pressurized sodium.

While this wider spectrum in most LEDs can improve visual acuity for humans, even LEDs 3000K and below can have significant negative effects on wildlife and the environment.

Migratory birds, bats, insects, and turtles are all well documented to be

disoriented by lights that resemble daytime sunlight (Gaston, Davis, Bennie, & Hopkins, 2012). Birds collide with brightly lit glass windows in large numbers. Insects crowd around daylight-resembling artificial lights and fireflies cannot communicate. Their

Figure 21 - A hatchling headed inland, from BBC's Planet Earth II

rate of predation increases, and the overall biodiversity is lowered (Owens, Cochard, Durrant, et. al, 2019).

Hatchling turtles with their poor color vision head inland towards the crowd of lights instead of out to sea (BBC Newsround, 2016). Most people don't actually enjoy dead songbirds outside their office or hatchling turtles in the road. Many coastal areas now require "turtle safe" amber lighting and red lights for aviation safety have been required to blink for many years, which helps reduce bird strikes.

In the future, we may have the data to prioritize light colors by native species, but for now narrow spectrum amber LEDs are the most ecologically safe option (Owens, Cochard, Durrant, et. al, 2019). This information is of greatest importance for lighting decisions around nature preserves, migratory paths, and very rural communities where wildlife will be most disturbed by artificial lights.

For most urban and suburban areas, the 3000K and below range is suitable when properly shielded, as long as the increased brightness of LEDs when compared with many older lighting types isn't missed. The broader spectrum of light being produced by most LED streetlights makes them brighter to the human eye, even when brightness output is intended to be the same. For LED lights that are not a diode specially narrowed in output such as narrow-band amber, an LED fixture producing less luminance is needed to replace an older fixture type.

This is because of how light is absorbed and/or reflected by objects. Sunlight contains a spectrum of light wavelengths. In simplified terms, objects humans perceive as specific colors absorb that colors' wavelength and reflect others. When there are more wavelengths present in a light, more light is reflected from most objects. This is why fog lights are traditionally yellow, the light scatters less off of the white fog, avoiding brightening the vapor instead of the road. Shorter wavelengths such as blue and purple scatter more easily.

Over-bright lighting also leads to an increase in glare. Glare difficulty seeing due to either light reflecting off of something or reaching the eye at an angle that isn't wanted. Glare is especially harsh on the eye in otherwise dim lighting conditions, where scotopic or mesopic vision is being used. The rods in the eye that allow night vision are much more sensitive to bright light than our daytime vision (Pinel, 2014).

Figure 22 - Light clutter and glare in multiple light temperatures. Photo courtesy of Richardson at Volt.com.

Glare coming from many angles and sources is a key part of the over-lighting which leads to light clutter. Light clutter is similar to other forms of visual clutter such as is discussed with signage. There are too many lights and light sources for the eye to process efficiently, so many it becomes difficult to identify the item needed, such as the lit sign of a specific business, or to identify where the light is coming from. In Figure 22 it is almost impossible to tell if shop windows are lit or not due to the over-abundance and excessive number of unshielded streetlights. The glare finally reaches the point where everything is daylit, yet nothing actually looks bright anymore.

This process of glare, clutter and then competitive brightening is illustrated throughout many dense cities. South Korea approved a nationwide Light Pollution Prevention Act in 2012 to address the excessive and disruptive brightness in their modern cities. The streets had been brightly lit in the 20th century to support long working hours and nightlife activities, but this was followed by brighter signs, brighter lights for commercial shops, and then even brighter outdoor lighting as the original streetlights now appeared dull amidst the clutter (Cities & Lighting, 2016).

The correct brightness of lights and less variety in the light temperatures reduces clutter, but the fastest way to reduce clutter, lateral glare, and overall light pollution is through proper shielding for light fixtures. The safety of any bulb can be improved through proper shielding. As seen in Figure 23, the shape of a light

fixture and the reflective surfaces near the light source has a significant impact on ensuring light shines only where it's wanted.

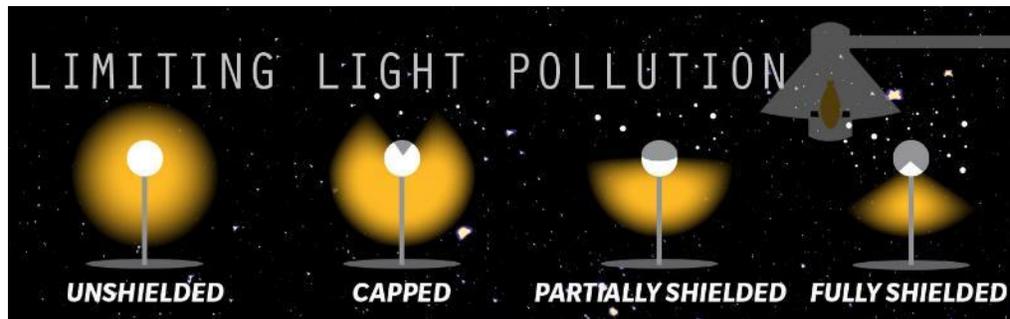Capped light fixtures are frequently assumed to mitigate more upward lighting than

Figure 23 - Typical Fixture Shielding Types. Image courtesy of Community Impact Newspaper.

they actually do. The amount of light actually blocked by this small covering is not enough to create significant improvements. Partially shielded fixtures block much more upward light, but they still allow a lot of lateral glare to travel outwards, potentially in through windows at night.

Many fixtures are being installed every day that are completely unshielded. These are the worst offenders for glare, trespass, and skyglow. 30% of the light being paid for is being shone up into the atmosphere. No lateral glare is being prevented, leading to further inefficiency and lowered safety. At most, 50% of the light being paid for is reaching the street. Often this percentage is much lower. Less powerful bulbs would be needed and a smaller energy bill created with better lighting standards.

Fully shielded fixtures are the best choice whenever possible. These put the light only where needed, keeping it away from windows and the sky. Less powerful bulbs are needed when lighting is directed properly, so up-lighting from pavement is also reduced. The additional restriction of a full-cutoff fixture, which further restricts upwards glare from lighting reflecting off of the fixtures, would be beneficial around areas such as nature preserves or where observatories are active (NLPIP, 2007).
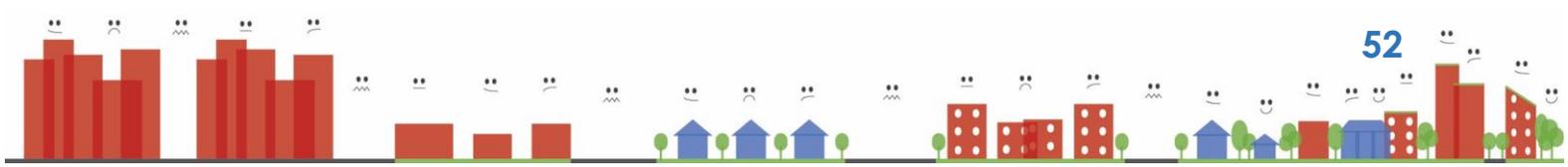
The shape of light fixtures and how they are aimed is one of the main components that leads to light trespass. Light trespass was defined in the article "Light Trespass and Light Pollution - Practical Approaches to Dealing with Problems" as, "Unwanted light which causes annoyance, discomfort, distraction, or a reduction in visibility" (Lewin, 2000). When glare is pouring into our windows from streetlights or neighboring buildings this is light trespass. Increasingly there is movement for light trespass to be treated as a neighborhood nuisance, just like excessive noise (My Neighbor's Lighting, n.d.). This includes the light cast by motion activated security lights when they are set off. Part of being a good neighbor, whether residence or business, is keeping your light on your own property and off neighboring buildings.

Another form of trespass is when this light is shining upwards into the night sky. This creates skyglow and the other things we would most commonly picture when thinking about light pollution, a haze of light around urban areas, orange-glowing clouds, and less than a handful of stars visible to the naked eye.

Not only is light over 3000K harmful for humans and wildlife, it greatly increases the brightness of skyglow due to the greater scattering of shorter-wavelength light colors like blue (Luginbhul, 2014). While this light does not travel as far from cities as the longer wavelengths, it is brighter and harsher to the scotopic night vision most of us would theoretically be using to view the night sky. Much of humanity right now, around 80%, has never truly used their scotopic vision outdoors (Morelle, 2016). The ambient light levels where most live are so high daytime photopic vision or transitional mesopic vision is all that is used.

A common way of interpreting the darkness and quality of a night sky is the Bortle Scale, developed in 2001 by J. Bortle, an experienced amateur astronomer (Bortle, 2001). This scale has nine categories, with 1 being a dark sky area excellent in every way and 9 being the absolute worst, a city sky so bright most can only spot the moon and maybe a planet or two. Most of the DFW

metroplex is a 9 or optimistically an 8. The more suburban cities around the metro struggle to achieve a true class 5 night sky due to DFW's brightness. This situation is the
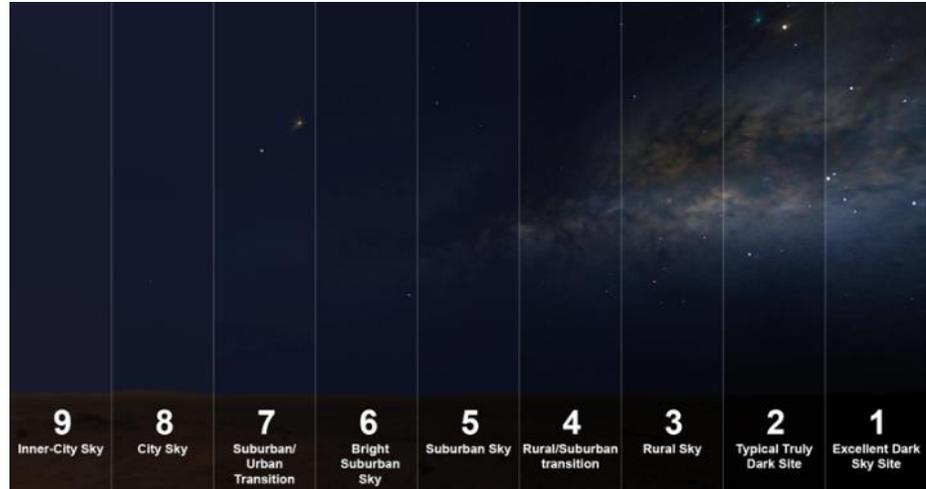

Figure 24 - The Nine Classes of Dark Sky Quality on the Bortle Scale

same with most metro areas such as Houston or Los Angeles.

Since this scale was developed almost two decades ago the light pollution has only gotten dramatically worse. In addition to the nighttime need for healthy sleep, consequences to wildlife, and the navigational safety issues outlined so far outdoor lighting can damage the night. The effects of poor lighting design on observatory locations, on amateur astronomy, and on the once-common pastime of star gazing are destructive. Often light pollution is thought to only affect the latter set of issues, and although the first set of problems are more critical to urban planning, they do not make the other unimportant. Sometimes darker skies are discussed through the grassroots point of view of Right To Night, framing access to a dark night sky as the same sort of right as access to air and water.

A more widespread understanding of these lighting design issues and their mental and physical effects is needed among urban planners. Most critically, in urban design and municipal policies most of lighting design remains an afterthought. Pole height and spacing is often the whole of the discussion, unless the historical aesthetics of a light post is brought up. Most cities do not have engineers on staff trained in lighting design. Even major street lighting projects

are often undertaken without the involvement of a lighting engineer or urban planner trained in lighting design (Volt, n.d.). For this period of rapid change in lighting technology, this business-as-usual approach has already led to problems in cities.

There is little doubt LED outdoor lighting will be the standard for many years to come, but public lighting is an expensive investment, with the LED light expected to last a very long time with little maintenance. It is crucial that the best decision is made up front, so cities can avoid an expensive redo of their brand new lights as has happened in New York City (Volt, n.d.). A one-to-one replacement of older lights with LEDs leads to upset in communities when their night turns into the awning of a gas station. Due to the lack of research beforehand or community input collected, New York City had to pause implementation, do additional research, and replace many brand-new bulbs. (Volt, n.d.).

Figure 25 - Backyard security light, unshielded.

There are many reasons to avoid this large-scale brightening taking place during many LED conversions. Most of these poor lighting decisions are being done out of genuine lack of knowledge of lighting design standards, a problem solved through more widespread education efforts of homeowners, engineers, and planners. Another reason stems from assumptions about safety and fear of the dark. This is often the source of pushback against improved lighting standards and was the common concern when Dripping Springs changed their policies.

But over-lighting is a documented security hazard. Bright lights are frequently said to be necessary as a crime deterrent, but FBI crime studies do not back up this claim. Lights left on 24/7 while people are

Figure 26 - Backyard security light, shielded.

away do not deter burglary and the majority of home burglaries actually take place during daylight. Even for commercial areas, there remains a greater number of daytime burglaries than those at night, though it is not by as large a margin as home invasions (FBI Statistics, 2014).

When burglars need flashlights to see anything, they are far easier to spot than if the area has been conveniently daylit for them. When the glare is in everyone's eyes, it no longer gives the homeowner any advantage.

This is well illustrated by the set of two backyard images shown in Figure 25 and 26. The light fixture and bulb are unshielded and very bright, causing lateral glare (US DOE, 2013). Only when the light source is shielded does the potential problem at the back gate become visible.

Evenly distributed, reasonably dim lighting in a warm color range and shielded so it only lights the areas intended to be lit is always going to be safer.

Effects on the Public Mental Health

The effects of poor sleep on overall health and of light exposure upon sleep have the benefit of being much more easily verifiable by the biology and psychology fields than other problems with the urban environment, which often depend entirely on self-report. In addition to survey methods, how artificial

slighting affects the human sleep cycle can be studied in various ways in laboratory settings.

An article, "Effect of color temperature of light sources on slow-wave sleep.", published in the *Journal of Physiological Anthropology and Applied Human Science* in 2005 documents a study monitoring different types of light exposure during sleep in a laboratory setting. The results of this study show that higher light temperatures effect a change on our experience of stage four sleep, the last portion of our sleep cycle (Kozaki, Kitamura, Higashihara, Ishibashi, Noguchi, et al, 2005).

It is important to note again that 'higher' in this case does not mean warmer light, but cooler light due to the wave forms of different light spectrums. Cooler light temperatures are often 4000 Kelvin or higher. Lower, warmer light spectrums did not show the same effects of sleep disruption. This is generally those numbers below 3000K.

Another article, "Missing the Dark: Health Effects of Light Pollution, by Ron Chepesiuk in the journal *Environmental Health Perspectives* provides a detailed overview of how the advent of artificial light has affected society. The study describes information gained through anthropological study about human sleep patterns prior to the industrial revolution. Without easy access to artificial light, many humans have traditionally slept in two three-to-four hour shifts, often referred to in letters and manuscripts that have been studied as 'first sleep' and 'second sleep'. In between these shifts people would wake up for one to three hours and take part in quiet activities. Today there is significant pressure to only sleep in one shift.

Exposure of light to our eyes affects our brain's interpretation of night and day. This frequently leads to sleeping problems when the exposure happens late at night (Chepesiuk, 2009). Changes to our bodily circadian clock do not only affect sleeping, but also our neuroendocrine cycles that regulate our mood,

storage of body fat, and risk of cancer (Chepesiuk, 2009). For example, the risk of cancer is known to be higher in shift workers. Light pollution is thought to be expanding this health risk to many more people.

A study published recently in the journal *Sleep*, "Artificial Outdoor Nighttime Lights Associate with Altered Sleep Behavior in the American General Population", has been able to offer some very succinct results about artificial light exposure and sleep health. Over 16,000 people were surveyed about their sleep habits and levels of satisfaction with their sleep. This information was then compared to the respondent's geolocation, where the brightness at night was measured by satellite.

The study stated that, "Living in areas with greater Outdoor Night Lighting (ONL) was associated with delayed bedtime and wake up time, shorter sleep duration, and increased daytime sleepiness. Living in areas with greater ONL also increased the dissatisfaction with sleep quantity and quality and the likelihood of having a diagnostic profile congruent with a circadian rhythm disorder" (Ohayon & Milesi, 2016).

As part of their conclusions the article states, "Although they improve the overall safety of people and traffic, nighttime lights in our streets and cities are clearly linked with modifications in human sleep behaviors and also impinge on the daytime functioning of individuals living in areas with greater ONL" (Ohayon & Milesi, 2016). The magnitude of this particular study makes denying that outdoor artificial lighting levels can negatively affect human sleep difficult.

We know from the previous section that sleep helps maintain our alertness, lower our stress, and helps the physical body repair itself. Without this necessary maintenance, we are more vulnerable to chronic diseases like cancer. Urban lighting practices must be altered for human safety. Currently they are not serving us as well as we might have thought.

Supportive Strategies

Unlike greenspace or human preferences for engaging with urban forms, there is little traditional planning literature for urban lighting to be found. Up until the last few decades, options for bulbs have been limited. Now for many planners, there are more lighting options than we are sure what to do with or what to recommend to our clients.

Figure 27 - A fully shielded, amber streetlight. Courtesy of Volt.

There are four main items that need to be addressed for healthier and safer outdoor lighting:

- Light Temperature (or color)
- The brightness (generally in foot-candles)
- How the light is shielded
- The evenness of the light level in a space

The temperature of the light spectrum being produced is crucial for health, the environment, and for the night sky. Having the lighting brightness within the correct range is better for light pollution, safety, and energy costs. Ensuring lighting elements are shielded properly is safer for sleeping, for traffic, and for pedestrians. Even lighting is a light level that is consistent throughout an area, both in light color, brightness, and distribution. The variety is hard for the human eye to process at night, and quick changes in light level ask the eye to adjust faster than it evolved to.

If all four of these items cannot be repaired in a city's lighting all at once, pursuing one or two is far better than none. If there are cool-white bulbs that cannot be replaced, fully shielding them can made a significant improvement until they can be swapped. If there are completely unshielded fixtures in a

historical area that cannot be changed, making sure the light source inside them is in the low 2000K temperature range and of lower brightness would still create healthier lighting for sleeping and the night sky.

The light fixture shown in Figure 27 shows an improvement of concept to the traditional 'cobra-head' light seen all over Texas. This light fixture has the bulb fully shielded inside the structure of the fixture. The light is only shining on the road. The bulb is one of the kinds of amber LEDs available. It is less harsh on night vision, has better color rendering than HPS, and is safer for human sleep and the environment. With proper pole height and spacing to meet national lighting standards for brightness, this should provide an evenly lit street with minimal light pollution.

Figure 28 - Photomanipulation of the unseen night sky over Austin's skyline courtesy of Sergio Garcia Rill.

Once the difference in design is seen and understood it is difficult to stop seeing. City codes need to be updated. Urban design professionals need to be better informed. This is not an aesthetics issue or a star-gazers problem. This is an environmental and human safety issue.

Of the three urban environmental mental health risk factors being focused on in this research, lighting is currently going through the most changes. There is an opportunity here for planning to be proactive in updating design standards and lighting policies ahead of LED conversion. This mitigation of how lighting causes poor sleep, raises stress, and the subsequent lower sociability of exhausted

people towards their neighbors could be where planning is currently able to have the most immediate impact on the public mental health.

The Form Around Us

The urban form is made up of buildings & streets, grey & green infrastructure, seating, play equipment, transit lines,

Figure 29 - An example of safe lighting for a high pedestrian area, dim and uncluttered. Courtesy of DOE.

warehouses & homes. Anything we build becomes part of this wide and incredibly varied urban fabric.

All too often discussions of urban form become reduced to the aesthetics of traditional buildings over others, façade standards for how much of one type of siding over another, for roof pitches that have nothing to do with the needs of our climate. Discussion surrounding the fabric of our cities quickly devolves into a matter of subjective taste. But urban forms are rarely just for observing. They are for humans to use.

The human factor of the built environment is how we behave around urban forms, how we react to different spaces. The experience of a space can affect our moods, make us linger or move on quickly. If the human factors of the unique ways people are likely to use an urban form get missed, the space cannot fully serve our social needs or physical comfort. Poor design for the reality of people leads to low usership and spaces that do not serve us on a psychological level.

Study of Urban Form

Life Between Buildings by Jan Gehl is one of the fundamental academic works in the urban planning field in regard to how people interact with their space. The activities of human life are divided into three categories – necessary activities, optional activities, and resultant activities (Gehl, 1980, p. 13). In Figure 30, necessary activities are those required by everyday life, such as getting groceries or going to work. Optional activities are actions that can be pursued if someone wants to, like taking a more scenic walk than needed or sitting outside to work. Social activities (previously resultant activities) are those social encounters that can only take place if there are plentiful optional activities already in a space.

These types of activities can be used to compare the quality of different public spaces by examining the amount of each activity taking place in the space. Optional and social activities often result from another pretext. Someone goes out to

Figure 30 - Gehl's observations of humans using spaces from Cities for People.

run a quick errand, but instead lingers near an outdoor café patio. Someone walks to fetch their mail and ends up catching up with a neighbor (Gehl 1980, pg. 119).

Jane Jacobs, observer of street life and author of the popular work The Death and Life of Great American Cities stated, "The trust of a city street is formed over time from many, many little public sidewalk contacts... Most of it is ostensibly trivial but the sum is not trivial at all" (Jacobs, 1961).

Poor spaces, those that are unfriendly to human needs, are shown to be lower in all these activities while quality spaces have a far higher rate of optional and resultant activities (Gehl, 1980). If the scale makes it impossible to run into others or there is nowhere to go on pretext of doing something else, overall activity is reduced in a community. Gehl refers to this concept as "nothing happens because nothing happens" (Gehl, 1980, pg. 77).

One component of quality in form for human behavior is the ability to linger. Both Gehl and the author William H. Whyte undertook observation studies and developed detailed descriptions of sitting and leaning behaviors by various groups in public spaces.

Fixed seating is the traditional concept of public seating; a bench fastened into place in a park or plaza made of a wide variety of materials. Even the outdoor porch swing from Figure 15 is an example of fixed seating. But the availability of a bench is not enough to ensure it is used. When benches are placed as decorative objects throughout a space, they do not serve their intended purpose well. Fixed seating like this often has multiple benches in liner rows or placed far apart to line pathways or accompany planting areas. It is difficult for a group of friends or family to make use of these. Most people prefer to see each other when speaking in person and talking loudly across a pathway is unpleasant (Gehl, 2010).

Moveable seating for public spaces is frequently made up of small tables and chairs, usually metal, that can be relocated, grouped, or placed in an opportune patch of shade throughout the space. Moveable seating allows people to adapt to the local microclimate, sitting in sun on cold days and shade in summer (Gehl, 2010). It also increases the ability of people to adapt their social experience. Chairs can be moved over by benches if needed. Tables can be grouped closely. Where it is difficult to enjoy a quiet lunch alone

at a picnic table with six fixed seats without inconveniencing others, it is much easier to tug a table and chair into a quiet spot.

Actual public seating is far from the complete picture of urban sitting habits. Beyond static and moveable street furniture and how they become used or disused, Whyte discussed the concept of "integral sitting" spaces. These are structures that inherently exist in a way most people can sit on - stair steps, planter ledges, sturdy low fences (Whyte, 1980, pg. 28). Sittable structures are often along the edges of spaces, making them even more valuable spots for sitting. These items are often already at the correct height for seating, but when the "width of a human backside" is not taken into account or when items like low fences lack a flat surface they become unsittable (Whyte, 1980).

Gehl also highlighted leaning as an important staying behavior. Bollards, niches in walls, and fences all offer the opportunity to lean on something while waiting for a better spot in the crowd or pausing in running an errand (Gehl, 1980). People feel less likely to be buffeted by a crowd or by traffic when they can stand or lean by a sturdy item like a bollard (Gehl, 1980, pg. 153). When these items are flat on top they offer the additional benefit of being able to set something down for a moment. These are behaviors that should be taken into account when choosing streetscape items.

All of these forms of lingering behavior in urban spaces can be related to Whyte's concept of triangulation from *The Social Life of Small Urban Spaces* (Whyte, 1980, pg. 94). Triangulation refers to the social interactions that form when two or more people witness the actions of a third and therefore gain a shared talking point for conversation. Strangers are unlikely to strike up conversation about a random topic, but they will about a street performance or someone embarrassing themselves with a loud monologue.

Having the space available for these optional and social activities to take place leads to more of them taking place. The space doesn't cause them on its own, but it is difficult for lots of people to use a space not comfortable for or even available to them.

Gehl's concept of "soft edges" might be the most important to the concept of planning for human

Figure 31 - Plaza in Richardson with various edge conditions.

psychosocial health. The necessity of walkability is well understood in the planning profession, but how big an impact edge conditions have on overall usability is less so. When observed, most public activity begins in the edge of a space, and from there either moves out in the open or moves indoors.

Gehl lists the three most important factors for edge conditions between buildings and outdoor spaces as "easy access in and out", good "staying areas" directly in front of the buildings in the highest traffic area, and "something to do, something to work with" also located near this front entryway with all its foot traffic (Gehl, 1980, pg. 186). Thinking in an indoor/outdoor dichotomy is common in both architecture and urban design, but transitional spaces have a profound impact on the usability, comfort, and visual cohesion that promotes a stronger sense of place. This could be a lobby or atrium providing a transitional change in scale, or it could be an awning providing shelter from sun or the wind traveling down a flat façade (Gehl, 1980). These ground floor transitions become more and more important as building heights increase, aggravating windy days into something hostile for pedestrians (Gehl,

2010). If transitioning from one land use to another or from inside your office building to out onto the street is a harsh, abrupt experience, then we are back to only necessary activities taking place.

This concept of harsh transitions and noticeable visual stops and starts is in agreement with other research performed by Jack L. Nasar. In the collection *Environmental Aesthetics* edited by Nasar, he also wrote the article "The effect of sign complexity and coherence on the perceived quality of retail scenes." This article concerns the concept of perceived visual quality of spaces, specifically how the perceived quality of a space affects people's behavior to linger or move on quickly (Nasar, 1985). This is a concern for commercial areas, where if potential customers feel the need to move away from an unpleasant environment they are unlikely to shop. It is of interest that this study confirms some level of need for visual complexity (Nasar, 1985, pg. 303). Too little complexity and the visual environment becomes unpleasant.

This need for some level of visual complexity is echoed in Gehl's observations of how people behave around large, featureless or otherwise 'inactive' facades. They are likely to walk by more quickly, to think of the façade as boring even if it is made of new and high-quality materials (Gehl, 2010). Active facades offer more sights, sounds, and smells than passive ones. Much of Jacobs' depictions of lively streets are essentially describing the same principles, only for the day-today street activities of the mid-20th century era (Jacobs, 1960).

This affects pedestrian walking behavior due to how humans generally experience distances. There is the physical distance or the actual length that needs to be traveled and then the perceived distance, how long it feels like to travel it (Gehl, 1980). The maximum distance most physically able people are willing to walk somewhere on a regular basis is between 1,300 and 1,600 ft (Gehl, 1980, pg. 139). An inactive façade is perceived all in one go and seems like a longer and more tiresome walk than an active façade, where one walks to this

sign and then this café patio and then around this bend even if both are in reality the same length to travel.

Mixed-use areas and mixed-use buildings are often mentioned for bringing more life to a ground floor façade. When the ground floor is broken up by neighborhood commercial services and other activities such as somewhere to take a painting class there is more to see and more people on the street. Large offices or big-box stores do not offer the same amount of variety or traffic in and out and are often

Figure 32 - Inactive and monotonous façade vs small-scale active façade. Reproduced from Cities for People

much better placed on the second floor of a mixed-use area when density allows. Even with these limitations, larger ground level commercial can be improved with better standards for the amount and placement of windows to see inside and of doors. Cities like London and Melbourne Australia have adopted active façade ordinances, requiring greater amounts of openings and variety along busy streets and for shops near residential areas (Gehl, 2010).

Mixed housing areas can also accomplish the same task of creating visual variety. When residential areas have a good mix of dwelling sizes and styles and the width from residence to residence is not excessive for walking there is a reasonable amount of variety experienced by pedestrians. When long swathes

of detached houses are broken up further by mixing in townhomes, garden apartments, small condo buildings, loft apartments over garages, and contemporary apartment buildings at the corner a lot of variety is achieved without losing the residential character of the area.

This is not a residential concept suitable for all neighborhoods. There are people who very much want the experience of a traditional American suburb. But as per *Happy Cities*, when studied over 30% of us now are living in this sort of residential area who do not want to be there and have limited other choices available (Montgomery, 2013). Encouraging mixed residential with a shop or two every other block or so provides a badly needed transition point towards densifying cities and an additional choice in neighborhood between suburb and Transit Oriented Development.

Figure 33 - A bland facade in downtown Plano.

Even in urban cores and highly commercial areas, not all facades should be highly active. Uses like small warehouses, movie theaters, and interior spaces that need darkness require closed walls. But a significant percentage of long, featureless or enclosed facades in areas where high pedestrian traffic is desired are going to lead to poor performance (Gehl, 2010). The blank, horizontal boredom of these spaces can be broken up with various vertical design features to help mitigate this effect, but a mix of forms is more effective.

Obviously not every street will be suitable for the amount of small shopfronts shown in Figure 32, but the contrast between the bustle available in that lower façade vs the one above is clear. There is no reason for anyone to do anything except walk by as quickly as possible in the first image. Only those who really need the pathway to get somewhere important are going to use it (Gehl, 2010).

Figure 34 - Pedestrian space in Richardson, TX

On a different activity scale than a busy urban center, this shopping center in Richardson, TX shown in Figure 33 has integrated bike and pedestrian paths, outdoor seating of multiple types, plenty of openings in facades to allow views inside, and options for shade. This could have been the typical large-suburb grocery-anchored shopping area, but pedestrian infrastructure in integrated in front of every building and down the center of the busy parking lot. Foot traffic was able to travel between shops and restaurants and people were able to bike from nearby housing.

The same essential design principles work at this quieter scale, not just dense urban areas. There is still a need for visual variety in small shopping centers and residential neighborhoods.

Effects of Urban Form on Mental Health

City spaces with nowhere to sit or linger, nowhere to find a quiet corner or to gather together without being considered a nuisance cannot support vibrant street life. There is need for activities for groups of people to gather around and a need for visual variety that makes the urban experience interesting and

pleasant. Places without any of these things quickly become bland or even hostile. People avoid shopping and walking and socializing in hostile spaces.

There are many design strategies that play a role in improving urban form, but the connecting point for most of them is the reality of human scale. Most people will be between 3 and 7 feet throughout their lives, from children to our tallest individuals. When walking in a space we look forward and slightly down towards the ground ahead of us, an angle of around 10 degrees (Gehl, 2010, pg. 39). We can generally see activities throughout a space at a distance of 300 feet and can make out the behaviors of individuals around 200 feet (Gehl, 2010). These measurements are determined by the acuity of our daytime vision.
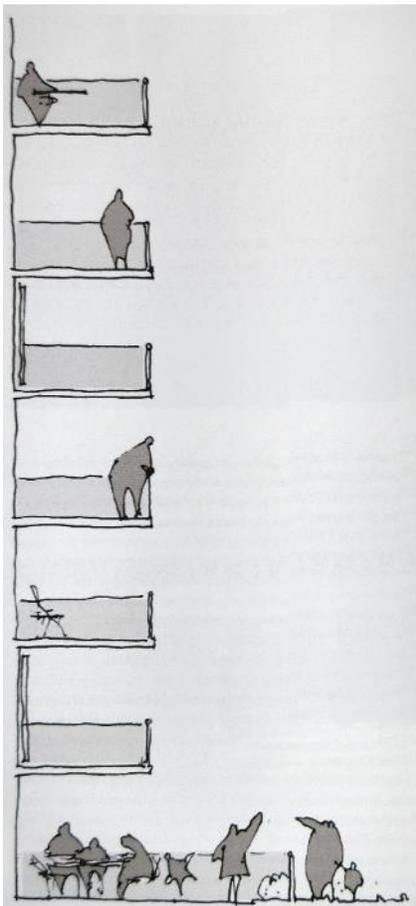

Figure 35 - Human Scale graphic from Gehl

There are similar limitations on our abilities to see and interact with people at different heights. Ground level is easiest for socializing. From the second through fifth floors it is not that difficult for friends to call upwards to be let in the building. Above five floors shouting would be required. By the tenth floor even energetic waving may be missed, the street activity becoming a distant view (Gehl, 2010).

Spaces that are built out of human scale loom over us or stretch so far in front of us that the idea of walking all the way across becomes an exhausting thought. Sometimes this is done to create spaces of grandeur, for large groups to gather. These spaces are useful for those purposes, but the rest of the time they loom too wide. People feel too exposed in them and efforts are often made to portion off smaller spaces so people feel more comfortable (Gehl, 2010.)

Urban forms that do not allow a variety of choices about privacy also become hostile. Public and private is an oversimplification of urban spaces. There is a need for the semi-private space to provide more opportunity for social interaction with an accompanying high level of perceived control. Semi-private spaces are front yards and patios for residential areas. For more commercial areas they could be shared lobbies or courtyards. Semi-private spaces allow casual encounters to take place or unplanned social interactions but provide spatial limits that can make the situation less intense for those less confident in social spaces or who are more easily overwhelmed by the variety of sensory input outdoors.

This goes along with the concept of choice in the activity level to participate in. One of Gehl's assertions about public spaces was that if there was nowhere to peacefully be a wallflower than those people will not come to the space at all (Gehl, 2010).

Just as there are measurable distance limits for human perception, there are distances for different social interactions to take place. Many of these are cultural, but they are measurable. For many 'western' cultures, social distances are between 4 and 12 feet, less than 4 for close friends and family and more than 12 feet for public gatherings (Gehl, 2010, pg. 47). The dimensions of semi-private spaces facilitate both these social distances often better than private and public spaces can multitask.

Most research on this topic in planning has been conducted through self-report or observation, essentially behaviorist methods of psychology. Today with new technologies such as smartphones and wrist strap heartrate monitors, there are multiple new studies taking place verifying in real time the biological reactions that accompany what has long been observed.

With all this data becoming available, it is still difficult to retrofit the forms of cities. They are busy places. People have many opinions about what they

should look like, an issue that consumes a lot of time. Fears and insecurities often drive public opinion in one direction over others.

Overtly hostile spaces are often created out of a desire for security, but in many cases, by the time a space has been successfully made unusable for those who want to consume alcohol around the city in inappropriate ways or who are homeless and need somewhere to sleep, it is also unusable for anyone else.

William Whyte said, "So-called 'undesirables' are not the problem. It is the measures taken to combat them that is the problem" (Whyte, 1980, pg. 60). In Whyte's observational research in New York City, this often took the form of extra expense to make integral seating un-sittable. Unfortunately, over three decades later this and similar practices in New York continue to accomplish little except generating a pervasive sense of unease (Hu, 2019).

Figure 36 - A hostile public bench.

This hostility of forms in the space spreads into unintended effects. The bench is now less comfortable for everyone. It is also a very loud sign letting everyone know there are people here we do not want. The perception that there might be something unsafe in the area is often far more impactful than the actual crime rates (Montgomery, 2013).

Supportive Strategies

Being more mindful of human perception and behavior in urban spaces can be accomplished in a variety of ways. Underperforming or dangerous spaces can be revitalized with greater chance of success if the physical side of their problems is better understood. Investments in urban improvements that will likely

backfire can be better avoided. Understanding the limits of human visual perception can also offer better guidance to residential building heights or block lengths.

Jan Gehl divided a set of 12 general criteria for quality in urban spaces for people into three categories, protection, comfort, and delight (Gehl, 2010, pg. 246). Most of these being shown in Figure 37 are structured around the things that make a space more comfortable or hostile to a person in it.

Protection included getting around without fear of traffic and mitigating the fear of crime in communities. This includes strategies like making sure spaces had different uses throughout the day so they stayed active (Gehl, 2010). This reinforces Jane Jacobs' observations of neighborhoods in New York City and the benefits of eyes on the street throughout the day (Jacobs, 1960).
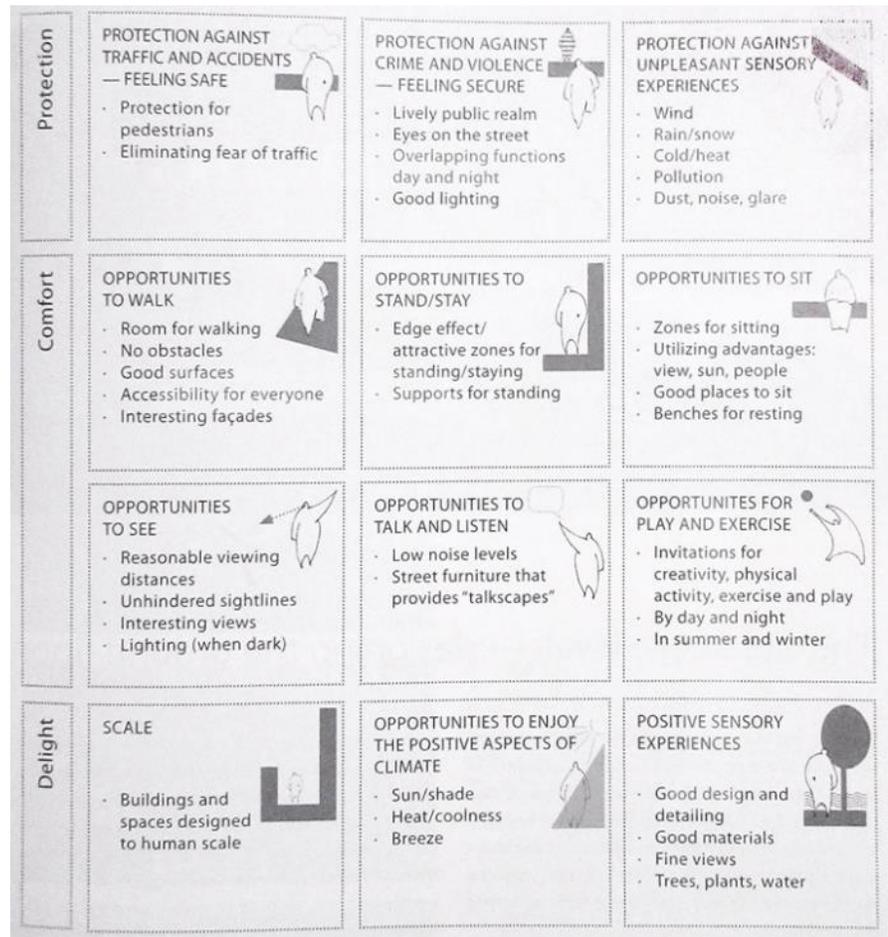

Figure 37 - The twelve recommendations from Cities for People

Comfort is composed of two sets of recommendations, the ability to take part in activities in urban areas as needed and the ability to perceive the area comfortably. This would include being able to walk without discomfort or

dodging inconvenient obstacles and having sightlines that are enjoyable and make it easy to perceive the character of the space around a person.

Delight refers not to special activities or temporary interaction with a public intervention, but to the general sense of wellbeing that comes from being in spaces made comfortable for you. This includes the ability to enjoy the weather of a place and having good sightlines to enjoyable views (Gehl, 2010).

Softening edge conditions, minimizing long, featureless facades in areas where frequent pedestrian usage and lower speed traffic travels, and taking into account the human need to be around people without also being completely exposed at every sight line could generate much less hostile public spaces.

The years of observational information from planning authors like Gehl, Whyte and Jacobs and the more "humanist architecture" ultimately desired by Herbert Gans can be applied to current urban and suburban areas to generate more human-friendly spaces. Designing spaces for the measurable limits of human perception, for our preference to not be shoved by harsh winds while walking, and for our tendency to sit anywhere with a good view better acknowledges the disorderly but not at all inexplicable realities of human behavior around urban forms. A biopsychosocial-driven humanism is needed in contemporary urban design.

This photo from downtown Plano, Texas in Figure 38 is a good example of many of the form principles that have been discussed here. It is not a particularly photogenic day. Opinions on the colors of the façade and pavers together may vary. The grass is still dead from winter.

But these detailed aesthetics are actually irrelevant. I watched multiple people cross the street to walk on this side rather than along the other sidewalk, which was plenty wide but along a blank-walled office building and without the vegetative barrier between pedestrians and the street. They walked along the

length of the block just the same, just on this side of the road when crossing later on if needed would have been just as easy.

But this side of the road had a physical barrier between the pedestrian and the street, one through which it was easy to keep an eye on the cars. This side of the street offered more green to walk between. Along this sidewalk were little fenced patios between the rise of the building and the sidewalk, a transitional space. This side of the road was better suited to human scale and perception of safety.

The aesthetics of the potentially clashing red bricks and red pavers vs the smooth tan and yellow façade on the other side of the street are not

Figure 38 - A walkway in downtown Plano.

what is generating this preference behavior. How our eyes communicate the variety of form and protection from the street to the brain is.

The Lingering Effects of 'Physical Determinism'

It is tempting for those in urban design to think that implementing the design strategies intended to improve city spaces in an orderly fashion will always lead to the desired result. A solution has been applied to the problem, so now it will mend. But none of this is to say that if we simply fix our built environment the desired behaviors will simply appear.

In Whyte's book, *The Social Life of Small Urban Spaces*, he studied several plazas in New York City that were built and intended as social spaces for the public, but for years these places were mostly vacant of people lingering in the area.

The spaces failed to take into account the wind from the side of the building or the angle of the sun or enough choices for sitting. Or they were so barren of activity there was no reason to linger in them. Or they were so actively made hostile to those the buildings around them found undesirable that they became useless to everyone (Whyte, 1980). An example closer to home is shown in Figure 39 from Richardson, Texas.

Benches are added in public spaces for sitting and socializing, for waiting, for human comfort on the shopping street in this picture. But this is a bench that will not get used. The planner's intention for its use is there, but the human behavior that we

Figure 39 - A disused bench along a shopping street.

do not like to sit in the middle of nowhere with cars moving behind us that we cannot see is not overridden because of design intent.

This direct causal relationship between design intent and use does not exist. The assumption in urban design that it *does* is known as physical determinism, a term first popularized in the writings of Herbert Gans as a refutation to assertions about urbanism made by Jane Jacobs. Gans stated that planners and other urbanists seem to believe, "…that buildings, streets, and the planning principles on which they are based shape human behavior" (Gans, 1991, pg. 36). This statement is to mean that the planners in question believe that however a space is designed and intended to be used it will become used that way. This thought process was present through much of the rational planning era of the 20th century. It has lingered in planning conversations about urban form and aesthetics since that era.

That concept is not what is intending to be discussed here. Mitigating the urban risk factors being discussed throughout this paper necessitates proving opportunities that are lacking and acknowledging the biological realities of human perception, not controlling behaviors. Nor are these issues of human need and urban design meant to be framed as an "urgent priority" to mend severe and systemic social problems (Gans, 1991, pg. 3). Other interventions are needed in a crisis.

But that does not make these design issues unimportant entirely. Urban design that best serves human comfort and behaviors should not be expected to be an apologetic afterthought in the face of other 'greater' problems. Even in Maslow's Hierarchy, one level was not intended to be perfectly addressed before another could be worked upon.

To be more humanist, to take biopsychosocial realities into account, the bench should have been placed against the building wall or had moveable public furniture put in its place. Even a backless bench would have offered potential users the choice of how to sit so they feel safe. Planning needed to provide the option to sit and linger, not accidentally demand how people should sit with their backs to the road and stare at a blank wall.

Where Gans' assertions about the unimportance of urban design being to fall apart is when they are taken to the extreme that the built environment doesn't have an effect on human moods and behaviors at all, that it is irrelevant in the face of larger, systemic sociological problems he discusses in later chapters of his work (Gans, 1991).

From all the research that has been done in the psychology field and all the measurable biological data that has been collected, we know without a doubt that the urban environment does contribute.

For all the rejections of the built environment influencing behavior, from other portions of Gans' collection *People, Plans, and Policies*, there is strong support for the idea of a more 'humanist architecture', designing spaces for actual, everyday human functions (Gans, 1991, pg. 23). This is in fact in complete agreement with both the other planning literature examined here and with the concept of applying the biopsychosocial model to planning.

It is not that planning shapes human behaviors, though it can affect human moods. It is what we know about human behavior that needs to shape planning.

In Summation

This is where we relate back to the issue of mental health risk factor mitigation.

A review of both urban planning literature and that of other social sciences has shown that the overlap between various facets of urban environments and risk factors for poor mental wellbeing have been studied before in planning literature, even extensively. However, this type of research in urban planning academia seems to have taken less advantage of the advances in modern psychology compared to other fields.

Many of the assertions made by authors like Gehl, Whyte, and even Jacobs from their observational studies have been verified through different methods over the last few years. For example, a study was completed last year in the London area by the Urban Mind Project. They used a smartphone app they developed

to survey a group of participants in real time over several weeks about what natural features they were being exposed to in their current location and how it affected their mood (Bakolis, I., Hammoud, R., Smythe, M., et all, 2018).

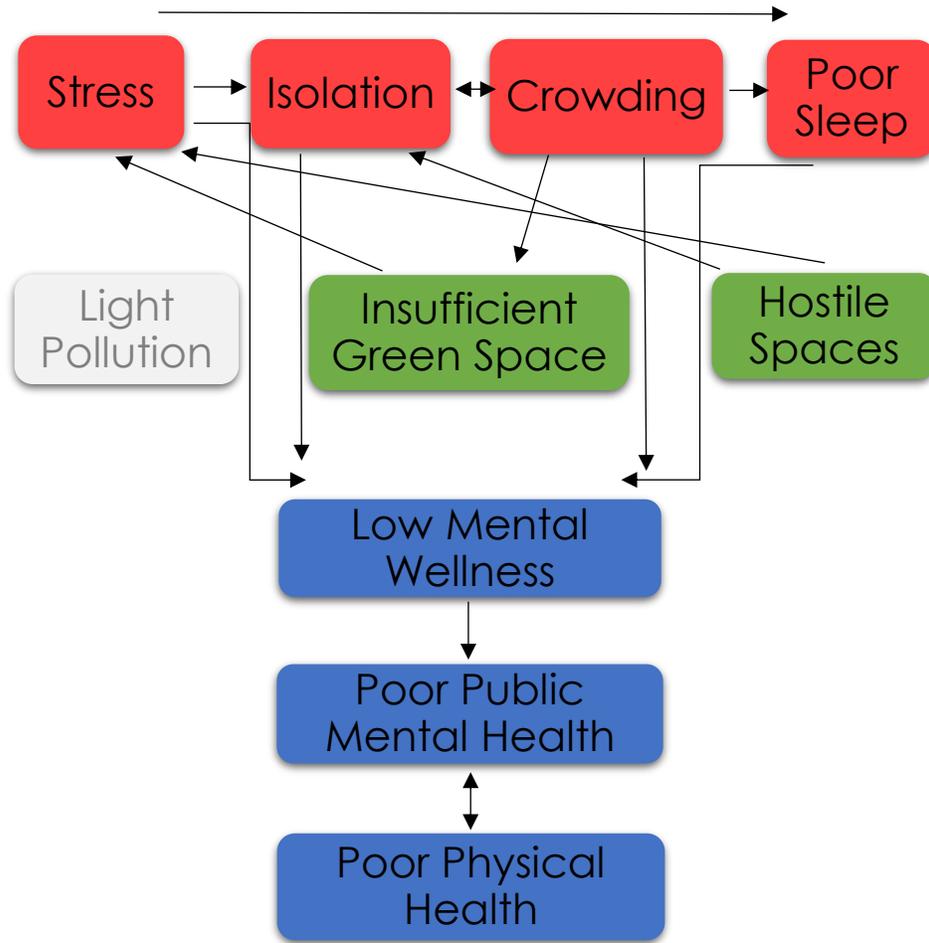This real-time feedback allowed the researchers to confirm that the

Figure 40 - The revised infographic with just one risk factor mitigated

psychological benefits of exposure to green lingers a significant amount of time after the individual had left the green space. They also discovered that individuals who were more behaviorally impulsive received a greater benefit from time with nature (Bakolis, Hammoud, Smythe, et all, 2018).

In New York City, participants in a walking tour were fitted with biosensors that monitored indications of excitement, interest, and levels of stress to go along with their self-report. Through items like heartrate and temperature, the experiment was able to biologically verify that people are overall less stressed

among green and more interested by active ground floor facades (BMW Guggenheim Lab, n.d.).

The biological side of the biopsychosocial perspective in psychology and adjacent fields tells planning that even passive exposure to green space or a change in our outdoor lighting can positively contribute to rates of high public mental health in our cities.

If even one of the urban environment risk factors from our chart can be mitigated such as in Figure 40, the whole picture improves.

Taking Action for Where We Are Now

A review of the planning literature has showed several gaps in the research and opportunities for both new study and improvement. But, in addition to this academic side of planning, we have the working professionals, active in various parts of the field. Land planning. Transportation. Public policy. Community engagement.

Does the lack of significant planning literature that takes advantage of modern psychology translate into a lack of awareness of mental health issues among planning professionals? Or is there awareness of how public mental health effects today's cities, but no clear next steps available in their professional role?

If the survey indicates that the planning profession leans far more towards the latter issue, than the introduction of a new ideal city concept into professional discourse could quickly be useful. This is the primary purpose of this survey - where we are compared to where we'd like to be as planners, what we are aware of and what we consider priority issues.

The secondary purpose of conducting this survey was to undertake comparison of planners and non-planners to each other on several broad-brush topics. Are planners adequately informed about public health issues outside physical

planning? Do non-planners who work adjacent to planning generally understand urban planning concepts in similar ways as planners? Is there a general communication problem or are we mainly reluctant to discuss mental health issues?

The survey results might show big disparity on how we define and prioritize these topics or they might show a high level of consensus. The survey could show significant differences on these topics between planners and non-planners or similarity. The results might show strong agreement of what urban environment and public mental health issues are, but show that most believe mitigating public mental health risks in cities is a problem best solved without urban planning.

Survey Methodology

This study is intended to serve as action research, to address the primary and secondary research questions in a way that suggest next steps for further study within the planning profession. For the survey I served as the primary researcher, managing survey distributions and the data collected. The question format and phrasing was designed with guidance from Dr. M. Arefi during the spring semester of 2018.

All the participants in this survey were asked either 23 or 25 questions about their knowledge and opinions regarding urban environment issues and public mental health using the format of free-response or a 5-point Likert scale. Likert scales were developed by Rensis Likert in 1932 and are commonly used to measure opinions or feelings about a topic or product (Kornuta & Germaine, 2019, pg. 62).

Participants could choose from the options strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, and strongly disagree. The same potential answer range was offered for questions regarding frequency and for yes/no questions. Only answer ranges that allowed for a neutral

response were used, rather than forcing a choice be made. For this study, it was important to know if the respondents were potentially confused by or indifferent to a question. This survey is being used to gather data on the opinions and experiences of current professionals surrounding these issues.

Five questions, numbering 2 - 6, were asked to establish if there was agreement or disagreement with the way several planning and public health terms being used throughout this paper aligned with how the respondents perceived them.

Five questions, numbering 7 - 11, were asked regarding the frequency with which the respondents encountered these topics in their average workday. These questions were intended to allow comparison of the planning and non-planning professions being surveyed.

12 additional questions, numbering 12 - 24, asked either for the respondents' agreement or disagreement on the different ways the urban environment and public mental health topics interrelate or for their opinions on different elements of the three urban design items discussed earlier in this report. These questions were intended to collect data on the respondents' individual opinions on these topics for comparison with common misconceptions.

All respondents were also given the opportunity for more detailed answers in 3 free response questions, questions 25 - 27. These questions were in regards to raising the profile of public mental health in their specific professional area, what other information or type of educational materials would be of most use to them, and any further concerns about the issues being surveyed that had not been addressed by the other questions.

Those respondents who self-identified as planning professionals were asked two additional questions, 29 and 30, to better guide the next steps and recommendations portion of this paper in addition to the planning literature from earlier in this report. These questions asked where the planner thought the

planning profession had the most impact on the public physical health and the most impact on the public mental health.

The final survey design was distributed in an online-only format available through personalized links to track who had responded. Only the primary researcher knew the identities of the respondents at any time. No personal demographics beyond professional status as a planner or non-planner were collected. 30 questions were included for planners and 28 for non-planners in a mix of 5 option Likert scale questions and free responses.

Originally allowances were made for potential follow up interviews by phone or email. This idea was not pursued due to both time constraints and lack of need. The answers to the free-response questions generally were without room for confusion and included good amounts of detail for the analysis. After multiple requested revisions, IRB approval was granted for this survey as a minimal risk study on August 24th of 2018.

The Selection Process

Given the two goals for the data collected, the potential respondents were essentially handpicked from their work. More general groups to survey such as planning students or general APA members were considered and discarded.

Inclusion in this study was based on being part of an organization with an active role in either urban planning and design, city government, public health, or other urban environment areas. Municipalities, policy organizations, and non-profit groups who consistently work with very multifaceted urban issues were prioritized. Cross-disciplinary groups were also prioritized. The focus area was limited to American organizations, with an additional focus on Texas and Arizona.

The websites for these groups were searched for employee profiles and contact information. This generally meant potential respondents would be full-time

professionals. This information was generally readily available and avoided the necessity of using more personal contact information. Only two of the organizations chosen only offered a general Contact Us box with which to reach them. Every respondent was informed during the consent process that they were selected due to their work.

Besides the geographical region limitations, having the pool of potential respondents be limited to specific organizations, handpicked by the primary researcher, and leave out all personal demographic information limits the types of analysis that this data should be used for.

This set of criteria was used to select the potential groups of respondents in both rounds of the survey.

This selection pool is intended to reach professional planners who have likely worked with issues of mental wellbeing in their careers and to reach non-planners such as public health professionals who have likely worked with issues surrounding the built urban environment. This mix is intended to allow analysis of how well we understand each other on these shared issues and whether the priority we give to issues such as physical health vs mental health is more similar or different.

Plan4Health

Plan4Health was an APA managed three-year project collaborating with the American Public Health Association

PLAN4Health
An American Planning Association Project

and also with support from the Center for Disease Control. This organization worked to help form community groups for population-wide positive change in various public health issues. Locally they were working with Tarrant County.

This organization states that they have two main focus areas: nutrition and physical activity. While active, they were working towards, "achieving health equity through a health-in-all-policies approach" (About Plan4Health, 2017).

City of Arlington

Arlington, Texas defines themselves as the American dream city. It was founded in 1876 along a rail line. Today it is home to over 350,000 people and is the largest city located between two major cities in America (History of Arlington, 2019).

Currently the City is in the middle of extensive improvements to their downtown, including integrating mixed use designs and more multimodal streets. Other main focuses are the rehabilitation of the City's housing stock and modernizing the ageing commercial corners.

Texas Department of State Health Services

The DSHS is the main public health organization of Texas, focused on "good stewardship of public resources" and "core public health functions" (About DSHS, 2019).

We understand no single entity working by itself can improve the health of all across Texas. We must all work together to create a better system that includes prevention, intervention, and effective partnerships.

The state is divided into 11 public health regions to better focus on the needs of those communities. Only region 2, region 3, and region 8 were sent survey invites as these areas correlated with the Texas cities also involved in the survey.

National Complete Streets Coalition

The National Complete Streets Coalition was formed in 2004 as a sub-program of Smart Growth America. It is a non-profit organization focused on assisting cities with the development and implementation of Complete Streets policies and accompanying best practices. Complete Streets works to better integrate the needs of people into urban transportation networks. Currently, there are over 1,100 Complete Streets Policies in place. This organization states that they promote street design that supports overall public health (National Complete Streets Coalition, 2019).

NAMI

The National Alliance on Mental Illness was founded in 1979 through the cooperation of several families. It is a nonprofit organization that serves as the nation's largest grassroots answer to mental health advocacy (About NAMI, 2019). NAMI focuses their efforts on education and awareness about mental illness facts and getting treatment for them. They are advocates for mental illness in public policy at the national level and more. The organization also manages its own crisis helpline.

Project for Public Spaces

PPS is a cross-disciplinary organization founded in 1975 inspired by the urban behavior research of William Whyte. They promote a better social environment through interventions in public spaces that improve recreational and social opportunities for those communities. They've completed projects in 50 countries and all 50 states. They focus their work on the concept of placemaking -

focusing on human scale and spatial context to make memorable places. PPS states they are focused on, "public spaces that contribute to people's health, happiness, and wellbeing" (About PPS, 2019).

Bexar County Department of Behavioral Health

This department works with a county including over 1,700,000 people, including the vast majority of the population of San Antonio.

They define their general mission as to lead in "planning, coordinating, advocating, and organizing community behavioral health stakeholders in activities to continuously improve the availability of services in Bexar County (TDBH, 2019). Current goals include identifying gaps in their current mental healthcare services and increase the capacity of people the county is able to provide services for.

Their ultimate goal is to become a national model for intervention in homelessness and care structures for the mentally ill.

City of Dripping Springs

Located west of Austin in the Texas Hill Country, Dripping Springs is home to around 3,000 people and has many visitors who come for both the scenic countryside and to enjoy the night sky (History of Dripping Springs, 2019). This city became Texas' first dark sky city in 2014 and remains one of our very few (Dark Sky Places, 2014). They now host a night sky festival every March.

NAMI Texas

Every state has a local branch of the larger NAMI organization, focusing on community education,
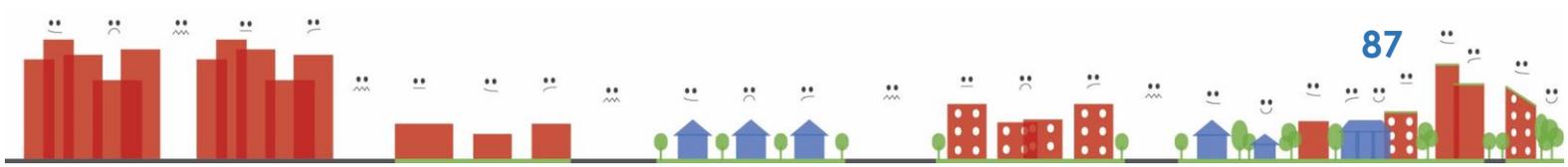
state policies, and connecting people with local mental health resources. They operate mental health awareness events such as NAMIWALKS in Texas each year (About Us, 2019). Our local branch was founded in 1984 and has around 2,000 members.

NCTCOG

The North Central Texas Council of Governments is a voluntary association of local government entities to support collaborative decision making for quality regional development. NCTCOG serves a 16-county region of North Central Texas, centered around the two major urban centers of Dallas and Fort Worth.

The organization's main purpose is to help local governments "recognize regional opportunities, eliminate unnecessary duplication, and make joint decisions" (NCTCOG About Us, 2019). NCTCOG has a membership of over 230 governing entities such as cities, counties, and school districts.

American Public Health Association

The APHA is the nation's oldest and largest public health organization, founded in 1872 (About APHA, 2019). They advocate for science-backed health policies at all levels and equitable access to care. APHA membership involves every state and over 40 countries.

Out of 11 of our peer nations, we spend the most on health care and have the worst performance (APHA Vision, 2019). The APHA vision is to take us from the bottom to the lead in one generation.

City of San Antonio

San Antonio is the nation's seventh most populous city at around 1.5 million people and the state's oldest, established in 1718 (City Data, 2019). This is the home of the Alamo, now a UNESCO World Heritage site. The city also contains multiple military facilities, two theme parks, and the well-known urban canal area the Riverwalk.

Currently the city is working to revitalize its major traffic corridors to be more user-friendly and multimodal, with the eventual goal of implementing Bus Rapid Transit or BRT (SA Corridors, 2019).

The city also contains a large, centralized shelter and transitional housing project to address the needs of their homeless population. This is an ongoing effort partnering with Bexar county and other organizations.

International Dark Sky Association

The IDA began in Arizona in 1988. It was the first organization of its kind and remains the largest international grassroots dark sky organization today (IDA Who We Are, 2019). Their efforts span lighting design recommendations, public outreach, and advocacy for improved public policies. They've also generated criteria for high achievement by cities and natural parks through Dark Sky certification programs.

American Planning Association

The APA is a professional leadership organization guiding planning "through leadership in education, research, advocacy, and ethical practice" (About APA, 2019). Over one hundred countries around the world are involved with this organization. The APA helps organize state and national conferences and continuing education events every year, as well as managing their own publications and

the professional licensing for urban planners, AICP. This organization formed in 1978 through the consolidation of several previous professional groups.

City of Flagstaff

Flagstaff, Arizona has been populated since 18 and was incorporated in 1928. The city is home to around 65,000 people, a university campus, observatory, and a regional Amtrak facility. Flagstaff sees millions of tourists every year for outdoor activities like skiing and hiking (Community Profile, 2019). It is also the first Dark Sky City, certified by the IDA in 2001 (Flagstaff Dark Skies, 2018). This was accomplished through community awareness, education, and commitment as well as city policies that gave lighting standards and their designs significant attention.

Saving Our Stars

This is a Dallas-area organization focused both on spreading awareness of technology options for better lighting design to the average individual and on citizen's rights to a dark sky at night (About SOS, 2019). The website and twitter account both serve as points of connection between larger dark sky organizations, individuals who work with these issues, and residents of cities who are trying to learn about lighting issues. They've worked to distill a lot of technical information on lighting into very beginner-friendly terms.

Survey Distributions

The first round of the survey was sent out on February 4th and ended February 25th, taking place over three weeks with one reminder email sent upon the last week. 34 emails were sent. 5 useable responses were received for a response rate of 14.7%.

This is a reasonable response rate for this type of survey, but five responses were not enough to perform a reasonable analysis, even for research just meant to provide a first glance to inform future actions.

For this reason, a second round of the same survey was added. The second round expanded the pool of potential respondents to include additional public health and planning organizations. These included NCTCOG and the APHA among others. Given more potential respondents were being added, IRB re-approval became necessary. The second round of the survey was approved as a minimal risk study on April 24th 2019.

As no one declined participation in the first round of the survey, everyone who did not submit a response in the first round received the survey again. This amounted to 27 repeated invitations.

The survey was sent out on June 19th and set to close for responses on July 3rd at midnight, giving potential respondents two weeks. 122 survey invites were sent this round. During this time, I received several emails that participants had attempted to leave and return to the survey only to be locked out. I sent several new links to these individuals. Due to these glitches, all potential participants who had not yet responded were emailed and offered a time extension to Monday July 8th at midnight. No one participated in the offered extension. 11 useable responses were ultimately received for round two for a response rate of 9%.

Through both rounds of the survey 21 total responses were gathered. However, three responses were somehow submitted which only contained answers to the first few questions and two were somehow submitted completely blank. These results were discarded from the analysis process.

As shown in Chart 1, there are 16 survey responses to work with for this analysis. 10 of these respondents self-identified as professional planners. The other 6 respondents were members of other professions.

Given the sample size and the variety present in those surveyed, this cannot be considered a representative sample of any general population. As this research is only focused on taking a quick overview of big-picture questions such as whether we are prioritizing mental wellness in similar ways or a variety of ways, useful analysis is still possible.

The survey responses came from members of the APA, NCTCOG, the Project for Public Spaces, Saving our Stars, the International Dark Sky Association, the City of Arlington, the APHA, the City of San Antonio, Complete Streets, and former members of the Plan4Health organization.

Composition of Reponses Analyzed

6, 38%

10, 62%

■ Planners ■ Non-Planners

Chart 1 - Of the 16 responses analyzed, 38% were by non-planners and 62% by planners.

No responses were ever received from the City of Dripping Springs, the City of Flagstaff, the Texas DSHS, the Bexar County TDBH, NAMI, or NAMI Texas.

Quantitative Analysis

The data from the 16 survey respondents allowed analysis of the level of agreement or disagreement present about how the topics are being defined in this report. The data was also able to visualize the potential presence of common opinions or assumptions and their relationship to the planning topics being studied.
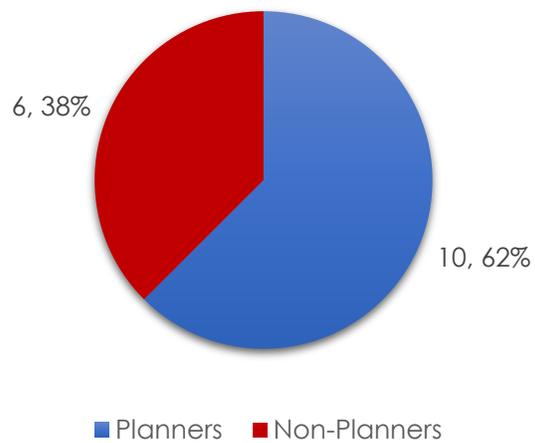
The five definition questions at the beginning of the survey were intended to eliminate the possibility that I would be asking detailed questions to groups who defined the issues very differently from one another. In general, there was agreement that the definitions being used were satisfactory, though the levels of agreement and disagreement for definitions varied.

Question two asked, "Would you agree with the definition of public green space as freely accessible areas that include natural vegetation such as grass, plants or trees?" As Chart 2 shows, agreement on this definition was very high. This kept the standard deviation of the answers low at 0.79. No respondents expressed indifference or confusion to this definition. One expressed some level of disagreement. This definition of

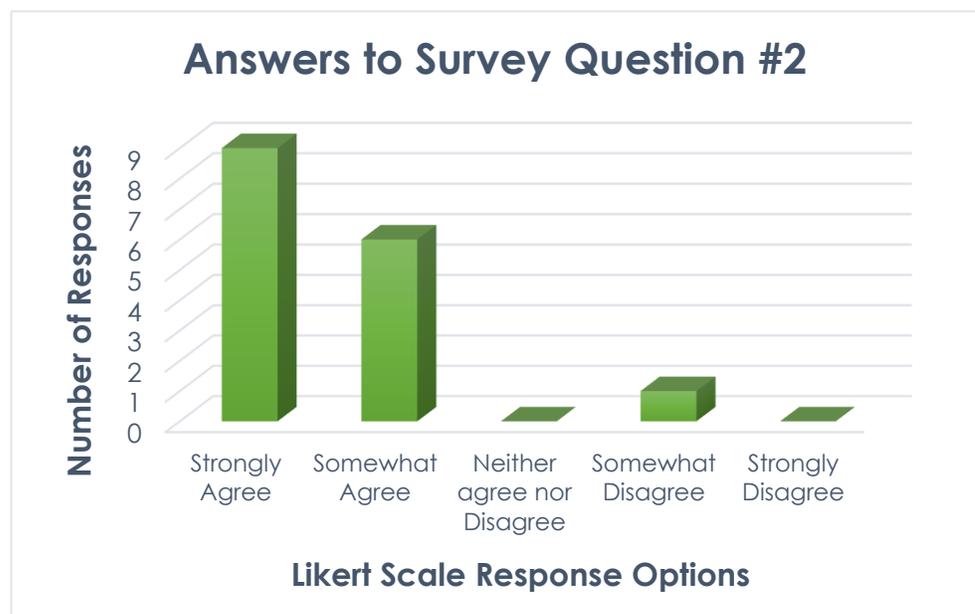**Answers to Survey Question #2**

Chart 2 - A bar graph of responses to the question, "Would you agree with the definition of public green space as freely accessible areas that include natural vegetation such as grass, plants or trees?"

green space was used for its flexibility, allowing for discussion of both parks and hardscape areas with planters and trees. When both answers of agreement are combined, 93.8% of respondents agreed with the definition.

Question four asked, "Would you agree with the definition of light pollution as a disruptive brightening of the night sky caused by streetlights and other man-made sources?" The bar graph above shows a very similar response pattern to question two, with the only difference being one additional respondent chose

to strongly agree. With this small change, the standard deviation and percentage of agreement remain the same as that of question two. We can infer from these results that the respondent group has a reasonable level of awareness of what light pollution is.

Chart 4 - A bar graph of responses to the question, "Would you agree with the definition of light pollution as a disruptive brightening of the night sky caused by streetlights and other man-made sources?"
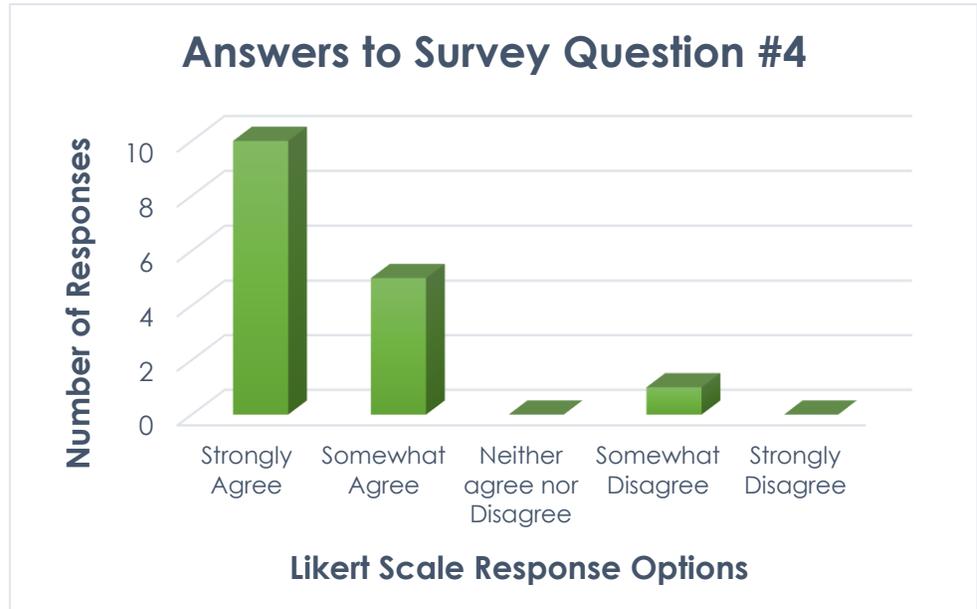
Question six asked, "Would you agree with the definition of public social space as freely accessible spaces where people are able to congregate, socialize, and linger?" This definition question also had a high level of agreement, but there was also the addition of a neutral response to one response of partial disagreement. The standard deviation of this response was 0.86 and the
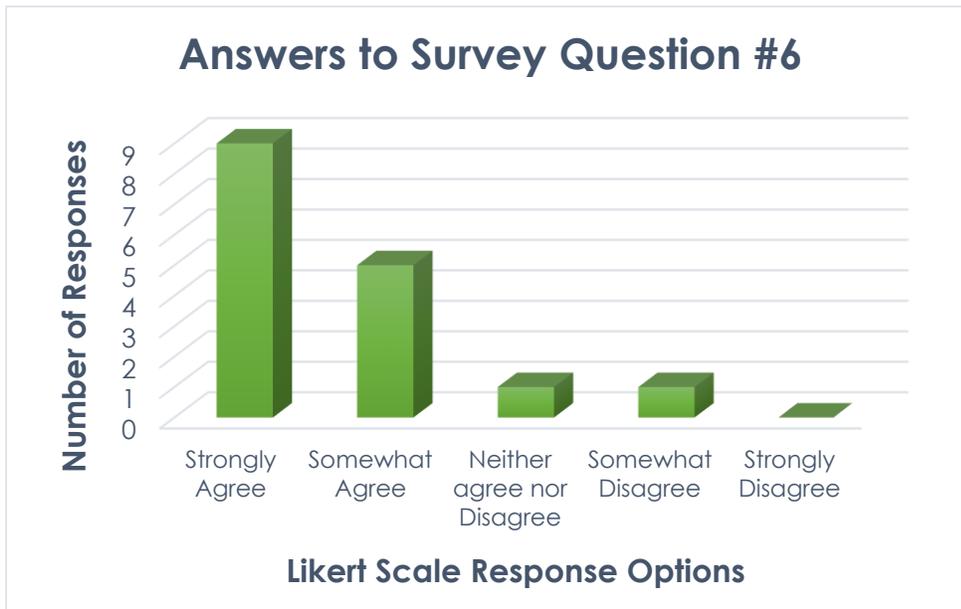

Chart 3 - A bar graph of responses to the question, "Would you agree with the definition of public social space as freely accessible spaces where people are able to congregate, socialize, and linger?"

overall percentage of agreement with the definition was 87.5%. As truly public spaces are different from places that are in the public view, opinions on this definition were important.

The low levels of variety in the responses to these questions and the general lack of answers choosing option three, *neither agree nor disagree*, showed a high level of agreement and a low level of confusion or indifference to these definitions among the group surveyed. This starting point allows a greater level of confidence in the validity of the responses given to the more complex questions asked later which focused on specific parts of these three topics.

Answers to Survey Question #3
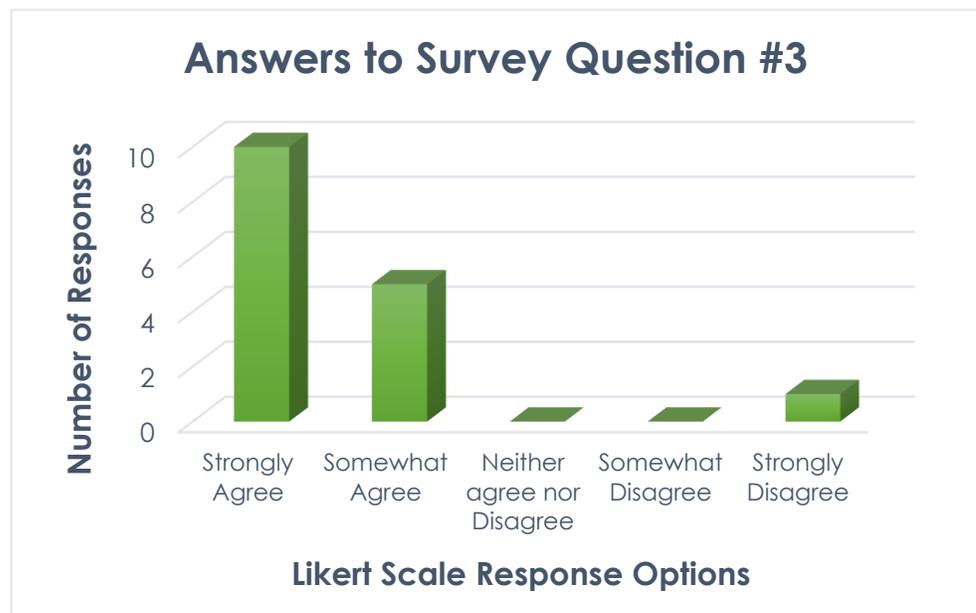
Chart 5 - A bar graph of responses to the question, "Would you agree with the definition of public health as preventing disease, prolonging life, and promoting human health through organization and informed choice?"

The questions regarding the public physical and mental health saw a greater variety of responses between the two questions. Question 3 asked, "Would you agree with the definition of public health as preventing disease, prolonging life, and promoting human health through organization and informed choice?" 15 respondents expressed some level of agreement with the definition. However, one response by a self-identified planner was in strong disagreement with the definition. This response raised the standard deviation of this question to 1.00 due to its distance from the
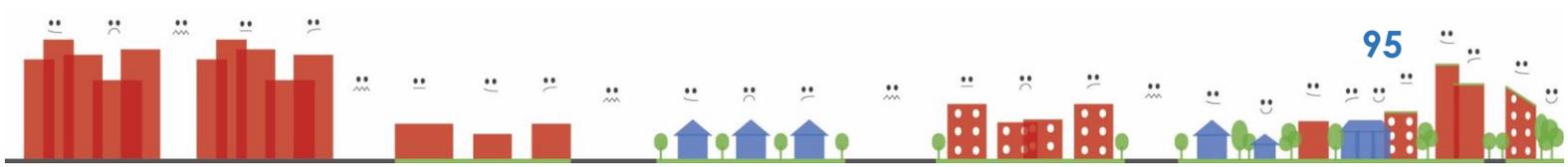
rest of the averaged responses. The percentage expressing agreement was still 93.8%.

Question five asked, "Would you agree with the definition of public mental health as improving mental health and well-being and preventing mental illness through organization and informed choice?" While the majority of the respondents still chose agreement with the definition, only six chose strongly agree compared to ten for the broader and more physically-focused definition of public health. The five responses of somewhat agree are the same for both questions, but for #5 three respondents chose the neutral answer and one chose somewhat

Answers to Survey Question #5
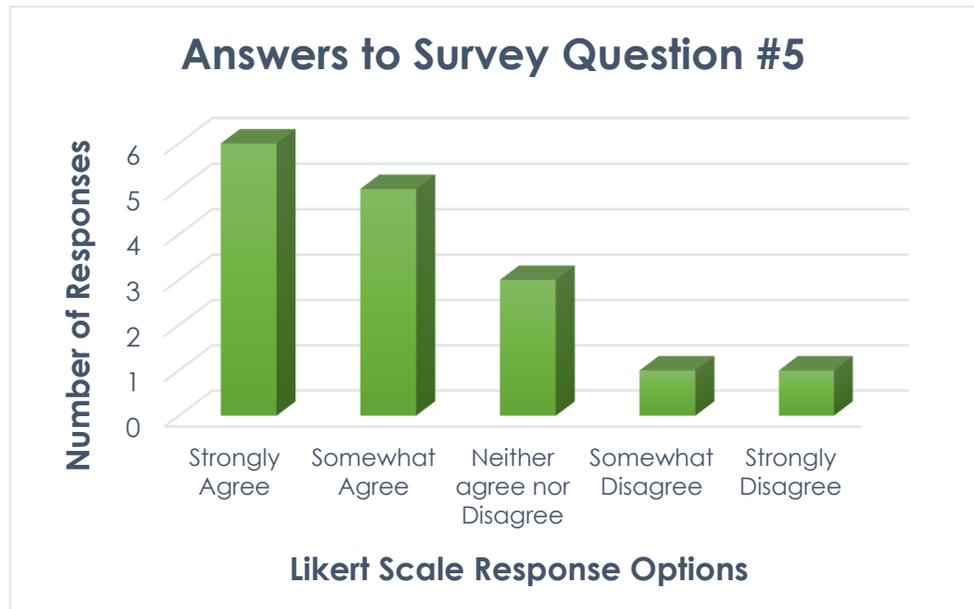
Chart 6 - A bar graph of responses to the question, "Would you agree with the definition of public mental health as improving mental health and well-being and preventing mental illness through organization and informed choice?"

disagree compared to zero responses in those categories before. The standard deviation of this question is 1.17 and the overall percentage of agreement is only

One of the limitations of these results is my respondents were adult professionals with advanced education and mostly from areas that work with these issues. A larger sample size is likely to result in more varied answers even among this professional demographic. The same survey distributed to a more diverse demographic would greatly increase the variance.

Other survey questions with responses relevant to this research are questions #16 and #20. Question #16 asked, "Would you agree with the statement that urban light pollution can affect sleep quality?" While 81.25% of respondents expressed agreement that nighttime exposure to too much light could affect sleep, one respondent

Answers to Survey Question #16

Chart 7 - A bar graph of responses to the question, "Would you agree with the statement that urban light pollution can affect sleep quality?"

expressed strong disagreement. This outlier response gave question #16 a standard deviation of 1.07. From the responses to Question #19 shown in the next section, it seems the planning profession is currently making the decision to sacrifice sleep quality in favor of perceived safety.

Answers to Survey Question #20

Chart 8 - A bar graph of responses to the question, "In your opinion, do large parks offer more social benefit to communities than small parks?"

Question #20 asked, "In your opinion, do large parks offer more social benefit to communities than small

parks?" The majority of responses (68.75%) were for the might or might not response, showing a high level of uncertainty about this concept amount the respondents. The standard deviation for this question was 0.70. This is an important point of discussion given the previous sections' examination of literature on urban form and how green exposure effects the human brain.

Question Comparisons

Four of the survey questions were used to generate two pivot tables in Excel to facilitate cross-comparison of the responses to two different survey questions. Rather than examining individual survey's combinations of responses, these tables provide visual information on the trends revealed by comparing the distribution of responses along each answer option for the Likert scale questions.
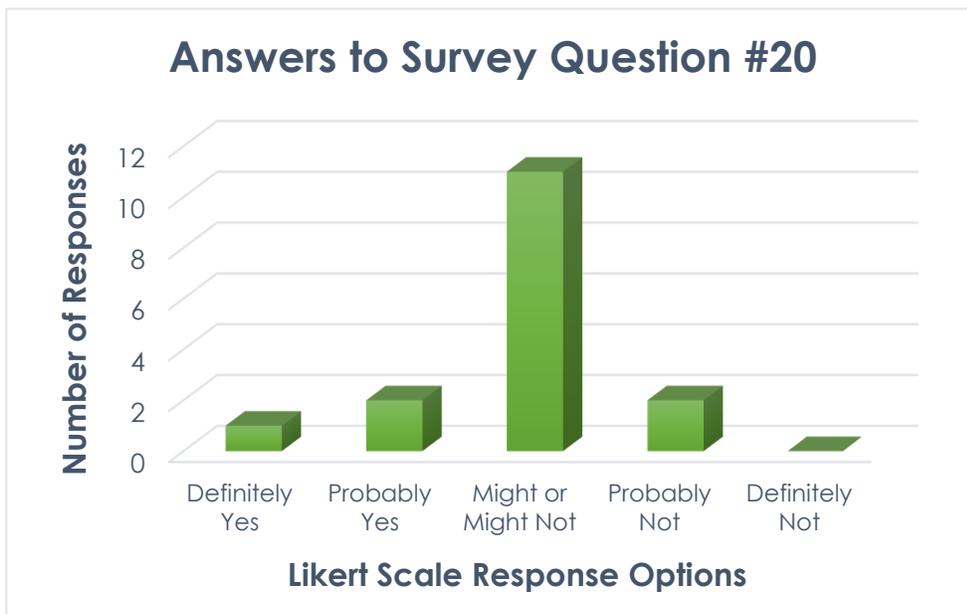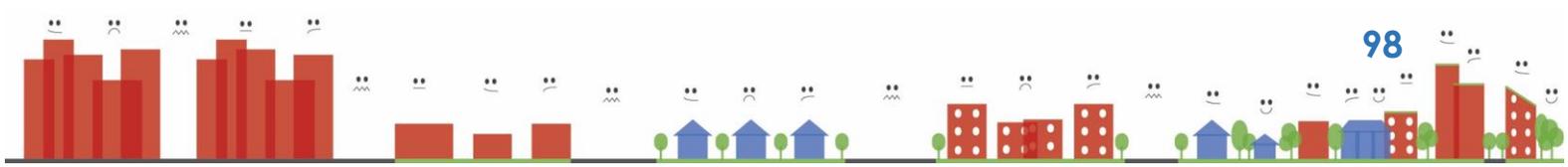
Cross comparing questions #10 and #11 should allow analysis of whether most respondents answered with a higher frequency for discussions of physical health than they did for mental health.

Table 1 - Examining Frequency of Physical Health Discussion vs. Mental							
		#11) How frequently does the issue of public health (mental) come up in your work/work environment?					
		Frequently	Somewhat Frequently	Neither Frequently nor Infrequently	Somewhat Infrequently	Infrequently	Total
#10) How frequently does the issue of public health (physical) come up in your work/work environment?	Frequently	1	2	-	-	-	3
	Somewhat Frequently	-	2	3	2	-	7
	Neither frequently nor infrequently	-	-	-	3	-	3
	Somewhat Infrequently	-	-	-	-	2	2
	Infrequently	-	-	-	-	1	1
	Total	1	4	3	5	3	16

A variety of responses to #11 regarding mental health discussion appears within the somewhat frequently responses to #10. When physical health came up somewhat frequently for most of the respondents, mental health was more likely to be either neutral or infrequent. There is no variety within the neutral responses to question #11. All chose somewhat frequently for physical health discussion. This further illustrates the decrease in frequency from professional discussion of physical health to the frequency of discussion of mental health.

The majority of the high frequency answers for both physical health and mental health were by non-planners. The cells shown in green were all responses by non-planners and the cell in red had one response from a non-planner and one from a professional planner. As the non-planner group is composed of public health professionals and dark sky researchers and advocates, this result is not surprising. It does further illustrate that discussions of physical health in cities are generally given more air-time among planning conversations than those of mental health.

Cross comparing question #4 to question #19, should allow us to verify whether a common assumption about lighting and safety remains even in groups that are aware of the problems of light pollution.

15 out of the sixteen respondents expressed agreement with the definition. The one response of somewhat disagree was from a lighting professional.

The high level of agreement with both questions shows that while the majority of survey respondents were aware of how the issue of light pollution is defined and the problems it causes, the majority was also much less aware of how common assumptions about outdoor lighting make their way into urban designs and contribute to the pollution problem.

Table 2 - Examining if the Association between Bright Lights and Safety Remains in those aware of Light Pollution							
		#19) Would you agree with the statement that there is a relationship between bright exterior lighting and safety/security?					
		Strongly Agree	**Somewhat Agree**	**Neither Agree nor Disagree**	**Somewhat Disagree**	**Strongly Disagree**	**Total**
#4) Would you agree with the definition of light pollution as a disruptive brightening of the night sky caused by street lights and other man-made sources?	**Strongly Agree**	3	7	-	-	-	10
	Somewhat Agree	-	-	4	-	1	5
	Neither agree nor disagree	-	-	-	-	-	0
	Somewhat Disagree	-	-	-	-	1	1
	Strongly Disagree	-	-	-	-	-	0
	Total	**3**	**7**	**4**	**-**	**2**	**16**

As was discussed previously in the section on light in cities, brighter lighting does not on its own correlate with higher security (NPR, 2016). It was also discussed that while there is a minimum level of brightness needed for areas with higher activity, overall brightness of outdoor spaces is not universally safer, as it both negatively effects healthy sleep and often leads to glare and compromised night vision, which reduces visibility (Miller, Koltai, & McGowan, 2013).

The two responses expressing strong disagreement with Question #19, the cells shown in green, were both professionals in outdoor lighting issues. This analysis reinforces that the planning profession needs better understanding of the effects of light pollution and poor lighting design in cities.

Qualitative Analysis of Themes

In addition to the Likert scale questions, three free response questions were posed to all survey participants and two additional questions about the

profession were given to planners. Question #25 asked, "How do you think the profile of public mental health could be increased in your profession?"

Eight respondents mainly discussed the need for accessible education materials both for planners to learn and for everyone to better communicate about these issues with the general public. One respondent said, "*I think reports and/or visual presentations that clearly delineate the negative and/or positive impacts of the built environment on public mental health would be an effective way to educate policymakers and the general public on (these) issues. … Today, people are receptive to short videos, infographics, and simple marketing on image-heavy social media platforms, such as Instagram and Pinterest*."

Five respondents also specified a need for more communication in general about mental wellbeing and illnesses. One respondent said, "*I think it is important to de-stigmatize mental health as being more than just the presence or absence of severe mental illness. Our mental health is a spectrum and can be affected by more than just genetics/biology. I believe our built environment plays a major role in people's well-being and that well-being impacts our minds, our emotions, and our physical health…*"

However, one planner indicated they didn't feel sure the public mental health should have a greater presence in the planning profession.

Question #26 asked, "What learning tool or information would be most useful to you for better understanding this issue?" Like question #25, the majority of respondents expressed interests in infographics, short presentation, or at-a-glance look sheets to help inform themselves, their workplaces, and their clients or residents in their cities.

One respondent specifically expressed interest in case studies of how planning policies meant to be supportive of the public mental health have played out, including cost-benefit analysis information. Another found the idea of GIS

mapping tools for these topics of use for their work. Two respondents indicated they felt this idea of continued learning about the various topics surveyed was not applicable to them.

As a continuation to their interest in educational materials, one respondent said, "*I think many cities/counties struggle to implement good urban design on the grounds that people assume it's all about controlling aesthetics rather than promoting health and well-being. We bring in speakers who talk about making places walkable or building transit, for instance, but who do not do enough to tie those concepts to the ways in which they benefit each individual…*"

Question #27 asked, "Do you have a concern about this issue that has not been mentioned so far? Five respondents said they did not. Three respondents mentioned noise pollution.

The issue of sound or noise pollution is every bit as important for cities as the previous three topics. It was discarded from this report for three reasons: how human cognition deals with sound involves different biological processes and parts of the brain than the other visually-focused issues, the time and length constraints of this report, and the sources of most noise pollution.

Planning standards can have a positive impact on urban noise levels, but the majority of our noise pollution comes from all kinds of vehicles, traffic, and other industrial items like rail and construction equipment. Much of the root cause of urban noise might be better addressed by public policy noise limits and better product design *before* the problem ever reaches the point of mitigation through urban design. The minimum **and** maximum safe volume levels for safety items like alarms, engines, emergency sirens, and even crosswalk beepers need to be studied so they provide sufficient ease of use for the hard-of-hearing without overdoing it and becoming their own kind of hazard for those with sensory processing issues. This is information planners need, but it needs to be studied by product engineers and the medical professions.

About urban lighting and people's relationship with darker skies, one respondent said urbanization tends to disconnect human beings from the natural world and that, "*People need to relate to the night as a positive rather than negative experience.*"

Another respondent said, "*…I have safety concerns for both areas that are too well lit at night and those that are not as well lit. It's all relative to where this "light pollution" is occurring. Seasonal changes are much influential than just artificial light.*"

This response plays into previous sections of this report where it was examined how different kinds of artificial lights effect the human brain in ways similar to or different from natural sunlight.

In regards to mental health, one respondent went into more detail about working with public mental health levels and mental illness prevention, saying, "*… I think the notion of wellness and prevention get overlooked in favor of a focus on the most severe forms of mental / behavioral illness and addiction. Selling promotion of mental wellness and prevention of more serious impairments is very difficult. I think it should be a primary focus, however. In that 1 in 5 people will experience at least a brief period of mental illness -- mild, moderate, or severe -- at least at some point in life, it is important for people to know that it is a continuum, and not an end game.*"

This fact was illustrated very well by another respondent who said, "*I don't know that government or the "public realm" is in the top categories of important influencers or changers of mental health... I see the association, but it is fairly tangential... and less direct than having the right doctor or access to health care or medications or a supportive friends/family network... not if someone has a park nearby... that seems pretty low on the list.*"

This perspective is why this research was conducted. Planning cannot treat mental illness once it has arrived but lowering the levels of risk factors surrounding a population to support wellbeing is part of prevention. Prevention is crucial.

One respondent succinctly said, "*How to fund any of this.*" The three main planning topics discussed in this report are already a part of most city codes and public improvement projects anyway. Research and education take funding as always. But for working with urban form, large increases in costs are not anticipated by planners knowing to disallow zero-cutoff fixtures in their codes, recommend only 2700K or below as the LED light temperature when cities replace streetlights, or that five smaller parks with a variety of activities and natural spaces are going to offer more psychological benefits to more of the community than one large regional outdoor facility would.

Planners on Planning

The questions displayed only to self-identified professional planners were #29, "Where do you think urban planning has a significant effect on public health (physical)?" and #30, "Where do you think urban planning has a significant effect on public health (mental)?" These questions were intended to gather information on where planners see the most being accomplished or capable of being accomplished.

For planning and the physical health of the public, four respondents considered walkability and other active transportation a key area where planning improves public physical health.

Two others mentioned the health problems inherent in having no choice but to drive between every land use in reference to better zoning or land use planning. Two respondents also mentioned zoning in regards to "compatible" land uses or keeping noxious land uses away from housing.

While a few answers offered more detail about how active transportation effects socializing or how we could think about green space design, most of the answers to Question #29 reflected the early modern physical planning paradigm of the planning profession.

When asked the same question in regards to the public mental health, five responses focused on improving urban infrastructure and policies to be more mindful of how those nearby might be affected, referencing walkability and housing density. One respondent used the statement, "*Ensuring that required public infrastructure is not disruptive to nearby residents*," which acknowledges necessary infrastructure as every bit as much a contributing factor to public mental health as items like façade standards and park access.

One planner mentioned making sure there is access to mental health care in the community. If planning regulations are affecting access to care for a group or community, then we should be prepared to be proactive in mitigating them. Another stated mental health is a "very personal issue" and wondered how mitigation could be measured, making no mention of planning.

Focusing on public spaces and green exposure, one respondent said, "*Creating parks and public spaces that "feed the soul" either by creating calm, quiet places or by creating spaces that can be actively used to alleviate stress, such as sports venues, and by creating urban environments that allow positive interaction and communication among friends and strangers*."

This answer reflects the need for variety in our green spaces. A different respondent mentioned the need for more "third spaces" in our cities for socializing.

Another respondent said, "*Urban environments should strongly incorporate nature into the way these places are built. While people assume you must go out of cities to find nature, I find that to be only partly true. Ample landscaping throughout the public and private realms are crucial to both stress and healing... Addressing artificial light and noise are key to helping keep people's cortisol levels in check, as well as finding more ways to encourage active transportation. Driving is proven time and again to be an anti-social behavior that feeds into other anti-social behaviors--it is simply not sustainable.*"

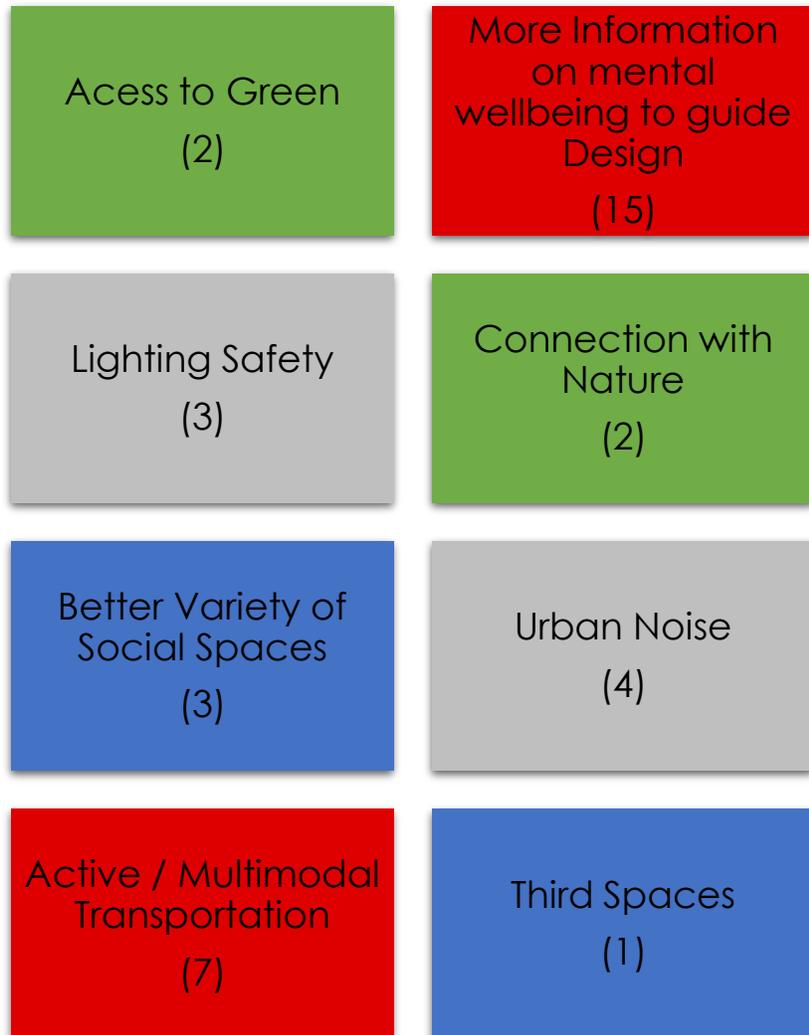|	
Acess to Green (2)	More Information on mental wellbeing to guide Design (15)
Lighting Safety (3)	Connection with Nature (2)
Better Variety of Social Spaces (3)	Urban Noise (4)
Active / Multimodal Transportation (7)	Third Spaces (1)

Figure 41 - Frequency of Themes in the survey free-responses

This response perfectly illustrates why the three planning issues in this report were chosen.

In Summation

Figure 41 provides a count of the main themes discussed in the analysis of the free response questions. These reflect the needs and priorities present in the

responses to this survey. The most frequent topic was clearly a desire to know more.

Overall there was a very high level of agreement with the definitions used throughout this report on both planning and public health matters. Only two answers expressing strong disagreement with a definition were received, amounting to less than 2% of the answers provided to those five questions. In general, we don't seem to be talking past each other that much in discussions of planning, public health, and public mental health rates - we just aren't having those discussions as often as needed.

No strong level of disconnection was shown in the responses between planners and non-planners on these topics. While this was not a representative sample of the professions involved, this was still a positive result for an initial study.

While cohesion on the Likert scale questions analyzed was high, the validity of the data gathered from these free response answers varies. For questions #26 and #27, all the responses were in line with what the intent of the question was. Question #25 had a single response that was an outlier compared to all the others and may have involved something as simple as misreading the question. With a good match between what was intended to be asked and what got answered, the validity of these questions seems high.

The validity of Questions #29 and #30 may be low. Several responses were received for both these questions that did not resemble what was intended to be asked, either addressing the distant future or listing the same items on both questions. One responded with essentially disagreement with Question #30.

The planners who responded to this survey were generally aware of at least some of the interrelationships between the built environment and mental health but were often not sure where to start making improvements or what more supportive design would look like. Multiple requests for educational materials

such as quick guides, infographics, or videos were made by planners for lighting and for how space affects the human brain and mood.

While this was also a common request among non-planners, they provided less specifics about which planning topics would help them improve public mental health or the awareness of it through their areas of work.

Planning in general focused their responses around traditional planning tasks such as zoning code and land use planning.

Ultimately, there was high agreement that public mental health's relationship with the urban environment is an issue planners and cities should be working on. When Question #23 asked if public health could also be an urban (built) environment issue, all the responses were for either somewhat agree or strongly agree. There was no expression of neutrality or disagreement.

We do seem to believe urban planning can and should help address mental health concerns in our urban environments, that this issue is important and we want to do more.

This survey has accomplished its intentions - there is a need for further research of this topic among professional planners and for more publications that communicate mental health issues affecting the public into planner-friendly terminology. While that process will take time and resources, there are still actions we can take to begin improving our professions performance in regards to public mental health risk mitigation right now.

Returning to the Supportive City

With this need for more collaborative and cross-disciplinary conversation fresh in mind, the potential uses of the Supportive City paradigm as a framework to move the conversation forward appears to be relevant. Cities with more

Supportive systems in place can avoid having to undertake greater efforts to address compounding problems later.

As an example of both current efforts and the importance of prevention, the City of San Antonio and Bexar County have undertaken major efforts into improving their ability to intervene in mental health crises without having the situation end up in jail or tragedy and in creating a positive way to intervene in their homeless population within their city center. Over the past 15 years, these efforts have resulted in the city becoming one of the most exemplary cities for community mental health intervention in the nation (Helman, 2016).

Prior to concerted intervention from the judicial system, county public health services, and police training efforts, San Antonio like many cities had a bloated jail population and large homeless population that both consisted of many individuals with mental health issues.

While the population of the City has continued to grow over these last years, their jail population has actually decreased. The overall homeless population has been reduced as well through a system of counseling and access to services, outreach, and transitional housing placement at San Antonio's central Haven for Hope facility.

This 22 acre campus in downtown San Antonio is a nonprofit collaboration with city and county public health organizations and various other organizations. It operates on public and private funding has been in operation since 2010 (Helman, 2016).

At any given time, the Haven and its Courtyard, a monitored place to sleep outdoors for those waiting to take further steps or not mentally ready, houses around 1,700 people (Oak, 2019). The organization's current President and CEO Kenny Wilson stated, "Sometimes at two in the morning, I think, 'We have 1,700 people at Haven. Where would they be if Haven didn't exist?' They would be all over the city. We have data about that," Wilson said. "We do know that since Haven opened in 2010, homelessness downtown has decreased a little over 80%" (Oak, 2019).

Special city police units specifically trained in dealing with ongoing mental health crisis incidents have also been able to positively intervene and deescalate situations that would have gone very differently 15

Figure 42 - The Haven for Hope campus.

years ago (Helman, 2016). Those in crisis are often talked into agreeing to seek treatment. Others are persuaded to go to the Haven for Hope facility. Even those who are not easily persuaded to move on from their location are being brought to this facility instead of taken to jail, a place with no chance of helping them.

The problems of lack facilities for mental healthcare and the lack of first responders trained in intervening when someone is in mental crises is only a facet of a larger problem. The deinstitutionalization of the mental healthcare

facilities of the 20th century was necessary, but the safety net meant to appear in its stead never materialized. Group homes are insufficient in number. Outpatient care is far from those who need it. Local facilities for those in crisis are often nonexistent and emergency rooms are usually not able to provide that type of care (Guevarra & Wilson, 2019)

Similar police training efforts have taken place in other parts of the country. Portland, Organ has increased the amount of training in intervening in mental crisis situations for some officers. Other efforts to improve the situation in the city include five special units where officers are routinely paired with a mental health clinician to try and assist individuals with access to care (Guevarra & Wilson, 2019).

Both of these police programs consider themselves a patch for the larger problem, but while mental healthcare infrastructure continues to struggle, these models offer intermediate steps for first responders that can be taken to improve the situation. There are also limits to the centralized Haven for Hope care model. While the facility offers multiple advantages over traditional shelters, around 30% of the homeless and or mentally ill are not willing to interact with the large facility or the crowded Courtyard. The Courtyard area has continually improved on safety concerns, but it is still continually overcrowded and often noisy, unsuitable for many who still need somewhere to sleep (Brodesky, 2015). For these people, other kinds of help is still needed (Bailey, Kamal, & Colvin, 2019).

San Antonio is an example of a city already in a dire situation taking steps to be more Supportive. Haven for Hope was founded for serving the City's homeless population within the city center. Currently the planning department is partnering with many organizations to develop a more flexible and

comprehensive system to mitigate the effects of housing displacement (Bailey, Kamal, & Colvin, 2019).

San Antonio has many problems with homelessness, housing insecurity, and mental

Figure 43 - A Return to the Supportive City

healthcare, but they are not yet at the level of crisis that cities like Austin and San Francisco have reached and are taking steps to prevent their ever reaching that point (Bailey, Kamal, & Colvin, 2019). Even with the known limitations of the situation, these efforts generally address the grey regions of the Supportive Cities concept being shown, but for the most part this is occurring while a severe problem already exists.

The grey and green factors discussed throughout this report are for general prevention efforts to mitigate tense situations for individuals and communities from sliding into something worse. But they are not the only physical elements in a city that are supportive of mental wellbeing nor intended to limit the flexibility of this framework. More green elements such as urban noise levels or access to water can easily be added or substituted for another risk factor that isn't playing

a big role in a particular city. This is the same for the grey factors, which would be driven by the existing state of mental health infrastructure in the city.

The particular items within the Supportive City framework may shift given the situation cities are facing, but the general structure remains of how the grey and green factors of the concept, both planning and non-planning, can achieve more to address these problems together than either could ever accomplish on their own.

Many cities when faced with rising homelessness reach for more and more hostile spaces. San Antonio was open to being Supportive instead.

Recommendations

Both successes and poor examples of greenspaces, outdoor lighting, and urban form have been discussed throughout this report. Traditional planning literature and studies relating to the human perception of our urban environment share many of the same conclusions on steps to be taken for improving the human experience in an urban environment. The free responses by those planners surveyed have also indicated interest in beginning either better implementation or improving understanding of many of them.

Here those three themes will be revisited by what the planning profession could accomplish in their cities in the near future, what the profession could work on over a larger period of time, and the further research undertaken outside of planning that would provide information that would enable planners to encourage better municipal policies for the public mental health.

Following are two lists of potential improvements that could be begun based upon research that has been done already. One focuses on specific design recommendations and the other focuses on broader policy updates municipalities could undertake.

For specific design recommendations:

- For the vast majority of urban and suburban areas, light temperatures need to be restricted to 3000K and below.
  - Industrial uses like loading docks and airports will need different allowances on lighting than most uses, but they still do not require general pedestrian areas to be lit with a temperature of over 3000K.
- Most lower-activity areas need to be aiming for a light temperature of around 2700K.
- Lighting around nature preserves, riparian areas, or ocean shorelines should be a narrow-spectrum amber light source in the low 2000K range.
  - This is the current best-practice for preventing necessary outdoor lighting from harming wildlife.
- Light fixtures for new construction should all be either partially shielded or fully shielded.
- Decorative landscape lighting needs to be dim and aimed down. String lighting that is not too bright it also a better option than uplighting.
- The nationally recommended lighting ranges in footcandles, such as those by the IESNA, need to be incorporated into codes to allow cities to better regulate against overlighting.
  - For example, the lighting code for the City of Flagstaff has maximum levels in footcandles that sites of various uses are allowed to produce, which include all kinds of lighting.
- Street trees and street greening should be given higher priority than as an aesthetic item.
  - Greener streets are cooler in temperature and get more business traffic and pedestrian use.
  - Views of greener streets provide the needed passive benefits to mental wellbeing that decorative hardscape and turf grass only do not provide.

- City landscaping codes need extensive recommended planting lists to encourage both variety in trees and groundcovers used and overall biodiversity.
  - For example, the City of Arlington's planting list covers many types of landscaping with a good variety of options. Farmers Branch and Celina's lists are very limited and both include an invasive species.
- The "soft edges" concept is needed for new multifamily and other infill residential and for pedestrian sidewalks along streets.
  - Larger, ground floor patios or little gardens provide a transitional buffer between the building and public street, as well as providing more choice in housing for apartment dwellers.
  - The narrow green buffer between street and sidewalk provides an increased sense of safety to pedestrians and more contrast in surfaces that can be seen by drivers, especially when a more textured groundcover is used instead of mown turf grasses.

For more the more varied and potentially city-specific suggested changes and updates to municipal policies:

- There should be a specific lighting design standards section in city code, even if the information is also located with each zone. Lighting standards that vary with each zone are also likely to be difficult for residents and developers.
  - The City of Flagstaff has a lighting section that explains their three lighting zone types in both technical detail and understandable language.
- Changing the standards for new construction only won't be sufficient. As much existing lighting needs to be updated as possible.
  - As was done in Dripping Springs, municipal code should have items such as remodeling trigger bringing outdoor lighting up to code

and also have a time limit such as a decade for everyone to reach full compliance with new standards (Wilder, 2014).

- Urban parks need to be more accessible in every way - ADA, age, lifestyle, for wildlife, etc. Regional parks offer more variety, but that variety is also needed at the local level.
  - DFW is covered in local parks that are essentially a patch of lawn, some equipment for small children only, and a static bench for someone to sit and watch. This only serves a small section of people.
- To better support urban biodiversity and other forms of green infrastructure that can provide the passive psychological benefits needed, cities should reexamine how green areas are maintained and why.
  - Frequent mowing is expensive and prevents green spaces from being more ecologically useful. Fields and areas high in pedestrian traffic are one thing, but there is a place for meadow in urban environments and definitely a place for better use of evergreen groundcovers.
- Many parks, public and private, close at "dusk" while remaining brightly lit all night. Longer park hours are needed.
  - For months of the year many of us don't return to our neighborhoods until after dark, but parks still available to the public at 10 or 11 PM seem rare. Our cities are full of shift-workers, students, and night owls who could use them.
- Many cities should rethink how mental health care facilities are allowed to be placed. Some medical offices do have specific site needs, but others do not and likely need more zoning flexibility.
- Allowing small counseling or psychological practices into live/work spaces could also increase access to care.

- o As most of these practices work with individuals or small groups and only psychiatry involves medications, a live/work space would often be enough room to practice.
- More guidance on urban form is needed in design standards and zoning codes regarding human perception, such as the active facades, soft edges, and transitional conditions discussed in Cities for People.
    - o It is isn't fair to designers and developers to provide little specifics or guidance for what the goal for a space is. It quickly leads to confusion, frustration, and inefficiency (Whyte, 1980).
- Some amount of variety in material, form, and color is needed. Per *Environmental Aesthetics*, too little and it becomes off-putting.
    - o Some level of aesthetics regulation is needed, but when only one of items like roof pitches or façade materials are allowed in a neighborhood or only one font and color is allowed for a commercial shopping center there is likely too little visual variety for many people.
- How residential areas are being zoned should be reexamined. It isn't just commercial areas that need activity throughout the day and visual variety.
    - o Homogenous residential areas encourage populations to be all of one demographic, which diminishes the ability to have "eyes on the street" throughout the day and night.
    - o Euclidian zoning was intended to keep noxious uses away from residences but has expanded far beyond these intentions. Other tactics for regulating land uses are being tried in many cities right now.
    - o Most cities in America are short on both housing and density. Adding the ability to have items like garage apartments or "grandmother houses" on properties would be a place to start

before other types of housing are incorporated (Montgomery, 2013).

Many of these relate back to the benefits of passive exposure to urban green, but a lot of this list is lighting related. To further illustrate why expanding lighting design standards would have an immediate impact in so many areas, Flagstaff, Arizona has a 12 page section on lighting with standards for types of light, the temperature of the light, for measuring the light level on a site, and for decorative and ornamental lighting. These standards are in no way a ban on decorative lighting, which can offer a lot of visual character to the nighttime urban environment

Figure 44 - Decorative lighting feature that also serves as building height indication for the Addison airport.

such as the feature in Figure 44, just reasonable limits on brightness and the requirement that the decorative feature be counted as contributing to the overall brightness produced by a site.

The City of Arlington's Unified Development Code has lighting standards scattered throughout the zoning information, which often varies by zone, which leads to a lighting environment that is uneven. An example of one of the rapidly growing suburban cities far north of Dallas who pride themselves on offering a more 'rural' living experience, the lighting code for Celina, Texas has no mention of light temperature and limited design guidance for new lighting. There is room for improvement.

For further research undertakings either in the field of urban planning or through collaboration with others, new information on these topics is needed to make improvements to our cities.

- It is established that many green revitalization projects lead to gentrification, but further study is needed by planning on the equity of different urban greening efforts. For some neighborhoods, smaller or simpler parks and street greening may offer the more equitable solution.
- More detailed information is needed on upper and lower noise limits that would be suitable to require for items like construction equipment, emergency sirens, crosswalk beepers, etc. to assist in policy writing.
- Public policy research is also needed for the regulation of vehicular lighting. Car manufacturers are increasingly installing brighter and brighter blue-white headlights and aftermarket user modifications tend to be even more harsh on vision. The clutter and glare from this light source is significant on busy roads.
- Research is needed into the potential of different median designs for mitigating the glare of oncoming headlights for increased driver safety. That street trees help calm the speed of traffic is known. If there is an ideal height for shrubs placed in the medians of busy roads to help block glare it would be useful information for cities, transportation departments, and landscapers.

For other further research endeavors, another source I would have liked to find in the course of this research is a cross-cultural meta-analysis of urban environment effects on mental wellbeing. Much of the psycho-social factors of a population are cultural, where we perceive the threshold for crowding for example. The more that is understood about these preferences and where they are similar and different, the better we will be at designing spaces for our multicultural cities.

This would also be a useful contrast for the biological factors of health in the urban environment. Humans cannot breathe lots of smog without unpleasant effects. We become annoyed and tired when it is too bright to sleep. South Korea enacted a "Light Pollution Prevention Act" nationwide in 2012 to return darkness at night to their country after decades of competing light clutter (Cities & Lighting, 2016). They created Asia's first dark sky park in 2015, the Yeongyang Firefly Eco Park, through proactively managing light sources in and around a natural area (IDSA, 2015). Subjective concepts of crowding may vary widely around the world, but other health factors such as light are much more universal.

But most critically, a further study of our own profession is needed to understand how aware most professional planners are of how the urban environment can raise or lower a population's mental health through these risk factors. The survey that was performed showed a lot of agreement that this should be a priority matter for planning and a lot of uncertainty about the details. There were many requests for more information about the topic. A survey of planners on a much larger scale would provide a much clearer picture of how to approach that task.

Sociological discussion of demographics and cultures and how these things affect planning needs are already common themes in urban planning education. While we cannot reasonably expect most planners to learn a base level of biopsychosocial information, especially the biological portions, for those planners who want public health matters to be a focus in their careers, the pursuit of some basic knowledge of modern psychology, human factors psychology, or an equivalent needs to be encouraged and available.

In Conclusion

Throughout this report we have examined how the biopsychosocial perspective of psychology provides insight on how we interpret the risk factors present in our urban environment. This perspective can be used to support urban forms that work to support human behavior at the instinctive and sometimes messy level, rather than design interventions that control organic behaviors and cannot achieve the same goal. A review of planning literature has informed us that although this topic has been studied in the past, we lack research being done either by planners or through collaboration with planners on this topic with contemporary scientific information incorporated. Research in this topic is also being done by non-planners, but these studies often quite understandably miss the details of planning topics.

A survey of professionals in various fields involving the urban environment showed that the respondents generally understood the planning topics of green space, outdoor lighting, and public spaces to mean the same things between professional planners and non-planners. The survey results also showed a high level of agreement that urban planning should be involved in efforts to improve the rates of good mental health in today's cities.

There are many urban environmental risk factors involved in mental health, more than were examined in this research. Urban noise mitigation will require collaboration outside the planning field. Interventions to improve urban greenspaces and forms are often restricted by the spaces that already exist in cities. But many cities right now have either only just begun transitioning to LED lighting or have not started yet. There is an opportunity right now for planning to get out ahead of this particular environmental risk factor and prevent the widespread implementation of unhealthy lighting.

The most heartening part of undertaking this project has been watching this topic grow. This research topic was conceptualized in 2015, before I had even

begun graduate study. An undergraduate background in architecture and biopsychology lead me to it, that and the unforgettable experience of seeing city-center levels of skyglow for the first time as a horrified 19-year-old.

2015 was the same year Conscious Cities was founded. As sources were being collected for this report numerous studies were in progress in cities around the world. The Urban Mind Institute's first research study took place and was completed as this paper was being written, using the new method of a smartphone app to survey participants wherever they were in real time over a period of weeks, methods not available for planning research even ten years ago (Bakolis, et all, 2018).

Research and enthusiasm for applying more biological data and psychological research methods to how we can design cities for people has taken a leap forward over the last decade. But how planning discusses mental health and uncomfortable or "negative" emotions still lags behind, just like most professions. We'll discuss our joints and our latest diet and the need to 'be healthier' ad infinitum, but conversations about all but the shallowest levels of mental wellbeing are still taboo for many.

At APATX19, the keynote lecture by Candy Chang focused on what brings humans together to share space in the first place. We gather to share and to hope, but when the topic shifted to shared grieving, towards not hiding death out of site when shared ceremonies to memorialize our dead was one of the first gathering points of human society, to the acute depression of loss, the shift as large portions of the crowd looked away, found something interesting about their empty plates, was obvious (Chang, 2019). If the planning profession wants to create an urban environment supportive of the public physical and mental health, we must improve our ability to discuss both equally.

Technology will change. Aesthetic trends will change. New building materials and different types of infrastructure will arrive. Urban planning will adapt

accordingly, but what a human needs in their environment to be content will remain similar. Time among green things. A warm light for safety and a dark sky for sleep. A sense of choice in human connection. What brings us together emotionally, joys and griefs, will not change.

When access to these items and similar are supported throughout the urban environment, the overall rates of our public mental health improve. Not a cure for disease, but a prevention of the lifestyle of overload that too often leads to it. We can only become more Supportive Cities by giving equal weight to the challenges of the mental risks of our urban environment as we do for the physical ones.

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Appendix

The full text of each survey question and all answer choices is as follows. Questions are numbered in bold. The numbers in parentheses are due to a Qualtrics glitch where five numbers were skipped over. The numbers in bold were used throughout this report.

Q1 -

▲ CONTINUE - I voluntarily agree to participate in this study.

▲ DECLINE - I do not wish to participate in this study.

Q2 - Would you agree with the definition of public green space as *freely accessible areas that include natural vegetation such as grass, plants or trees*?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q3 - Would you agree with the definition of public health as *preventing disease, prolonging life, and promoting human health through organization and informed choice*?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q4 - Would you agree with the definition of light pollution as *a disruptive brightening of the night sky caused by streetlights and other man-made sources*?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q5 - Would you agree with the definition of public mental health *as improving mental health and well-being and preventing mental illness through organization and informed choice*?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q6 - Would you agree with the definition of public social space as *freely accessible spaces where people are able to congregate, socialize, and linger*?

▲ Strongly
Agree ▲ Somewhat
Agree ▲ Neither Agree
nor Disagree ▲ Somewhat
Disagree ▲ Strongly
Disagree

Q7 - How frequently does your professional work involve public green spaces?

▲ Frequently ▲ Somewhat
Frequently ▲ Neither
Frequently nor
Infrequently ▲ Somewhat
Infrequently ▲ Infrequently

Q8 - How frequently does the issue of light pollution come up in your professional work/work environment?

▲ Frequently ▲ Somewhat
Frequently ▲ Neither
Frequently nor
Infrequently ▲ Somewhat
Infrequently ▲ Infrequently

Q9 - How frequently does your professional work involve public social spaces?

▲ Frequently ▲ Somewhat
Frequently ▲ Neither
Frequently nor
Infrequently ▲ Somewhat
Infrequently ▲ Infrequently

Q10 - How frequently does the issue of public health (physical) come up in your work/work environment?

▲ Frequently ▲ Somewhat
Frequently ▲ Neither
Frequently nor
Infrequently ▲ Somewhat
Infrequently ▲ Infrequently

Q11 - How frequently does the issue of public health (mental) come up in your work/work environment?

▲ Frequently ▲ Somewhat
Frequently ▲ Neither
Frequently nor
Infrequently ▲ Somewhat
Infrequently ▲ Infrequently

Q12 - Would you agree with the statement that the urban (built) environment has an impact on physical health?

▲ Strongly
Agree ▲ Somewhat
Agree ▲ Neither Agree
nor Disagree ▲ Somewhat
Disagree ▲ Strongly
Disagree

Q13 - Would you agree with the statement that mental health has an impact on physical health?

▲ Strongly
Agree ▲ Somewhat
Agree ▲ Neither Agree
nor Disagree ▲ Somewhat
Disagree ▲ Strongly
Disagree

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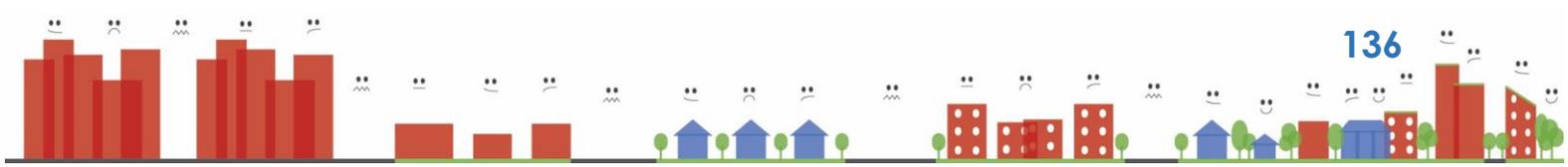
Q14 - Would you agree with the statement that the urban (built) environment can contribute to stress?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q15 - Would you agree with the statement that the urban (built) environment may contribute to social isolation?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q16 - Would you agree with the statement that urban light pollution can affect sleep quality?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q17 - (22) Would you agree the public health (physical) should be a major priority for cities?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q18 - (23) Would you agree the public health (mental) should be a major priority of cities?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q19 - (24) Would you agree with the statement that there is a relationship between bright exterior lighting and safety/security?

▲ Strongly Agree   ▲ Somewhat Agree   ▲ Neither Agree nor Disagree   ▲ Somewhat Disagree   ▲ Strongly Disagree

Q20 - (25) In your opinion, do large parks offer more social benefit to communities than small parks?

▲ Definitely Yes   ▲ Probably Yes   ▲ Might or Might Not   ▲ Probably Not   ▲ Definitely Not

Q21 - (26) In your opinion, is public health strictly a public policy issue?

▲ Definitely Yes   ▲ Probably Yes   ▲ Might or Might Not   ▲ Probably Not   ▲ Definitely Not

Q22 - (27) In your opinion, can public health also be an urban (built) environment issue?

▲ Definitely Yes   ▲ Probably Yes   ▲ Might or Might Not   ▲ Probably Not   ▲ Definitely Not

Q23 - (28) Do you discuss public mental health with your coworkers?

▲ Definitely Yes   ▲ Probably Yes   ▲ Might or Might Not   ▲ Probably Not   ▲ Definitely Not

Q24 - (29) Are you reluctant to discuss public mental health with your clients?

▲ Definitely Yes   ▲ Probably Yes   ▲ Might or Might Not   ▲ Probably Not   ▲ Definitely Not

Q25 - (30) How do you think the profile of public mental health could be increased in your profession?

_____

Q26 - (31) What learning tool or information would be most useful to you for better understanding this issue?

_____

Q27 - (32) Do you have a concern about this issue that has not been mentioned so far?

_____

Q28 - (33) If you work in urban planning please click Continue. If you do not work in urban planning, please click Finish

▲ CONTINUE   ▲ FINISH

Q29 - (34) Where do you think urban planning has a significant effect on public health (physical)?

_____

Q30 - (35) Where do you think urban planning has a significant effect on public health (mental)?

_____

FINISH