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The Case of Santiago de Chile: Pedestrian Deaths, Neo-Liberal Urban Design, and Insufficient Traffic Policy Reform

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THE CASE OF SANTIAGO DE CHILE: PEDESTRIAN DEATHS, NEO-LIBERAL URBAN DESIGN, AND INSUFFICIENT TRAFFIC POLICY REFORM

By

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ABSTRACT: The Case of Santiago de Chile: Pedestrian Deaths, Neo-Liberal Urban Design, and Insufficient Traffic Policy Reform

Chile's rate of road fatalities and pedestrian deaths, in particular, has remained a global outlier, even as comparable states have reduced occurrences. Santiago, one of the most urbanized cities in Latin America and Chile's capital, serves as a unique product of competing urban design ideologies put forth by democratic and authoritarian governments throughout the 20th century, and the social and economic stratification created has continued to present challenges for solving urban planning issues in modern Santiago. Recent adjustments in traffic laws have begun a reduction in road fatalities, but they still do not account for the discrepancy between Chile and other states. This is due to the failure to address the underlying problem of urban design solely shaped to create profit which has ignored lower-income sectors of the population who rely heavily on walkability in urban areas. A comparative analysis of US pedestrian deaths in suburban arterials furthers this analysis that adjustments in traffic policy will be insufficient in impactfully lessening pedestrian deaths in Santiago, Chile to globally comparable rates.

Chapter 1: Introduction

Pedestrian Deaths in Perspective

Out of all the members of the Organization for Economic Co-operation and Development, Chile has led in road fatalities since 1998 per 10,000 vehicles, with more than five fatalities per registered 10,000 vehicles compared to the average of less than one. Further, in recent years as safety issues have become more widely addressed, other states have made significant progress in reducing their rates. Between 2001 and 2013 Germany lessened road fatalities by 50% and Spain by 70% - at the same time as Chile reduced by 10% (OECD, 2021). The long-term trend for road deaths points to stagnation in Chile. Between 2000 and 2019 the number of annual road fatalities fluctuated at around 2,000 deaths per year. In 2019, Chile registered 1,973 road deaths – a 0.9% increase from 2018. Even besides fatalities per vehicle, Chile experienced 10.5 traffic deaths per 100,000 inhabitants. The average in the European Union in 2019 was 5.1 deaths per 100,000 inhabitants (International Transport Forum, 2019). These staggering statistics show Chile to be an outlier in traffic fatalities and lead us to question the causes and policies behind them that have created this phenomenon and how it plays out in the daily lives of Chileans.

Traffic accidents will become the fifth main cause of death by the year 2030 according to the World Health Organization (WHO, 2015). However, traffic crashes are accepted for the most part to be caused by known and preventable causes, speeding, distracted driving or driving under the influence, non-use of seat belts, and lack of respect for vulnerable road users such as cyclists and pedestrians (UNECE, 2009). For context, the

standard definition of traffic fatality used by the International Transportation Forum and the World Health Organization refers to any person killed immediately or dying within 30 days as a result of a road injury accident. Suicides involving the use of a road motor vehicle and fatalities involving non-motorized bicycles as the only road vehicle are excluded (OCED, 2016). If the correlation between these factors and traffic accidents and fatalities is agreed upon, then why has the problem stagnated in places with still high levels of traffic fatalities such as Chile?

As is in many situations in both life and policy, there is a gap between knowing and doing, especially when these traffic fatalities disproportionately impact lower-class citizens who have less access to and influence in the policy-making process. Some of the most vulnerable individuals, socially, and in traffic accidents, physically, are pedestrians, who account for a third of Chilean road deaths (International Transport Forum, 2019), as well as one-quarter of global road traffic deaths (World Health Organization 2013a). And though pedestrians with physical disabilities are not a high portion of the pedestrian population, they are at a particularly high risk of injury and death in traffic collisions. The pedestrian population remains vulnerable, both to factors in the built environment as well as the demographic characteristics of pedestrians at-risk (Stoker, Philip, et al, 2015). Some of the only research on this topic in this area has been conducted to prevent pedestrian-specific traffic fatalities around bus stops and schools in Santiago, but that is because child deaths are sympathetic to the public, though the 0-14 age group is the least at risk of traffic fatalities (International Transport Forum, 2019). Outside of involving children, pedestrian deaths are primarily seen as the result of carelessness on the part of pedestrians, not on drivers. Children are absolved of the responsibility to obey street

signs and only cross the street on sidewalks, but for all others, they must be obeyed without question.

In a perfect world, this mentality would be understandable, but when cities are designed to prioritize the efficiency of car travel over the needs of the pedestrian and land usage regulations allow for massive highways near businesses that are frequented by pedestrians, a disregard for street guidelines will occur. Since the early 2000s, the National Road Safety Commission (Comisión Nacional de Seguridad de Tránsito, or CONASET) has both proposed and implemented many policies to lessen traffic fatalities by regulating the behavior of cars such as harsher restrictions on inappropriate speed and alcohol use, but have not concretely addressed the underlying issues that cause pedestrian deaths in the first place.

The city built environment should be designed to protect and provide security for pedestrians, but that is not always the expressed intention or focus. Pedestrians face risk from a variety of factors, including urban development patterns and land usage, difficulties related to pedestrian walkability such as poor lighting and a lack of crosswalks, and risky car behavior. Incident-inducing characteristics of the built environment are not solely dependent on the actions of individuals, both pedestrians and vehicles, but the infrastructure can inform those actions, visibility, traffic volume, and speed.

Research Question

This thesis will examine how policy designs have influenced the frequency of pedestrian deaths in Chile's capital city, Santiago, one of the most urbanized cities in

Latin America. My initial research question was to ask why Chile has such a high level of pedestrian deaths and if pedestrian deaths are due to poor policy decisions in Latin America, more specifically Santiago, Chile, in the way that they are in the United States. High pedestrian deaths in Santiago, Chile can be attributed to poor urban policy planning decisions that did not take into account the culture of walkability in Latin American communities. The thesis discusses this policy design and analyzes why the recent design is making a difference and what is still needed to be adjusted. Chapter 2 gives an overview of Santiago's political history and urban development priorities from the Frei Administration to the Pinochet Military Junta and how each era has influenced the present city's planning. Specifically, this literature review includes both academic literature and gray literature discussing the social segmentation and sprawl that occurred as a result of reckless urban planning and synthesizes some of the most recent research on pedestrian deaths with Santiago's political history. In the majority of these sources, it is noted that further research is needed as well as a focus on interdisciplinary collaborations, showing that the researchers that are examining this topic professionally agree that it needs more attention in both the academic and professional spheres. There are several special interest groups that focus on pedestrian safety or walkability, but they are often not given authority to speak on these issues because larger planning and transportation groups remain focused on planning as an economic tool, rather than a humanist one. With this literature review, I place the current planning situation within the larger context of Chile's political history to better understand how overall changes in transportation policy have been impacted. It concludes with a summary of Santiago's urban policy and planning today and my methodology. Chapter 3 gives a review of transportation policy

developments since the 2017 update to the National Road Safety Policy and the specific laws implemented to lessen those known and preventable causes of traffic fatalities like inappropriate speed and alcohol use. Then in my data analysis section I will cover the impact of these changes and argue that while they have been effective in lessening traffic fatalities overall, they are still not sufficient in solving the root cause of pedestrian deaths. Chapter 5 will explore the policy implications of Santiago's predicament and give a comparative perspective to the problem of pedestrian deaths in the United States, as I believe that while the root causes of these fatalities in Santiago are specific and due to Chile's history, it is also a common problem that other nations have not adequately addressed.

Methodology

When referring to Santiago in this work, when used without any other descriptor, it is being used to refer to Greater Santiago (Gran Santiago), the metropolitan area that is defined by its urban continuity. It includes the commune of Santiago, also known as Downtown or Central Santiago (Santiago Centro) which serves as the city's administrative division and constitutes the area of the city occupied during its colonial period. Greater Santiago also includes more than 40 other communes. Frequently the term "Santiago de Chile" is also used to differentiate between other cities called Santiago, so it may also be referred to as such (Martínez & Contreras).

This work will also utilize the definition of risk from the World Health Report *Reducing Risks, Promoting Healthy Life* from 2002 when discussing pedestrians as an at-risk group, meaning "a probability of an adverse outcome, or a factor that raises this probability" (World Health Report, 2002). When referring to sprawl, that term is being

used specifically and technically to refer to an area that 1. is a widely dispersed population and low-density development; 2. the rigid separation of residential, commercial, industrial, and office uses; 3. poorly defined activity centers; and 4. a road network typified by large blocks and poor connectivity (Ewing, Pendall, and Chen 2002).

My research consists of a blend of qualitative and quantitative research, using journal articles and other forms of academic literature to build the literature review of how Chile and Santiago's political histories have influenced successive eras of urban development. I combined academic literature detailing various administrations with grey literature such as policy reports, and government documents from international organizations focused on global health and safety. I also include a brief primer on walkability unique to Santiago and its culture, which informs the level of pedestrian activity within the community. In Chapter 3 I examine 2 major policies passed in the 2010s in detail: the speed limit reduction legislation from 2018 and reforms related to alcohol use in 2012 and 2014 (Emilia's Law). These are commonly understood causes of traffic fatalities and are representative of the legislative focus and response to Chile's high level of traffic fatalities and pedestrian deaths. I then look at the changes in traffic fatalities and pedestrian deaths using archival research and data from CONASET (Comisión Nacional de Seguridad de Tránsito) which is Chile's main governmental entity that oversees transportation and safety. In this analysis, I suggest that the lack of significant decrease in traffic fatalities and pedestrian deaths is due to a misalignment between legislative priorities and the realities of the impact of poor urban planning in regard to pedestrian safety.

Chapter 2: The Case of Santiago de Chile

Urban Development Priorities: Frei Administration to Pinochet Military Junta

Santiago has undergone various eras of urban development with contradictory goals being pushed by different government administrations, creating a unique history regarding urbanization that provides important context to understanding its modern issues. Though the city has grown since 1541 after being founded by a group of Spanish conquistadors, the story of modern Santiago begins with the dictatorship of Augusto Pinochet in 1974, whose economic reforms led by neoliberalism were a sharp departure from the state-owned industries and centrally-planned economic programs previously championed by Salvador Allende's Marxist government. Influenced by the "Chicago Boys," a group of primarily United States-educated economists who advocated for libertarian economic policies such as privatization and widespread deregulation, urban design practitioners began to focus specifically on crafting policies that prioritized profit above all social considerations to fit within the neoliberal framework. Professor Francisco Vergara Perucich from Universidad de Las Américas (Chile) states that this is a phenomenon within metropolises of the global South, "an area where neoliberalism has reshaped cities for the sake of increasing capital, thereby fostering a sense that the development of a city is a financial investment rather than a social project" (Perucich pg. 3). This intense focus on profit margin has reduced urban development in Chile to define economic gross as the main goal of human activities and disregards the role of urban design has to "involve cohesive socio-cultural values that shaped cities and maintain

equilibrium based on human values (Golany, 1995), and serve as "the discipline through which social aspirations can be realized physically" (Canniffe, 2006, p. 1).

The institution of a military dictatorship makes it obvious that an open and free state would not be entirely aligned with the administration's goals, but acknowledging the intense and expressed focus of urban design solely for economic benefit is important to note when understanding the history of urban design in Chile in the 1970s, exposing the true character of what the regime held to be the conception of socioeconomic development. This shift in the institutional framework (norms and regulations upheld by government, companies, local authorities) led to a change from Diseño Urbano Social (Social-Oriented Urban Design) to Diseño Urbano de Mercado (Market-Oriented Urban Design). While practitioners under Diseño Urbano Social produced urbanism aiming to contest capitalist ideals and advance social justice, under the framework constraints of Diseño Urbano de Mercado, attention was focused on supply and demand and the needs of real estate investors.

In the administration of Jorge Alessandri (1958-1964), the policies in place were within the framework of the market economy but held a certain degree of protection for the country's business sector. They also modeled tax exemptions laws for builders off policies in the United States, creating the Sistema Nacional de Ahorro y Préstamos (National Savings and Loan System [SINAP]). These policies put pressure on the state from the public to assist low-income sectors, as they favored the middle and upper-income levels. Development continued but was still seen as insufficient with the overhanging accumulated deficit. The policies however did further the creation of *callampas,* the illegal construction of dwellings, and the occupation of periphery urban

lands, which planted the seed for spatial segregation, discussed more in the subsection "Urban Policy Today".

The Frei administration created the Ministerio de Vivienda y Urbanismo (Ministry of Housing and Urban Affairs), whose objective was to curtail the housing shortage by encouraging the production of housing with a policy of popular participation and income redistribution that would also stimulate the internal market. Frei's programs showed ambition and a desire to reform the liberalism shown in the previous administration that the business class had grown dissatisfied with. While they were fairly successful in construction, the response was not the enthusiastic social mobilization to support the administration's policies that they had hoped for, and the allocation of resources made by the government had not appropriately considered inflation.

Allende's socialist faction gained popularity as people began to search for more extreme solutions, as the shantytown *callampas* and *conventillos* (deteriorated rental housing or tenements in the central areas of Santiago) grew by 300,000 inhabitants. Allende's administration was the best equipped of the administrations so far to deal with the housing crisis, and the ideological changes that came with his administration shifted institutional priority to that of Diseño Urbano Social (Social-Oriented Urban Design). However, at a certain point, the intense growing need for housing that led some to critique the administration was absorbed with the critiques of those that had political opposition to the administration due to its Marxist and socialist identity. The obfuscation of the need for resources into a mechanism to achieve political upheaval was a factor leading to the military coup of September 1973 of the Allende government. Though there was significant government-led housing development, an average of 40,000 houses per

year under Frei and 52,000 per year under Allende, this period revealed the capability of overcoming inherent obstacles of the urban environment, but it was jettisoned by the incoming military junta for its incompatibility with the prevailing ideology.

The urban policies instituted under Pinochet's regime exemplified "an obsessive faith in the liberating forces of the marketplace as the motor for national growth" (Kusnetzoff, pg. 8). "Política Nacional de Desarrollo Urbano" published in 1979 stated that urban planning development "will be aimed at making the process of urban development compatible with the global model of the country's development, creating the conditions most convenient for facilitating the operation of the urban land market" (MINVU, 1979). This created significant negative impacts on the level of access to housing and urban services, especially for the poorest of the poor, and made clear that the administration's chief priority was profit, not people.

In 1985 the government developed a new national policy to deal with the effects of the acceleration of the informal settlements that increased due to the 1979 policy, reaching close to a million households by 1989. The 1985 modified policy was organized as a public-private agreement between the state and free-market agents, the política adjusada (adjusted policy) designed a necessity of creating planning instruments at a municipal level coordinated by local authorities. While this was seen as an improvement, the policy retained the guiding ideal of urban development led by free-market rules and a set of permissive ad hoc regulations that were designed to extricate as much profit as possible from urban development projects. While this began a public-private partnership with the Chilean government, leading to urban growth seen as exemplary by those who value profitability, the uneven development of the city has created problems lasting for decades

for modern practitioners to solve. The focus on market-based strategies above all planning priorities during the Pinochet dictatorship has been described by modern scholars as an "ideological black box" that worked to idealize the free market and install profit as the primary goal for not just infrastructure, but also education, health, and a variety of public sectors. This neoliberal model through policy strongly encouraged Chileans to become more consumption-oriented and to foster the idea of the entrepreneurial spirit as a way to encourage a shift away from more traditional, collective society-focused values.

Social Segmentation and Sprawl: Historical to Modern

Policies put in place in the Pinochet dictatorship encouraged a great deal of real-estate speculation that led to the middle and upper-income sectors gaining privileged locations within metropolitan Santiago, especially in the communes of the Oriente area, leading to housing constriction to reach an estimated 58% of the total urban land supply being inhabited by only 12% of the population of Santiago (Sabatini). Only a few years later the Ministerio de Vivienda y Urbanismo loosened control over urban land by abolishing the urban limits of Santiago. This act, established by Decree No. 420, added 64,000 hectares to the existing 36,000 hectares which tripled the potential land market (Hechos Urbanos). This also signaled a shift in attitude that urban land is not scarce but can be expanded as much as the market desires. The Ministerio stated,

> "Permanently it has been insisted upon that urban land is a scarce and irreplaceable resource, which has contributed to its price suffering frequent distortion in the marketplace by artificially restricting the supply. Present policy, on the contrary, is based on the principle that land is not a scarce resource, but

> that its apparent scarcity is provoked in the majority of cases by the inefficiency and rigidity of the rules and legal procedures applied up until now in order to regulate the growth of cities" (MINVU, 1979: 18-19).

While this was designed to increase the supply of land to increase accessibility to marginalized populations because of high prices, it actually drastically increased prices of this previously fringe land as well as prices for the urban interior. Arnold Harberger, an economic advisor to Pinochet, had believed that the limitation of the urban area by artificial regulatory instruments was the cause of the unbalanced differences in land values between urban land and surrounding rural land. The drastic expansion of urban boundaries encouraged the development of residential segregation. This sprawl of urban areas and spatial fragmentation due to social and economic stratification has persisted in modern Santiago and presents challenges for practitioners today to work to impact change and solve issues within certain sectors that reflect onto the whole city.

Urban Policy Today

In 1990 Chile began the transition back to a democracy, and in that period the city of Santiago underwent a series of transformations, the changing lifestyles of inhabitants and the emergence of new social systems, but also a reckoning with what would be the extent of the dominance of market-oriented policies in deciding the future of urban areas and the level of flexibility available in the urban development process. The speed and shift to try to move away from repressive Pinochet policies led Santiago to become even more fragmented and uneven. Like in the transition between previous administrations, the primary strategy in Chile for responding and adjusting to changes was through urban development projects, which in this context can be interpreted as specific urban

interventions that aim to resolve or relieve gaps or urban issues by working to provide a better public good. However, this leads us back to the problem mentioned in the section "Social Segmentation and Sprawl: Historical to Modern", that the policies implemented to create more housing led to urban sprawl.

The idea that the city's design has led to uneven development and the creation of housing without ensuring access to public goods per area, which can be seen in Figure 1 (Source: CASEN 2015 data & Perucich), has been recognized and attempts at adjustment have been made by politicians in the 2000s. In 2012 President Sebastián Piñera gathered a board of specialists to redesign the National Policy for Urban Development, which had the greatest amount of input from a variety of actors than the previous two revisions. Specifically focused on spatial segregation, this policy attempted to lessen the blatant division of economic growth in the city, which is the most segregated among OECD countries (OECD, 2103). The spatial segregation can be visually observed in Chart 1, sourced from the article "Space and social capital: social contacts in a segregated city" by Otero, et al.

Chart I

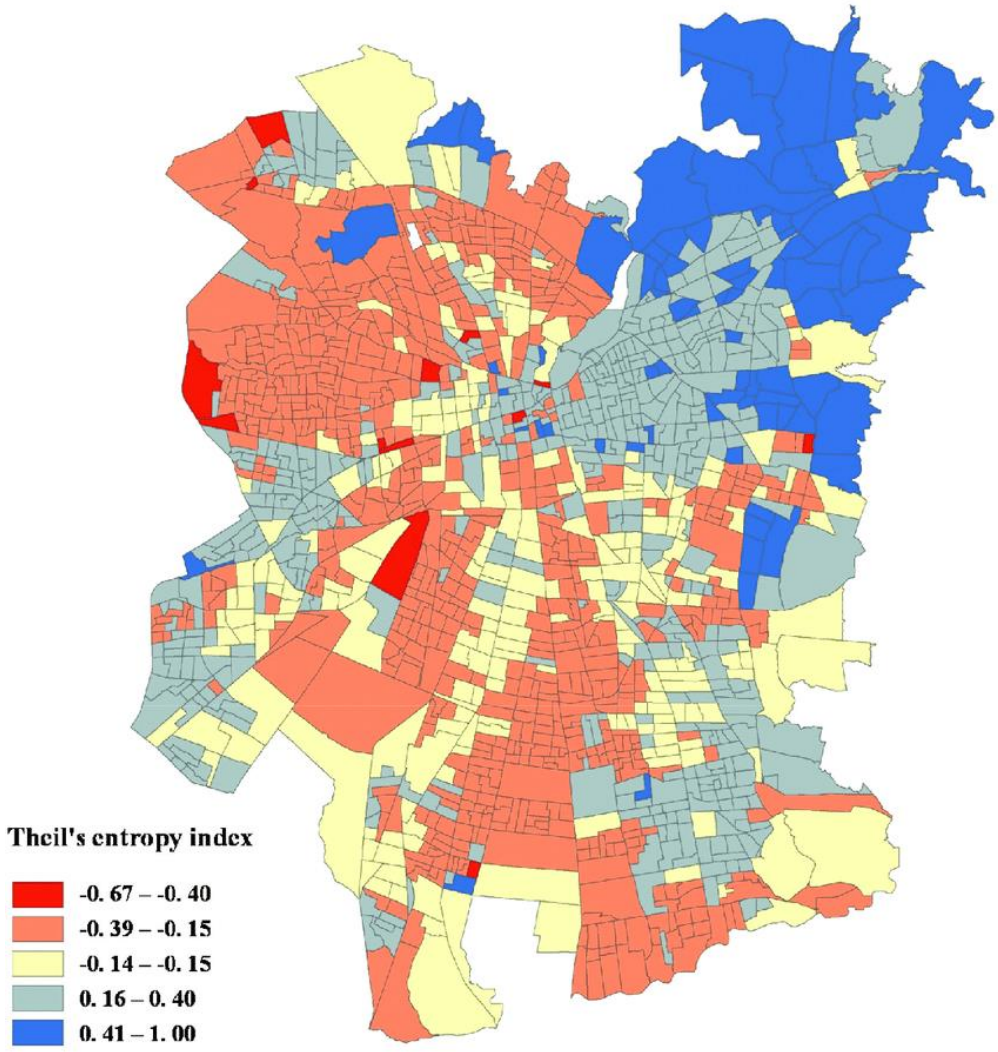


Chart I: spatial segregation based on quantified socioeconomic status (SES) using an adjusted Theil's entropy index

The terms spatial segregation and segmentation are used frequently in this chapter, and it is important to understand their connection but also distinct definitions. Spatial segregation has to do with the makeup of the people living in different areas, while segmentation is a business term that refers to a strategy for allocating resources. Therefore, segmentation is a conscious action that divides a community into markets

depending on their demands, interests, and especially, their purchasing capacity. This process is inherent to the idea of a city design governed by the principles of neoliberalism, creating space for the rich and the poor, which also leads to social segregation, by class, but also frequently by race, ethnicity, language, etc.

Urban sprawl is seen to be a factor in the fatality of pedestrian/vehicle collisions, as a 2003 study found a connection where each 1 percent decrease in sprawl resulted in a 1.49 percent decrease in traffic-related fatalities overall, as well as between 1.47 and 3.56 percent decrease specifically in pedestrian fatality rates (Ewing, Schweiber, and Zegeer, 2003). Urban sprawl can be defined by four characteristics according to Ewing, Pendall, and Chen, "1. a widely dispersed population and low-density development; 2. the rigid separation of residential, commercial, industrial, and office uses; 3. poorly defined activity centers; and 4. a road network typified by large blocks and poor connectivity (Ewing, Pendall, and Chen 2002). A 2011 study found that denser street networks with a higher number of intersections (which is the opposite of urban sprawl) had fever crashes across all levels of severity. Vehicle-pedestrian collisions that occur in areas near schools and neighborhoods with mixed land use also had a lower rate of injury and death when compared to collisions with other development styles. Another study found that the presence of strip malls and big-box retail stores along with the high mileage of arterial roadways (another factor common in urban sprawl) are determinants of traffic injury rates (Dumbaugh and Li 2011).

We have discussed spatial segmentation in previous sections and that the division of communities into economic markets has led to the unequal development of areas of the city, which in turn leads to sections of the city where pedestrian deaths are more

frequently occurring. When following the values of Diseño Urbano Social, cities should be designed to protect and provide security for pedestrians, but that is not always the expressed intention or focus when following the neo-liberal urban design emphasis. The risks facing pedestrians come from a variety of factors that are not dependent on cars or their own actions but can be influenced by aspects of infrastructure, such as visibility, traffic volume, and speed.

Visibility is obviously dependent on not just where pedestrians stand but the presence and upkeep of crossing lights and street lights, elevated crossings, and intentional design and maintenance can work to improve pedestrian safety. Traffic speed and volume are impacted not only by speed limits but by the physical build of roadways, which can alter behavior. Pedestrian infrastructure can reduce pedestrian exposure to vehicle traffic by creating separation between pedestrians and vehicles or reduce traffic volume by the addition of sidewalks and footpaths, overpasses and underpasses, and marked crossings. These factors have an impact not only on the frequency of pedestrian collision but also on the level of injury maintained or risk of death. Low visibility increases the risk of the collision, a high traffic volume can increase the frequency of crashes because of a fluctuation of both available vehicles, and traffic volumes increase the level of severity of collisions (Stoker, Philip, et al.). Pedestrian safety is impacted by a combination of factors, but also the risk relative to the type of vulnerable pedestrian. As discussed in the "Walkability" Subsection, women and the elderly are more frequent pedestrians, and they remain at a greater likelihood for pedestrian fatality.

High speed is a factor in pedestrian-vehicle collisions and subsequent pedestrian fatalities, but laws regulating it are not the only solution to changing it. Various

engineered speed management measures include those that are physical adjustments of roadways that are undertaken for the expressed purpose of altering vehicle behavior, those that require motorists to change the direction of travel by moving either to the level or right, or those that require a change in elevation by going up or down (Vanderschuren and Jobanputra 2009). These can be done in small changes, or be large-scale redesigns. One unique example is refuge islands, which are marked crossings with raised medians, that have shown a reduction in pedestrian-vehicle collisions, as well as more commonplace measures such as road humps, staggered lanes, and overall junction redesigns (World Health Organization 2013b). Narrow lanes are common in Europe in developed areas where they experience the lowest rates of vehicle-pedestrian collisions, while wide street lanes and higher operating speeds experience the highest rates (Garder 2004; Lamm, Psarianos, and Mailender 1999). Hauer (1999) found that since 1940 research has consistently shown that crashes increase as lanes exceed eleven feet in width, and Swift, Painter, and Goldstein (2006) found the safest streets to be those that are narrow (twenty-four feet wide). And as we have discussed that traffic speed can be the deciding factor in a collision's fatality rate, the changes in the built environment can cause drivers to behave less aggressively, run fewer traffic signals, and overall drive slower, as they feel more hesitant and conscious of their own safety, can make a life-saving difference (Untermann 1990). A reduction in speed can be understood as a benefit in the case of pedestrian deaths through elementary physics, vehicles driven at high speeds allow drivers less time to react to unexpected hazards which causes them to travel further before stopping or slowing down, resulting in an increased force of impact when a crash does occur.

While some may assume that the difference in population density between rural and urban areas could serve as the explanation for the frequency of these collisions, to infer a causal relationship between density and pedestrian collisions one must accept the presence of numerous confounding variables: more residents, more employment, more roads, and more of anything. As a result, density alone may not be a predictor of risk in the built environment (Ewing and Dumbaugh 2009). However, the density of development does affect the characteristics of built environments such as the inclusion of pedestrian-focused infrastructure and roadway design, which can impact the frequency of these collisions as stated before.

According to policy changes implemented within Santiago, these are seen to be the current problems that cause traffic fatalities by recent administrations: inappropriate speed and alcohol usage. Inappropriate speed is one of the main causes of road crashes, as a local study in 2014 found that 50% of drivers exceed the speed limit on interurban roads and 40% in urban areas at any given time. Speeding is also more prevalent during the night (when visibility is low) and on weekends (when pedestrian traffic is increased). Speeding is estimated to be responsible for around 30% of fatal crashes in Chile and in the last decade has been attributed to 4,559 fatalities (International Transport Forum, 2019). Alcohol-related collisions are also frequent. To be defined as alcohol-related, a traffic crash must have either a driver or another person involved with the crash (including pedestrians, motorcyclists, or cyclists) have an estimated or measurable BAC of .3g/l or above (International Transport Forum, 2019). We will discuss significant legislation related to alcohol use passed in 2012 in Chapter 3, but for context, in 2010 there were 4,256 traffic injuries due to driving under the influence of alcohol, and 202

fatalities (CONASET, Dataset: Siniestros de tránsito y consecuencias según Causa, año 2010).

Walkability: The Culture of Transportation

To the US reader, the idea of walkability may produce a variety of images based on lived experiences and perceptions of the level of "accepted" walkability in US cities, and the lack of walkability supported by infrastructure in suburban and rural areas. It is important to note the cultural differences between the United States and the culture of transportation in Latin American communities. Definitions of walkability are ranging, some refer to the physical infrastructure and urban characteristics that create walkable places, the social and health-related effects that come from walkable environments, other times it is used as a proxy term for better design in urban planning to mean increased levels of accessibility, safety, feasibility, comfort or pleasurability (Forsyth, 2015). The majority of studies on walkability come from Europe or North America, where cars are relied on most for transportation, while many countries in the Global South like Chile have high levels of walking, even as cars have become more prevalent. Some believe this gap is partially due to the limited access to cars for a majority of the population, as 40% of households in Santiago have cars (Sagaris et al., 2017). Sagaris's analysis of Santiago's 34 urban comunas (municipal planning areas) shows that car ownership (as well as wealth) is concentrated in only 4 to 6 comunas, those that are located on the city's eastern edge rising into the Andean foothills. This abbreviated literature review on walkability will discuss the unique culture of transportation in Santiago that impacts not only the city's trends of urban development but also helps us work to understand the question of the country's high level of pedestrian deaths.

Chile is not simply just behind the urbanization curve, they have virtually completed the transition towards urbanization, 40% of Chileans live in Santiago and its metropolitan region, with a population of 6.5 million people. Despite industrial pressures, economic changes, and a push for cultural changes (stretching back to the Pinochet era), walking has remained the main transport mode. Urban policies since the 1980s up until very recently have reflected the global focus on "automobility," the idea that cars are a vehicle (no pun intended) of freedom, economic development, and social progress, and communities should be designed with their needs prioritized, which has led to their domination (Beckmann, 2001; Sheller & Urry, 2000).

Following the Pinchot dictatorship, Chile's subsequent period of economic growth included the development of urban highways within the country but especially in Santiago, and these were planned by the government under neoliberal policies, but constructed by private companies under Build, Operate, and Transfer (BOT) concessions. These contracts guaranteed revenues of up to 75% of the initial investments, controversial when considering that urban highway concessions from these toll-highways were $215 million in 2017, and from 2004 to 2015 seven major urban highways were built totaling 200km. These have stretched into surrounding areas and communities, creating gated communities without walkable infrastructure as well as isolating large sections of the city, particularly low-income communities that cannot afford to use them (Figueroa, Greene, & Mora, 2018; Sagaris & Landon, 2017). This car-centric attitude can be seen plainly in the distribution of investments in the built environment of Santiago, between 2010 and 2016 30% of spending for transport projects was subsidies for urban highways and 7.7% for improvements and repairs on existing roadways, with just 2.8%

investment in that period for investments towards walking (Coalición por un Transporte Justo, 2016, Sagaris & Tiznado-Aitken, 2020). 32% of sidewalks in Chile's main cities are in poor condition according to a 2014 report (Cámara Chilena de la Construcción, 2014). The General Ordinance of Urbanism and Construction (Ordenanza General de Urbanismo y Construcciones) defines the street as a "vehicular road of any type that communicates with other roads and that includes both roads and sidewalks," which through their language makes motorized vehicles the priority and purpose of all streets, ignoring their role as public spaces for pedestrians and cyclists as well (Ministerio de Vivienda y Urbanismo, 2010, Article 1.1.2).

As continuous economic growth has continued into the 2000s and 2010s, car ownership has become more accessible for low-income groups, but in the same period walking trips have only decreased slightly, and not at the same level as the rise in cars, showing a persistence in walkability as a mode of transportation, not simply a lesser alternative when cars are not available. From 2001 to 2012 the number of vehicles per household in the lower-income group rose from .13 to .17 and 1.5 to 1.65 vehicles per household for higher-income groups, a 31% growth in the lower-income group and 17% in the higher-income group (Herrera & Razmilic, 2016). Walking trips in Santiago decreased slightly from 36.7% to 34.5%, originating in the lower and middle-income groups who were acquiring cars for the first time.

This persistence of walking shows walking to be more than such a transport of convenience or due to low income, but is a social and cultural part of the city and urban life. Besides the cultural reasons and economic accessibility of walking as transit, many have come to recognize the benefits of walking as a method of sustainable development.

It also has been shown to improve both physical and mental health and promote social interaction within a community. Data on the purpose of walking trips suggests that the frequency may reflect the traditional organization of urban life with high density and mixed land use (outside of segmented high-income suburbs), where grocery stores are located walkable distances from residential communities or street fairs are frequent within neighborhoods (Herrmann-Lunecke, Marie Geraldine; Rodrigo Mora & Lake Sagaris, 2020). Another factor could be the usage of public space in Latin American cultures, through events like street fairs, street festivals, and street markets, and historically the street in Chile has been called "the living room of the people." The layout of Chilean streets may as well be a factor in encouraging walking, as they were developed as orthogonal grids (damero español), which favor pedestrian movement and allow for mixed-use urban development (Herrmann-Lunecke, Marie Geraldine; Rodrigo Mora & Lake Sagaris, 2020). These cultural elements strengthen the argument that walking as transportation is more than just economics.

Despite the positives of walkability as a public health, economic, and sustainability measure, the current status of walkability in cities still presents many challenges for pedestrians, and since pedestrians tend to be women, the elderly, and low-income individuals, these challenges are disproportionately affecting these already marginalized identities. Walking comprises more than half of daily trips in Santiago's poorest comunas, particularly Pedro Aguirre Cerda (57.6%), Pudahuel (57.2%), Conchalí (54.3%), El Bosque (52.3%), Cerro Navia (51.3%) and Lo Espejo (50.6%). Women account for a high percentage of walkers (56% to 77%) (Sectra, 2012), and walking has been associated with care-tasks, such as shopping, dropping or picking others off, health

visits, accounting for 47% of daily trips and 64% of weekend trips, more than work (38%), education (10%) and recreation (6%) (Sagaris & Tiznado-Aitken, 2020). Aside from the frequency of these trips on infrastructure not always catered to pedestrians, women are particularly vulnerable due to conditions that can leave them exposed to sexual harassment, crime, or violence that would be less prevalent in vehicles (Seedat, MacKenzie, and Mohad 2006, 150). While the idea of the "average commuter" suggests a trip straight from home to work and back, women are also more frequently having multiple stops within a single trip, stopping for groceries, picking up children from school, etc.

Though it may be surprising, walking is actually the primary mode of transportation for the elderly worldwide (Siram et al. 2011). It is seen as an important source of freedom and independence for the elderly by many (Langlois et al. 1997). The increased risk for the elderly comes not just from the lack of pedestrian-focused infrastructure but especially comes from automated signals that do not allow adequate time for pedestrians to cross safely that are not considered the "average" speed (Job et al. 1998). It has been suggested that best planning practices for automobility encourage the movement of vehicles to be as quick as possible, and so is not designed to give any extra time at all.

It is apparent that low-income communities suffer from anti-pedestrian urban planning the most, affecting youth in particular. A majority of child pedestrian injuries are associated with low income and poverty status (Rivara and Barber 1985) and research from Chakravarthy et al. (2010) found that the percentage of the population living in low-income households is the strongest predictor of pedestrian injuries, with pedestrian crashes four times more likely in poor neighborhoods.

Chapter 3: A Review of Transportation Policy Developments & Changes in Santiago

Who's in Charge Here? & Their Impact

The National Road Safety Commission (Comisiòn Nacional de Seguridad de Tránsito or CONASET) was created on December 27 1993 as a presidential advisory committee through Supreme Decree 223. This inter-ministerial body includes the Ministry of Interior Affairs, Ministry of Education, Ministry of Justice, Ministry of the General Secretariat of the Presidency, Ministry of Housing and Urban Development, Ministry of the General Secretariat of Government, Ministry of Public Works, Ministry of Health, Ministry of Labor and Ministry of Transport and Telecommunications, plus the National Police General Director and shows how urban policy issues are inherently interdisciplinary and require attention from other sectors of public service. Using the "2011 Simplified Methodology for Estimating the Social Benefits of Reducing Accidents in Interurban Road Projects" from the Road and Urban Transport Programme of the Ministry of Transport and Telecommunications and the Ministry of Social Development, CONASET determined that the estimated cost of traffic crashes in 2019 was USD 5.4 billion, equivalent to approximately 2.2% of Chile's GDP. I will be focusing on major changes implemented by CONASET between 20013 and 2019, as fatalities fluctuate with no clear trend of lessening fatalities emerging.

In 2017 Chile updated its National Road Safety Policy which serves as the general strategic guide that had originally been written in 1993. Similar to the 2012 redesign of the National Policy for Urban Development, this policy was created through a

participatory process that included involvement from a variety of stakeholders, experts on road safety, citizens' groups, public and private entities, and road traffic victims associations. This rework created an updated strategic framework that would lead to a concrete action plan focused on the five strategic pillars of the United Nations' Decade of Action for Road Safety, road safety management, safer vehicles, safer road users, post-crash response, and safer driving environments. Chile's National Accord for Road Safety in 2018 created priority action items which were then used to develop the framework of the National Road Safety Strategy 2021-2030. This strategy's expressed goal contained a new target to reduce road fatalities by 30% by the year 2030 in comparison to the average number of fatalities in the period 2011-19 (International Transport Forum, 2019).

As discussed in the "Methodology" section in Chapter 1, recent changes have been focused on policing drivers' behaviors, specifically inappropriate speed and alcohol usage. In 2018 Congress approved a bill to reduce the urban speed limit from 60 to 50 km/h. This initiative had been a priority of the Ministry of Transport and Telecommunications for years. This modest change in speed is significant, as when struck by a vehicle traveling 64.4 km/h (40 mph) a pedestrian has an 85 percent chance of death, but fatality does drop to 45% at 48.2 km/h (30 mph) (UK Department of Transport 1997). However, the single most consequential intervention in reducing pedestrian fatality rates and injury is roadway treatments such as the installation of frequent stop signs and narrowing roadways, found by numerous researchers (Stoker, Philip, et al). The Ministry of Transport and Telecommunications has begun to aim for congress to allow automated speed management, but it is still in very early stages (International Transport Forum, 2019).

Drunk driving has been the topic of various pieces of legislation in the 2010s. In 2012 a new law was introduced to show a zero-tolerance policy. This set the maximum permissible blood alcohol content (BAC) at 0.3 g/l. The law defines driving under the influence of alcohol as driving with a BAC between 0.8 g/l and 0.3 g/l, while much tougher sanctions are implemented for driving while intoxicated, which is defined as driving with a BAC over 0.8 g/l. Sanctions include license suspension or annulment. Fatalities due to drunk driving declined almost 30% after the introduction of this law, from 267 in 2011 to 192 in 2012. Since, the number of alcohol-related fatalities has remained around 10% of total fatalities, in 2019 9.6% of total road deaths (190) were related to alcohol. Beyond just laws related to drunk driving, a particularly high-profile law that more severely punishes drunk drivers responsible for serious injuries or fatal crashes was passed in 2014 called Emilia's Law. Exacerbating the sanctions of the 2012 zero-tolerance law, a driver is subjected to at least one year of imprisonment and could be potentially disqualified to drive for life. It also made fleeing the scene or refusing an alcohol test a criminal offense.

Chilean government entities have begun extremely recently at the top level to show an acknowledgment of pedestrian safety and pedestrian fatalities, but these policies have not been established and implemented long enough to determine a change, especially with the drastic change in transportation rates since the onset of the COVID-19 in early 2020. In 2020, The National Day of Remembrance for Road Traffic Victims was established as the third Sunday of November. CONASET and the Ministry for Transport and Telecommunications also in 2020 published a guide as a way of technical support for implementing tactical bike lanes, sidewalk extensions for walking and queuing, public

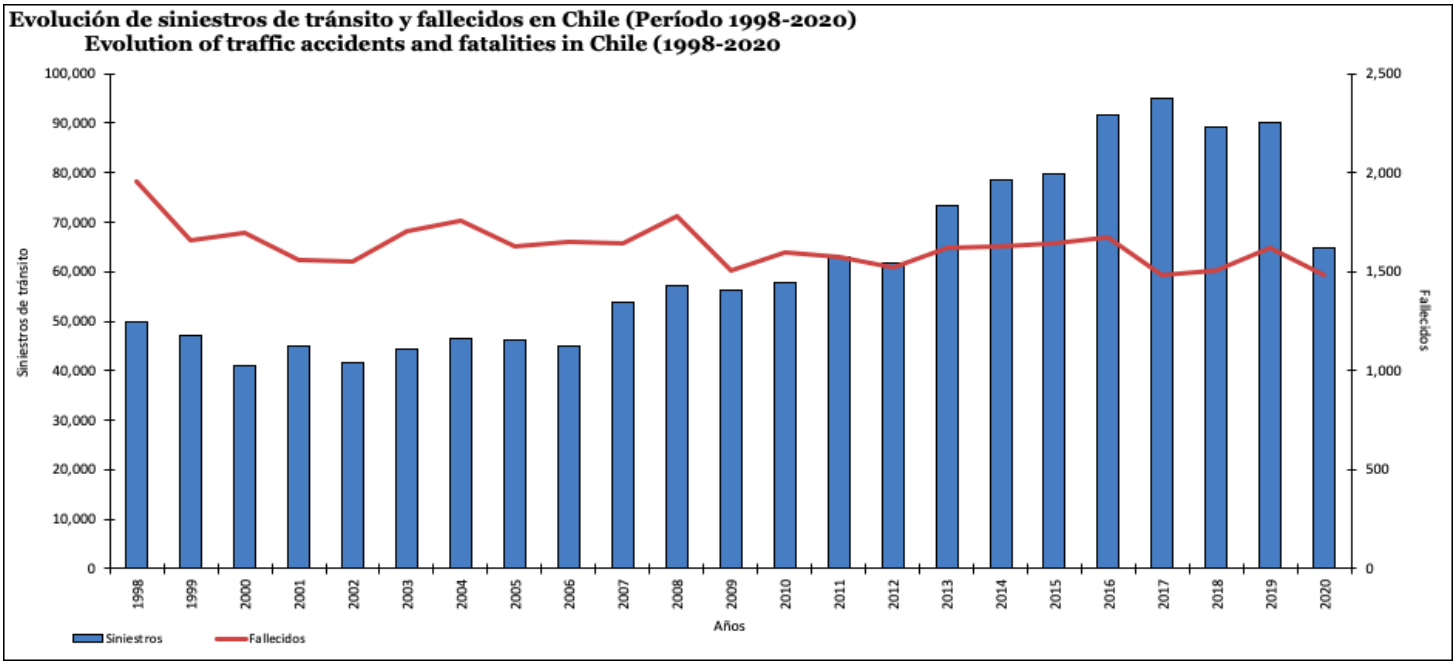
transportation sanitization, and physical distancing for passengers, as a response to COVID-19, but it actually contained many of progressive planning measures that were being advocated for before the pandemic. Decree no. 71/2019 published in 2020 modified the standard road-traffic sign manual to incorporate the new design of information signs related to road traffic co-existence. This was the result of the collaboration of the advocacy working groups that came from the road coexistence law, including participation from the Ministry of Public Works, Ministry of Transport, and CONASET.

CONASET Data Analysis

I intend my research to be a successor to an article published in late 2019 by Martínez & Contreras entitled "The effects of Chile's 2005 traffic law reform and in-country socioeconomic differences on road traffic deaths among children aged 0-14 years: A 12-year interrupted time series analysis" which looked at the effects of Chile's 2005 traffic law reforms and the change in traffic deaths in children 0-14 up until 2013. The 2005 reform introduced child restraint systems (CRS) for children under 4 years old, mandated seat belt use for all vehicle occupants, prohibited the use of cellphones while driving, and increased penalties for drunk driving, among others. The conclusion of the report saw a decrease in road traffic crashes during the 2002–2013 period and a significant reduction in the trends of road traffic collisions for children, but more significantly for child passengers rather than child pedestrians. During the 2002–2013 period, 34,492 road traffic collisions (RTCs) involved passengers aged 0–14 years, causing 510 deaths among that age group, while there were 21,675 road traffic collisions (RTCs) that involved pedestrians aged 0–14 years, resulting in the death of 535 people from this age group. This article also found that road traffic deaths (RTDs) of pedestrians and passengers in

this age group fell during the 2002-2013 period, from 2.48 and 1.71 deaths for every 100,000 vehicles in 2002 to 0.63 and 0.89 for every 100,000 vehicles in 2013, respectively. However, as discussed in my introduction, children are not the only vulnerable population group of pedestrians - all pedestrians are vulnerable, which is why my analysis looks at changes in the overall traffic fatality rate and the pedestrian fatality rate. My analysis follows the period examined (2002-2013) to pick up where that article left off and to analyze the changes after the major updates of the 2010s: the reduction in speed legislation from 2018, the 2012 and 2014 (Emilia's Law) reforms related to alcohol use, and the overall updates in the National Road Safety Policy from 2017 are the legislation. I utilize CONASET data to determine if there is a significant change in the overall number of traffic fatalities. Though it may be too recent to examine these impacts fully, the changes from the 2005 period of reforms have stagnated which needs to be addressed. It may as well be too short of a time period to adequately assess the impact of these laws, but the global rate of traffic fatalities and pedestrian deaths has fallen dramatically in 2020 and 2021 due to changes in transportation rates due to COVID-19, which has made the 2020 and 2021 data outliers and not reliable enough to be considered an extension of a trend. In 2020 in Santiago the number of vehicles in traffic decreased by 65% due to changes in lifestyle and public accessibility in the pandemic (Road Safety Annual Report Chile, 2019).

Chart II



(CONASET data, chart produced by author)

As Seen in Chart II In 2013, the number of traffic fatalities was 1,632. In 2019, the number of traffic fatalities was 1,617. By calculating (% increase = 100 x (final - initial)/initial) this change is only a .9% decrease in the rate of traffic fatalities, which is not a significant change. In the brief aftermath of the 2005 traffic reforms, the number of traffic fatalities fell from 1,626 to 1,652 in 2006, 1,645 in 2007, and an almost record high of 1,782 not reached since 1998, showing the trend to reduction as irregular then as well. The lack of significant change in Chile's overall rate of traffic fatalities between 2013 and 2019 suggests that the traffic reform policies of the 2010s have not made a meaningful impact on the rate of traffic fatalities.

Chart III

Dataset: By age and road user

Injury type	Killed							
Age group	Total							
Road user	Pedestrians							
Measure	Number							
Data type	Death within 30 days							
Unit	Persons							
Year	2013	2014	2015	2016	2017	2018	2019	2020
Chile	814	798	732	784	696	694	665	493

Data extracted on 01 Feb 2022 05:16 UTC (GMT) from OECD.Stat

However, regardless of the weak decrease in traffic fatalities, the rate of change in pedestrian fatalities between 2013-2019 was more meaningful, as seen in Chart III. The rate of change in pedestrian deaths from 2013 to 2019 was 18.3%, a major difference, surprising when looking at the fairly stagnant rate of change in road fatalities. In this analysis, I have discovered that Chile's high rate of pedestrian deaths has been somewhat exaggerated due to the high rate of traffic fatalities, and though Chile still has the highest rate of pedestrian deaths among OECD countries at 3.551 per hundred thousand population, it has experienced a noteworthy reduction percentage-wise. I had not foreseen this, as the high overall rates disguised the change over time in this exact period. However, with the lack of accessible multivariate data that includes the location of

collisions as well as the type of road user, we are unable to ascribe whether these pedestrian deaths were due to changes in infrastructure at certain locations, which has been attributed to be a major component of lessening pedestrian deaths in other studies (Rothman et al., 2019; Schmitt, 2020).

As discussed in many of the peer articles, a more thorough evaluation and understanding of the impact of these policies will come with time, but the breadth of policy regulations showed an exciting amount of interest in road safety issues that made me hopeful initially. Though there has been a decrease in pedestrian deaths, 665 in 2019 is still exorbitantly high in my opinion, especially when as we have discussed heavily, so many are preventable. Pedestrians continue to be the group the most affected by road crashes, in 2019 accounting for the largest share of road deaths, with 34% of the total, and occupants of passenger cars lagging behind at 29% (Road Safety Annual Report Chile, 2019). This problem is not just affecting the whole population, the 2019 article also suggested that regional socioeconomic differences are associated with higher road traffic death rates in the 0-14 age group, as well as that deaths due to road traffic collisions among children are not distributed randomly among the population. There is a clear link between these deaths and other factors that disadvantaged individuals such as socioeconomic level, class, neighborhood, gender, and race. While these laws passed in the 2010s show the beginnings of an awareness of a problem needing to be fixed, are they getting to the root of the problem? When examining these policies, the decrease in pedestrian deaths seems to be more incidental following a lessening of the overall rate of road traffic fatalities, not the object of the policy reforms itself. The CONASET website includes geospatial information, using a thematic map viewer of geocoded layers of

traffic accidents, which I originally thought would be helpful in understanding the prime locations of consistent pedestrian fatalities, but when you go into the site more it only has maps and filters specific to accidents involving bicycles, motorcycles, hit and runs, and critical points of traffic accidents. The data on pedestrian deaths should be just as available, but the time and attention have not been given to fully understand the connections between these incidents as they are still largely seen as senseless tragedies, not the conclusion to a series of policies and apathy towards those within the pedestrian class. As mentioned before, the National Road Safety Strategy 2021-30 set a goal by the year 2030 to decrease the number of annual road fatalities by 30% to the average for 2011-2019. The average was 1,586, meaning a 30% decrease would be 1,110 deaths. And while the 2020 and 2021 statistics are lower (mostly due to COVID), I am doubtful that with the current policies in place the rate will be able to maintain a lessening rate over time consistently enough to achieve that goal by 2030.

Who's in Charge Here? Part 2

Aside from Chile's unique political history regarding extremely different political ideologies back to back, the implementation of active modes of transportation within Chile is different than many other nations. While in the United States, the United Kingdom, or Australia more active modes of transportation were initially promoted by academics within the medical sphere and then adopted into national policy, Chile has widely ignored the role of the physical environment when building health policy or seeing the physical environment as a potential factor in individuals' health (Ibarra & Mora, 2011; Mora, Greene, & Corado, 2018). The current National Health Objectives de Chile 2012-2020 only contains two paragraphs about the role of cities and how urban

planning can make people more active in a document of over 350 pages, while 87.8% of Chileans live in cities (INE, 2018).

When looking at this difference in top-down approaches, it is important to note that the Chilean institutional structure divides the national territory into regions & municipalities. The Metropolitan Area of Santiago de Chile (MAS) covers 34 municipalities which are the local level of administration. The regional government has no power or function in urban planning, with its role being limited to set investment priorities for the region. There is no administrative level that functions over the entire MAS, and the 34 municipalities have 34 individual governing mayors and do not have a uniform institution or planning authority (Banzhaf, Ellen, et al., 2013).

Therefore, developments in modernizing urban planning as well as walking persisting as a form of transit have come not from a top-down, ministry-driven initiative, but because of more people-driven behavior, bottom-up through cultural practices. Some coordination instances between the municipalities have occurred but are voluntary and depend on the political willingness of the participants, and they are not adequate to develop long-term policies. Many local initiatives that have promoted pedestrian interests have been pioneered by comunas, and though the 2014 Chilean National Urban Development Policy named walking a priority to meet sustainable development goals, the majority of initiatives have come from communities and citizens, and the development policy is not really in the mandate for any particular government agency, whether that be local, regional, or national. A recent example of a locally pioneered planning policy is Santiago's city center mobility plan (Plan Centro), which is a comprehensive policy to improve infrastructure in Santiago's original town center. It seeks to promote non-

motorized mobility, by improving the walkability of a heavily used, central part of the city, where government, major retail, heritage, and other economic and cultural interests have a stake in development (de Santiago, 2015). This expanding pedestrianization covers 3.9 km of streets, complemented by a network of more than seventy pedestrian "galleries", interior walkways within usually commercial buildings. This interconnected pedestrian network has contributed significantly to making Santiago's historic center a very diverse and socially mixed quarter within a segregated city (Herrmann & Mora, 2018).

The Plan Centro was the first in Chile to give pedestrians and cyclists explicit priority over private cars. On-street parking was eliminated and car lanes were replaced by significant improvements to sidewalks, bus stops, and cycleways. 60% of eight major roads were allocated for public transportation and strictly prohibited for cars during the weekday. Though there was some initial resistance, the project, which began in 2015 on Merced Street, has expanded to San Antonio Street and Santo Domingo Street and has received numerous prestigious awards, including the Sustainable Transport Award in 2017, which has gone to New York, Paris, and London among others. Though these policies are extremely successful, they are occurring in small sectors of a massive city, and the lack of an overarching administration makes the development of these projects difficult.

One change in the built landscape that could be put in place across the board would be investments in enhancing infrastructure for walkers, as currently only 2.78% of public investment in roads is directed to improving walking (Iglesias, Giraldez, Tiznado-Aitken, & Muñoz, 2019). To implement this, coordination among different sectoral planning

departments (transport, urban planning, etc.), and between the national, regional, and local governments is urgently needed. Chile's highly centralized land-use planning system so far has given local authorities little decision-making power compared to those of national ministries and their regional secretariats. Current planning regulations consistently promote and ensure the mobility of motorized traffic at all scales, so a revision of the Chilean national standards for streets and sidewalks would also be massively beneficial, as sidewalks are currently undersized by law. These regulations set rigid standards for the minimum and maximum width of vehicular lanes and sidewalks, which have made roads wide and sidewalks narrow (Herrmann, 2016). For example, two-lane roads must be 7 m wide, regardless of the speed limit, or if it is a local or trunk road (Ministerio de Vivienda y Urbanismo, 2010). In contrast, the minimum width for sidewalks is just 1.2 m for residential areas and 2 m for commercial areas. Upholding maintenance is also vital, as many Chilean streets, especially in lower-income neighborhoods, have no sidewalks, or unpaved or undersized sidewalks. Sidewalks become overcrowded with posts, signs, parked cars, and other equipment, as well as lacking greening, lighting, and upkeep (Herrmann & Mora, 2018). Finally, new policies at the regional level are needed to promote walking developed through close collaborations between municipal government staff and community organizations. Single communas are unable to allocate the appropriate and necessary resources to undertake expansive projects, especially in deprived neighborhoods, where walkable environments and public spaces have been neglected for a long period of time. Reimagining our idea of transportation infrastructure and seeing city streets as multifunctional public spaces that should be equally available to cyclists and pedestrians, and for social, civic, and cultural

activities would have a major effect policy-wise. Redefining the street as a shared, multifunctional and democratic space for all transport modes would create policies that give all citizens regardless of their mode of transportation a greater sense of dignity and ownership of their community.

Chapter 4: The Implications of the Santiago Case and Pedestrian Deaths in Comparative Perspective

The case of Santiago and its consequences is not only relevant to Chile but is part of a larger movement to resolve the issues of how and for whom our cities globally are designed. Though Chile remains an outlier within the OECD, it ranks below numerous countries in Africa, Asia, and South America in traffic fatalities (Global Health Repository, World Health Organization). Approximately 96% of children killed worldwide due to road traffic injuries are in low and middle-income countries and nearly all countries with the highest absolute numbers and rates of pedestrian fatalities are developing countries (Peden et al. 2004, Toroyan 2009). Chile is the most developed nation in South America when looking at its GDP, quality of life, infant mortality rate, life expectancy, and HDI in comparison to neighboring states, but it only joined the OECD in 2010. I believe that these policy alternatives are useful not only for Chile but just as much for other nations struggling with high rates of pedestrian deaths and traffic fatalities, such as the United States, and I will give a brief comparison to show how relevant these concerning problems are globally.

Comparison to the US: Infrastructure, Pedestrian Fatality Frequency, and Walkability

Economic segmentation within Santiago affects which children are impacted by pedestrian deaths: the same is true in the United States. In the US, children from families earning less than $20,000 per year are seven times more likely to be injured than those in families earning more than $30,000 per year (Mueller, Rivara, and Bergman 1988). The environmental factors remain constant as well, 67% of all fatal vehicle-pedestrian collisions occur at night or under low light conditions (Stoker, Philip, et al). The US Fatality Analysis Reporting System (FARS) data indicates that pedestrian fatalities increase as illumination decreases, holding other factors constant (Dumbaugh, E., and W. Li. 2011).

My analysis of Chile's various legislation focusing on regulating and punishing driver behavior has shown how these laws, while effective in adjusting some levels, have not on a consistent level been able to lessen road fatalities and pedestrian deaths to a similar level as many European countries. If the US still has these problems despite having more regulatory oversight and a longer history of stricter traffic laws in place, that may suggest that both nations need to focus on the same solution - pedestrian-focused infrastructure. Angie Schmitt's *Right of Way: Race, Class, and the Silent Epidemic of Pedestrian Deaths in America* was a major inspiration for this thesis, so I wanted to take a bit of time to compare the two nations and how this problem is not only a Chilean one, but an American problem, as well as an international issue.

In Phoenix, AZ only a third of pedestrian deaths within the city, including those that occurred in crosswalks, were within 500 hundred feet of a crosswalk, and in nearly one-third of pedestrian fatalities the driver does not stop. Pedestrians are consistently portrayed by the media to be at fault, while these hit-and-run crashes are not given the same attention, and there is also a great deal of misinformation. For example, not being in a marked crosswalk does not necessarily mean that someone is legally jaywalking. Under most state laws, almost every intersection is an unmarked crosswalk where pedestrians have the right-of-way, and many journalists and even police are not aware. The way we speak about pedestrians and traffic fatalities has a real impact, and advocacy groups Transportation Alternatives and Families for Safe Streets have promoted dropping the term "traffic accident" and replacing it with the more neutral terms collision or crash. William Haddon, the first head of the National Highway Safety Agency "deplored" the term because "he believed [it] made automobile crashes sound inevitable and, by implication, not preventable" (Schmitt, 2020).

In Atlanta, called the eighth most dangerous city for walkers, the major hazard for pedestrians is not driver misbehavior, but the physical city itself. Pedestrian fatalities are rising in the mid suburbs but federal agencies have maintained messaging that puts the responsibility onto individuals, encouraging people to cross at crosswalks and wear bright clothing. The rising use of SUVs in the United States over the past two decades has had an impact on US pedestrian safety, and the Department of Transportation has introduced a plan to add pedestrian safety scores to crash ratings that the NHTSA gives for cars, but this has been pushed back against by automobile manufacturers like General Motors. The

election of Donald Trump stalled this plan due to his anti-regulation platform (Schmitt, 2020).

Swedish traffic safety is world-renowned for its Vision Zero policies that have been exported internationally and adopted by more than 40 major US cities. Vision Zero aims to entirely end traffic deaths over time through comprehensive and aggressive policy reform. They envision streets that "self-enforce," speed bumps, speed tables/raised crosswalks, and even in some places streets are physically narrowed with "bump outs" that shorten the crossing distance for pedestrians and necessitate drivers to turn slower. Aesthetic changes like planting trees near a road to narrow the road's look and feel and encourage drivers to lessen their speed, or implementing concrete bollards in the middle of streets to give pedestrians a midblock refuge while completing a crossing are all creative street adjustments that can make an impact. The adoption of Vision Zero policies has not been a perfect fit, and it has been difficult to judge concrete change over the handful of years of implementation within the United States. In 2017 Los Angeles received major backlash after "road diets" were implemented and caused congested highways, and the policies were reversed (Schmitt, 2020).

In 2012 a two-year $105 billion national surface transportation spending package, MAP-21, passed that weakened federal support for biking and walking, eliminating Safe Routes to School as a standalone program. This initiative encouraged walking and biking to school through infrastructure improvements and lumped it into the category of "Transportation Alternatives", which was funded at just over $800 million a year, a 33% cut, as the total federal support for walking and biking. This figure is staggering, as the National Highway Traffic Support Safety Administration (NHTSA) estimated in 2010

that the social and economic costs of traffic crashes are about $836 billion, with the share related to walking and biking being roughly $125 billion. Pedestrians and cyclists currently account for about one in five traffic deaths in the United States, but these forms of transportation receive about 1.5% of federal transportation funding or about $2.65 per American per year. MAP-21 also made it optional for states to invest in biking and walking, allowing them to transfer up to half of their transportation alternatives funding to other highway projects, which many have done so. Within a single financial quarter in 2017 eight states - Louisiana, Alabama, Connecticut, Iowa, New Hampshire, Washington, Nevada, and Oregon - transferred a total of $29 million out of their transportation alternatives funding to spend on roads and highways (Schmitt, 2020).

The United States remains in a unique middle position, a wealthy country where people die on the road at rates not experienced in peer nations, and has fallen even further in recent years. Traffic laws in the United States are also outliers in the developed world and more lenient than those in other peer states. The United Nations recommends speeds to be limited to less than 51 kilometers per hour on urban roads (about 31 miles per hour) and allows localities to adjust them, but in the United States speed limits are generally governed by the state and are difficult for cities to modify. The ideas of “American freedom” remain prevalent in discussions surrounding policy changes, and many researchers agree that there is a lack of political will necessary to incur lasting change.

Chapter 5: Conclusion

Latin American and Chilean cities are much more similar architecturally to European cities than American ones and have a higher density, making it possible that the Vision

Zero policies may be more effective in preventing pedestrian deaths there. Chile has undergone such a significant transformation in the past three decades especially, in not only urbanization but GDP and population growth as well. However, the state is still lower than many other OECD member countries in a number of urban-related factors related to the quality of life, such as the environment, housing, jobs, and income. Traditionally Chile's metropolitan and urban development has been driven by sector, especially due to the structure of local and regional governments, but there is a strong need for an integrated approach to urbanism. One policy in the Netherlands is known as woonerf, which treats the street as a "living yard" by promoting sharing the street between all forms of transportation, but giving priority to pedestrians and cyclists over motorists. This policy is not completely out of the realm of possibility as one might think, as Sunday open street initiatives have begun gaining popularity in Latin American communities. Colombia's "Ciclovía" program, which closes more than 70 miles of roads for vehicular traffic in Bogotá, has been occurring since 1976 where nearly two million people participate in walking, cycling, dancing, and socializing in city streets. Santiago began a smaller version of the program called CicloRecreoVía which is practiced in 33 countries, involving more than 1.5 million people every week (Torres, Sarmiento, Stauber, & Zarama, 2013). And while this program may not be strictly targeted to reduce pedestrian fatalities, the family-oriented and recreational atmosphere that it develops contributes to building a more walking and cycling-friendly culture within cities. It also has provided opportunities to reduce the social segregation of the city, by offering public space for recreation and community engagement (Mora, Greene, & Corado, 2018). Even other locally grown programs like "I Love my Neighborhood" (Quiero mi Barrio), which

invests in local plazas, parks, and sidewalk improvements to increase social capital in low-income neighborhoods in Santiago, and the Programa de Barrios Comerciales, which worked to improve high streets and made them more appealing and safe for female pedestrians, are beneficial tools for changing a community's culture surrounding walkability and the investment we are willing to put into it (Figueroa & Waintraub, 2015).

While pedestrian deaths and the other negative consequences of cities planned with a cars-first mentality have a universal impact, they also impact developing nations significantly. The World Health Organization reports that while people in developing nations account for just 1% of the world's cars, but 13% of the world's 1.3 million annual fatalities. The stratification of transportation modes by class in developing countries has prevented poorer nations from gaining stability and wealth in many instances. The World Bank estimated in 2017 that Tanzania could increase its GDP by 32% if it were able to reduce traffic injuries by 50% over a 24-year period (Schmitt, 2020). The growth of car ownership that occurs as some countries gain economic development is also cause for concern, however. Mexico has experienced a 4.2% increase in car ownership per year. Only about 15% of the trips made in Mexico are made in cars, but the cities' built infrastructure is geared towards accommodating the privileged minority that is able to afford the social status symbol that cars represent in many developing countries (Schmitt, 2020).

The problem of pedestrian deaths in Santiago, in the United States, and globally, will not be solved without a recognition that there is a problem. Beginning to look at traffic fatalities and pedestrian deaths not just as random injustices but as the consequences of

policy failures is so crucial to advocating for policy changes, whether they are structural improvements like narrowing streets, including more crosswalks, or more comprehensive policy plans like expanding public transportation and mixed land-use zoning. Understanding a nation's history regarding urbanization and the varying political ideologies that formed a city's built infrastructure gives crucial context to why unequitable policies have persisted. Santiago is just one example of a city that has been designed for a minority, but by challenging the current state of affairs there is the potential to lessen the concerning rate of traffic fatalities and pedestrian deaths, not only in Chile but in other Latin American cities and those around the world.

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