

## Were COVID pedestrian streets good for business? Evidence from interviews and surveys from across the US

**Hayden P. Andersen**

University of California, Davis  
haydena73@gmail.com

**Dillon T. Fitch-Polse**

University of California, Davis  
dtfitch@ucdavis.edu

**Susan L. Handy**

University of California, Davis  
slhandy@ucdavis.edu

**Abstract:** During the COVID pandemic, at least 97 US cities closed downtown streets to vehicles to create commercial pedestrian streets with the goal of encouraging active travel and economic activity at safe social distances. This study addressed three questions about these programs for businesses located on a pedestrian street: 1) what factors influenced their feelings about the program; 2) what concerns did businesses located on pedestrian streets have; and 3) how did the pedestrian street program impact a business's revenue as compared to other businesses in the area on streets that did not close. We created a geographic database of these pedestrian streets and identified nearly 14,000 abutting businesses, from which we collected interview and survey data. The interviews and survey results highlight key issues surrounding businesses' experiences with pedestrian streets. Businesses abutting pedestrian streets had a slightly higher opinion of these programs than businesses not abutting these streets. A test of the effect of pedestrian street interventions on business revenue using a pseudo-control group showed the effect to be uncertain but, on average, negligible. The findings point to steps that cities can take to maximize the benefits of pedestrian streets for local businesses.

### Article history:

Received: July 9, 2022

Received in revised form:

December 7, 2022

Accepted: March 3, 2023

Available online: May 11, 2023

## 1 Introduction

To encourage outdoor activity, dining, and shopping in safe and socially distanced environments during the COVID-19 pandemic, many US cities closed selected commercial streets to vehicles, creating pop-up downtown pedestrian streets. In implementing these pedestrian streets, cities were primarily motivated by a desire to boost struggling downtown economies. Restaurants and retailers suffered when they were forced to close or operate at limited capacity. Would-be shoppers and diners were generally instructed to stay home as much as possible and to leave only for essential purposes. As a direct consequence, local businesses struggled. US restaurants reported losses of \$240 billion during 2020, with 110,000 food and drink establishments closing their doors (National Restaurant Association, 2021). US retail foot traffic dropped by 97% in response to the shock of the pandemic in April 2020 but later stabilized to 30% below regular levels for the rest of the year (RetailNext, 2021).

“Open streets” programs were a hit across the country, at least with the public (Project Open

---

Copyright 2023 Hayden P. Andersen, Dillon T. Fitch-Polse & Susan L. Handy

<http://dx.doi.org/10.5198/jtlu.2023.2251>

ISSN: 1938-7849 | Licensed under the [Creative Commons Attribution – Noncommercial License 4.0](https://creativecommons.org/licenses/by-nc/4.0/)

Streets, 2021). Removing cars from commercial roadways clearly had benefits in terms of increasing pedestrian activity. But whether removing direct automobile access to forward-facing businesses could actually improve business performance was much less of a given. The closure of commercial streets could be a stimulant for some businesses but a deterrent to the customers of others. While pedestrian streets offered restaurants and retailers additional space for seating and merchandise display, business owners may have worried that potential customers would struggle to arrive at store fronts that lacked automobile access. Indeed, prior research shows that business owners perceive sufficient on-site parking to be a valuable asset (Von Schneidmesser & Betzien, 2021).

The substantial number of pop-up pedestrian streets that appeared during 2020 provided the basis for an unprecedented natural experiment to test their effectiveness at increasing foot traffic in commercial areas and boosting local business revenues. In this paper we take advantage of that opportunity to explore the impacts of COVID pedestrian streets on abutting businesses. We created a geographic database of these pedestrian streets and identified and collected contact information for nearly 14,000 businesses within close proximity to them. We first interviewed a diverse sample of 38 businesses located on pedestrian streets to understand the impacts of the program on their business activity. These results informed the design of a survey that we distributed to a large sample of the identified businesses, including businesses on the pedestrian streets and businesses nearby but not on the street (a pseudo-control group). The interview and survey results highlight issues surrounding parking, access for the elderly and disabled, safety, shifts in client base, deliveries, winter conditions, general atmosphere, and city involvement. We also tested the effect of pedestrian street intervention on business revenue and found pedestrian streets to have a negligible yet uncertain effect on revenue as compared to nearby businesses. We conclude with a discussion of actions that cities can take to maximize the benefits of pedestrian streets to local businesses.

## 2 Background

While the business benefits of active transportation infrastructure are well documented (Volker & Handy, 2021), evidence regarding the advantages of the complete closure of streets to cars is much murkier, especially in the US. In this section we review the literature to outline the history of planning for downtown commercial corridors in the US. This history includes the limited success of pedestrian streets in downtown areas in the latter half of the last century, as well as the somewhat more successful temporary street closures for special events ("open streets") that have recently become more popular. Prior studies of the effect of a retail environment on consumer behavior and of differences in consumer behavior by transportation mode also provide important background for our examination of commercial street closures.

### 2.1 Pedestrian streets in the US: Failure and future opportunities

COVID was not the first time that US cities created pedestrian streets in an effort to revitalize struggling downtown areas. During the second half of the 20th century, suburban shopping malls gained considerable popularity, with over 16,400 shopping malls accounting for 33% of all US retail sales by 1975 (Feinberg, 1991). These malls, dubbed "the new Main Streets of America," competed directly with central business districts and drew revenue away from downtown areas. The shopping-mall trend, along with the construction of the Interstate Highway System which allowed travelers to bypass downtown streets, contributed to an overall degradation and neglect of downtown commercial areas in the US.

In an attempt to make downtowns more competitive, city planners implemented a variety of

architectural, infrastructure, and placemaking strategies on many urban commercial streets. These strategies included travel lane reductions, on-street parking, wide sidewalks, intimate storefronts, ample trees and greenery, and outdoor dining parklets (National Association of City Transportation Officials, 2013). This movement also included the preservation of over 300,000 downtown historic buildings by the National Trust for Historic Preservation's Main Street America program (National Trust for Historic Preservation, 2022).

Converting streets to car-free pedestrian zones was among the more popular strategies for downtown revitalization in the US. Cities borrowed the concept from European city planning. As part of a larger effort to repopulate and rebuild European downtowns following World War II, cities installed new car-free pedestrian streets in town centers with the goal of improving mobility and providing open space for civic life (Gregg, 2019), and today, successful pedestrian streets are ubiquitous across Europe (Poiani, 2008). Across the US, over 200 permanent pedestrian streets were installed in the 1960s and 1970s (Judge, 2015). These pedestrian streets were initially met with great fanfare and optimism, with businesses willing to pay higher rent along the newly pedestrianized streets (Poiani, 2008). Initial successes led planners to believe that pedestrian street interventions boosted economies and impeded urban decay.

By the 1980s, however, the anticipated benefits of most pedestrian streets had not materialized. Visitors that showed up for the street's opening celebrations never returned to shop. Rents along the streets were lower and vacancies higher than before. By the mid-1990s, 100 of the original pedestrian streets had been ripped out and replaced with streets for cars (Poiani, 2008). After the removal of their pedestrian streets, many municipalities reported immediate economic success. Today, only 11% of all installed pedestrian streets in the US are deemed successful (Judge, 2015). Matuke et al. (2020) found that the remaining pedestrian streets were located in areas with higher population density, lower median age, higher percentage of white residents, closer proximity to a beach, higher levels of tourism, and a warmer climate; streets that were shorter in length were also more likely to be successful.

One of the primary reasons why European pedestrian streets succeeded while those in the US failed was the surrounding urban context in which they were built. In Europe, pedestrian streets were built in the middle of dense, pre-automobile era cities with high quality public transit, narrow streets, and a culture more inclined toward biking and walking (Poiani, 2008). US pedestrian streets, on the other hand, were isolated in heavily car-centric cities that were often surrounded by suburban shopping malls. Many factors steered US cities toward car centrism: ubiquitous off-street parking requirements (Shoup, 2005), wide streets and spacious intersections designed for automobile speed and throughput (Federal Highway Administration, 2012), transit disinvestment (Baxandall et al., 2008), among many others. US pedestrian streets existed in stark contrast to their pro-car cities, and potential shoppers were often deterred from visiting, leaving the space feeling empty and uncomfortable (Judge, 2015).

Policy trends in recent years suggest that the implementation of pedestrian streets in the US may have more chance of success in the future. The Complete Streets movement, for example, is a planning paradigm that focuses on reclaiming street space for all modes of travel, instead of just cars. Over the last fifteen years it has gained considerable momentum, with over 1,400 US jurisdictions having formally implemented such policies (Jordan & Ivey, 2021). The Infrastructure Investment and Jobs Act (IIJA), signed in 2021, authorizes up to \$108 billion for public transit investment across the country, the largest federal investment in public transportation in the nation's history (Federal Transit Administration, 2021). As already noted, the COVID pandemic motivated many changes to the use of street space. Cities across the US instituted policies and programs that prioritized active modes over cars, coming in the form of speed limit reductions, bike share program subsidization, repurposing of parking areas, etc. As of April 2022, over 700 such actions had been recorded in the US since March of 2020 (Combs et al.,

2021). These shifts away from a car-centric transportation system show that multimodal designs such as pedestrian streets could become viable, despite their previous failure in the US.

## 2.2 Economic impacts of open streets

Open street programs are temporary (generally partial day) street closures to cars for multi-block stretches. Some open streets are one-time events, while others occur regularly on weekly to annual bases. Examples include Ciclovía events (first developed in Bogota, Columbia), Slow Streets programs, and Streets Alive programs. Open streets initiatives have often been motivated by public health concerns stemming from a lack of safe public space in cities for social interaction and physical activity. With over 100 such programs implemented in North America in the last two decades (Project Open Streets, 2021), the programs' popularity among users is clear.

Though similar in some regards, the open streets programs described above and the pedestrian streets that this study focuses on are different interventions with distinct goals. Open streets programs are meant to benefit users directly with exercise and social interaction on longer stretches of car-free streets, with organizers often deliberately choosing routes through non-commercial areas (Project Open Streets, 2021). In contrast, while pedestrian streets do indeed provide space for physical activity, they are primarily focused on benefiting local businesses by attracting increased foot traffic.

Evidence regarding the impact of open streets on abutting businesses is limited to a few case studies. In a study of 317 businesses located along the route of San Francisco's 2012 weekly Sunday Streets program, 44% of surveyed businesses reported that the event had a positive impact, with 21% reporting a negative impact; restaurants experienced a decrease in business activity, while retailers saw an increase (Chaudhuri & Zieff, 2015). At San Diego's 2013 CicloSDias event, 81% of participants bought food or drink, and 51% made at least one retail purchase, according to one study (Engelberg et al., 2014). Half of businesses responded that the event had a positive or neutral effect, with restaurants reporting positive effects at the highest rates and grocery stores reporting at the lowest rates. In a study of two St. Louis open streets events in 2010, 82% of respondents made at least one purchase during the event, with 56% of them becoming aware of a new business along the route (Hipp et al., 2013). In contrast, businesses, except for restaurants, were against a 2018 San Jose open streets event, according to interviews (Douglas et al., 2019).

## 2.3 Impact of travel mode and retail environment on consumer behavior

Prior studies suggest that pedestrian streets have the potential to influence consumer behavior substantially by changing (1) the mode by which consumers travel to their destination, and (2) the retail environment in which they shop.

Pedestrianizing a commercial corridor will often restrict parking and limit car movements, and thus has the potential to encourage visitors to travel to the corridor by non-motorized means. Evidence suggests that consumer spending might actually increase with a shift in modes. One review identified eight studies that examine spending differences by mode, six of which concluded that bicyclists and/or pedestrians spent more money per month than people who drove (Volker & Handy, 2021), though only two of these studies found a statistically significant difference between the two groups (Forkes & Smith, 2010; Popovich & Handy, 2014). A Portland study found that bicyclists, pedestrians, and transit users spent more, on average, at all business types except supermarkets, where motorists spent far more (Clifton et al., 2013).

By pedestrianizing a commercial street, the retail environment is significantly altered, which in turn can change the way consumers behave. In the field of environmental psychology, the most common

model utilized to evaluate the effect of retail environments on consumer choices is the PAD model (Bohl, 2009), first introduced by Mehrabian and Russell in 1974. The PAD model posits that pleasure (feelings of contentedness, satisfaction, etc.), arousal (feelings of excitement, frenzy, etc.), and dominance (feelings of control vs. being controlled) are three key indicators in measuring consumers' emotional response to their environment (Mehrabian & Russell, 1974). According to the model, this emotional response influences consumers to either approach or avoid retail interactions.

Pedestrian streets can influence the PAD model metrics to increase the frequency of retail interactions. The absence of automobile traffic in commercial areas can engender a more peaceful and pleasing environment, increasing consumers' feelings of pleasure. Additionally, by converting street spaces into pedestrian walkways, users are given more personal space and may feel less crowded, which can lead to a greater feeling of dominance, as exhibited in several studies which have found that overcrowded environments can decrease consumers' feelings of dominance (Bohl, 2009).

## 3 Methods

Using existing datasets and results from our own preliminary investigations, we created a large database of COVID-related pedestrian street programs along with their dates of operation. Using this database, we identified businesses abutting the pedestrian streets, interviewed a diverse sample of them regarding their experiences with pedestrian streets, and distributed a survey to a much larger sample of impacted businesses along with a sample of pseudo-control businesses.

### 3.1 Digitizing pedestrian street geographies

We built a comprehensive database of pedestrian streets by querying the University of North Carolina's "Shifting Streets" mobility database, which contains 1,300 unique public responses to COVID-related changes to demand for transportation and public space such as street closures, road diets, bikeshare subsidies, speed limit reductions, etc. (Combs et al., 2021). We created a subset of this dataset that contains only complete street closures in commercial areas in the United States, yielding 49 pedestrian street programs. Independent of this dataset, we conducted a manual Internet search of the 500 most populous cities in the US, finding an additional 48 pedestrian street programs. Each program involved at least one street closure, but many programs involved multiple street closures. The Shifting Streets database along with our independent search yielded a total of 97 US pedestrian street programs on commercial streets in the US, each observation in the database containing at least the location of the pedestrian street(s) and a link to a news media article describing the program. As a part of the database, we digitized the geographic boundaries of each pedestrian street in each program. This was accomplished by skimming a news media article related to each program to find the streets that were closed, as well as the closure endpoints. The accuracy and precision of our geographic data was as reliable as the local news reports that we utilized. When news articles reported unclear pedestrian street boundaries, we did our best to check multiple sources and call local businesses to verify boundaries. Nonetheless, due to the flexible and changing nature of some programs, unknown geographic errors in the dataset may have persisted.

Once their geographies were digitized, it became apparent that pedestrian street programs during the COVID-19 pandemic were fairly ubiquitous across the United States, appearing in every region except for parts of the Midwestern and Southern regions. Figure 1 shows a map of pedestrian streets that were implemented in the US during COVID-19, while Table 1 contains summary statistics by region. The summary statistics illustrate the typical context of the pedestrian streets in this study. Most pedestrian streets were established along a few blocks of the densest areas of mid-sized cities, often in

historic districts. The median population of these cities was 97,700. The median population density in pedestrian street areas was 11,236 people/km<sup>2</sup>, similar in density to downtown Rockford, IL. Nationally, those living near these pedestrian streets earn 12% less income than their respective county average, suggesting that COVID-related pedestrian streets were more directly accessible for people from relatively lower income households. Whether people from lower income households benefited from these COVID-related pedestrian streets is likely to be highly context specific and deserves future study. The median score for pedestrian street areas on the US EPA's National Walkability Index was 16.2, which falls in the highest bracket of scores, "most walkable" (US EPA, 2021). This suggests that the COVID-related pedestrian streets were placed in already walkable neighborhoods which likely boosted their success at attracting pedestrians.

A large portion of pedestrian street programs were in the West, which also had by far the highest population density in pedestrian street areas (Table 1). Pedestrian street programs were implemented in the larger cities of the South and Midwest, and smaller cities of the West and the Northeast (Table 1). Households in the Northeastern and Midwestern pedestrian street areas had incomes that were 25-26% less than the county average, while those in the South had slightly above average incomes, suggesting potentially large regional variation in the programs' equity benefits (Table 1).

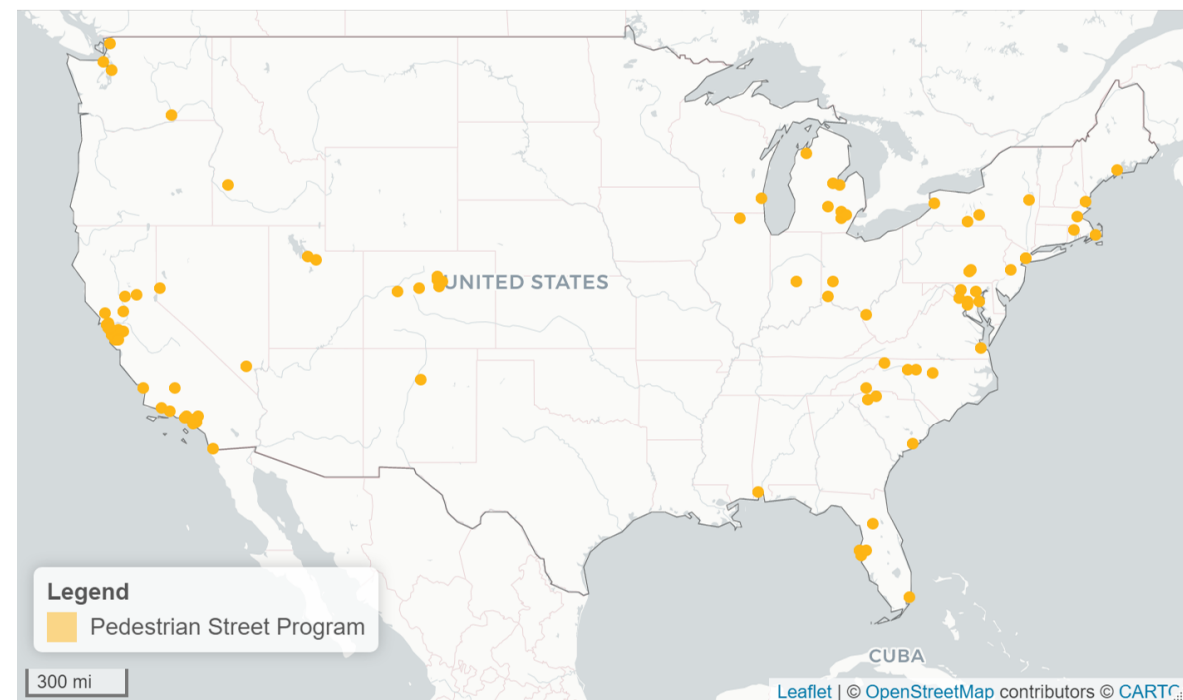


Figure 1. Map of COVID pedestrian street programs in the US

Table 1. Pedestrian street summary statistics by region

	West	Midwest	Northeast	South	Nation
Total Pedestrian Street Programs	49	13	15	21	<b>98</b>
Median length of all pedestrian streets per city [m]	402	524	610	442	<b>445</b>
Median population of cities with pedestrian streets [residents] (American Community Survey, 2019)	147,000	55,100	156,800	97,700	<b>90,400</b>
Median population density of pedestrian street areas, calculated by census block group [people/km <sup>2</sup> ] (Ibid.)	19,429	4,131	9,575	3,089	<b>11,236</b>
Percent difference between income of pedestrian street areas and county average (Ibid.)	-13%	-25%	-26%	0%	<b>-12%</b>
Median National Walkability Index score of pedestrian street areas [out of 20] (United States EPA, 2021)	17.2	12.7	15.8	15.2	<b>16.2</b>

### 3.2 Pseudo-control street selection

To form a pseudo-control group of study businesses, we identified and digitized pseudo-control streets. These streets, on which car traffic was not restricted, were generally located in nearby commercial districts, between one to two kilometers away from a pedestrian street program. The objective was to choose streets that were close enough to pedestrian streets to experience the same city-wide economic conditions, but far enough away to not be directly affected by a pedestrian street program. To ensure an appropriately sized pseudo-control group sample size, we digitized approximately five pseudo-control street segments for every one pedestrian street program line segment. Figure 2 shows an example of Yuba City's pedestrian street and pseudo-control streets.

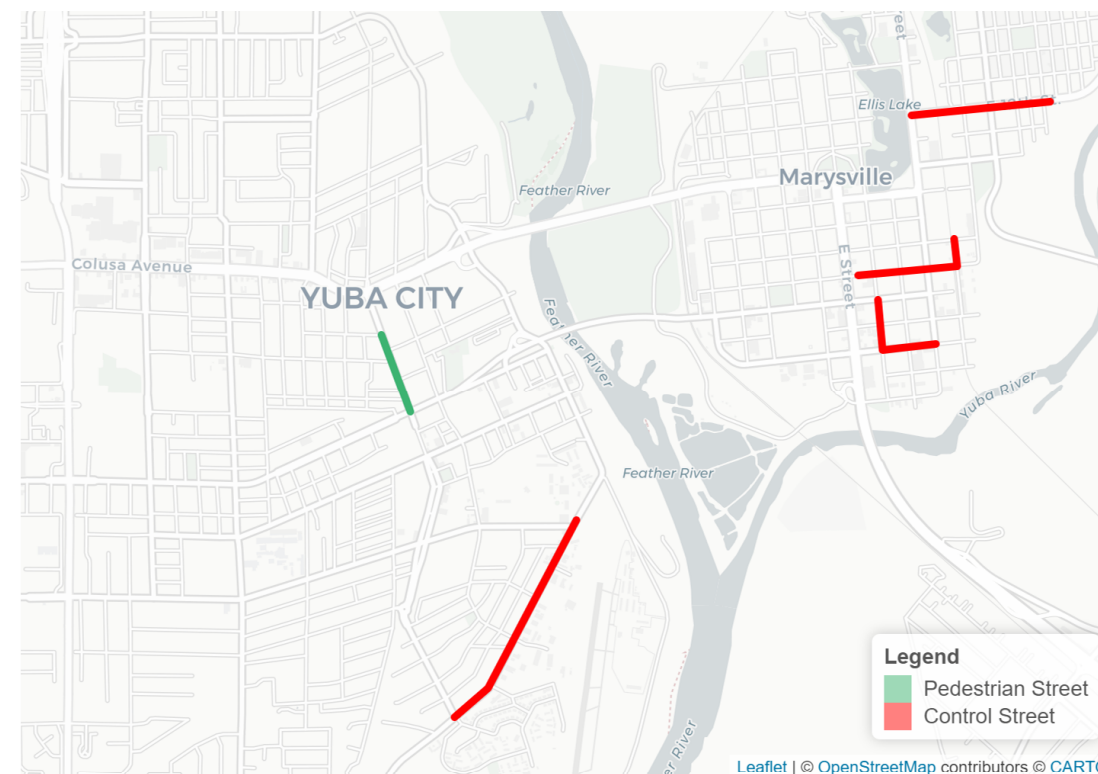


Figure 2. Yuba City pedestrian street and pseudo-control streets

### 3.3 Pedestrian street program dates

The experimental design required knowledge of the start and end dates (if the program had ended) of each pedestrian street program in the study. While most news media articles revealed the start date of programs, very few reported any end date. To catalog the end dates of the programs, we contacted municipal planning and economic development departments at each study city. In several cases, it was necessary to contact local businesses to verify this information.

The average pedestrian street program lasted 8 months. Fifty-two percent closed the street 24/7, 41% were only in effect on weekends, while 7% were special event closures for a single weekend. Of the 97 total programs identified, 28 pedestrian street programs remained in effect as of October 2021. Figure 3 shows the number of active pedestrian street programs during each month of 2020 and 2021 in the US. Pedestrian streets were most popular during the summer of 2020, tapered off during the subsequent winter, and regained popularity in the summer of 2021.

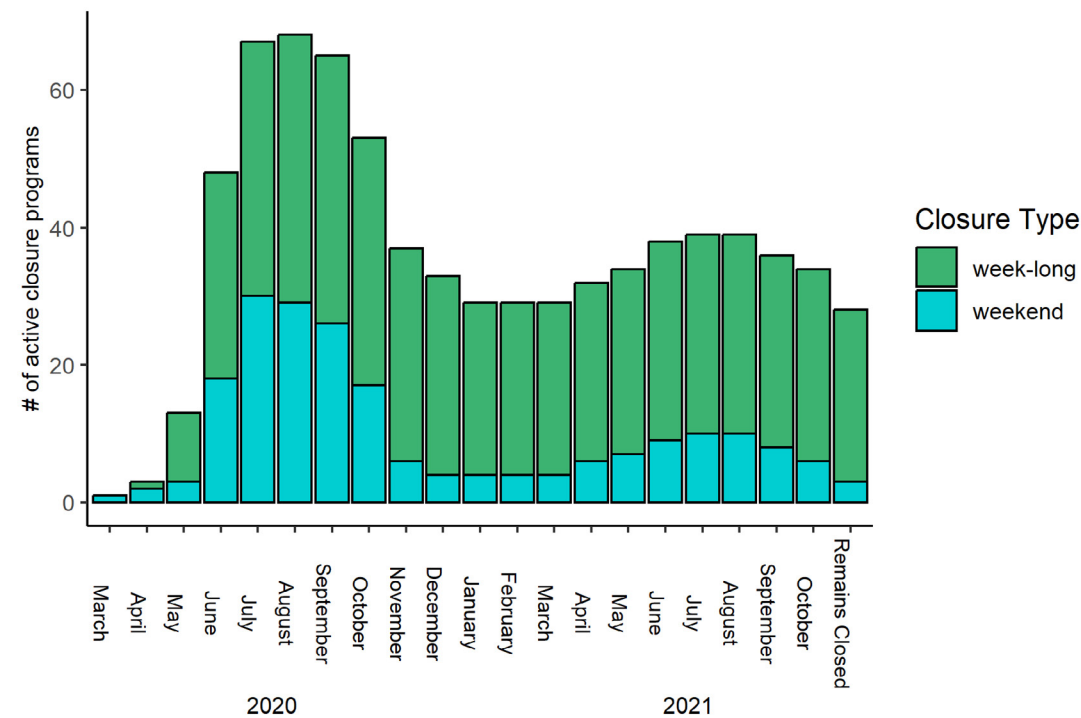


Figure 3. Number of active pedestrian street levels during 2020 and 2021 in the US

### 3.4 Indexing abutting businesses

Using the geographic boundaries of the pedestrian streets, we used the Google Places API to join business locations that were within 40 m of each pedestrian street, as shown in Figure 4. The Google Places API pulls data from Google Maps, by far the most popular and comprehensive business search tool (Panko, 2018). The attributes of the business included business name, type, phone number, website, hours of operation, number of patron ratings, latitude and longitude coordinates, and physical address.



Figure 4. Google places API business search sample street

We identified nearly 14,000 businesses along pedestrian streets, with food and drink businesses (restaurants, cafes, bakeries, bars, etc.) being most popular, followed closely by professional service providers (any business providing a service instead of a good), as shown in Table 2. This suggests that while pedestrian streets were placed in areas with a high density of restaurants, many other business types were impacted as well. Abutting businesses were also identified along each pseudo-control street, with over 58,000 businesses identified. One limitation of this study is the exclusion of businesses who closed during the pandemic, whose contact info was not available from the Google Places API. This survivor bias may have precluded the study from examining businesses that experienced the worst effects of the pandemic.

Table 2. Study businesses by experimental group and business type, according to the Google places API

Business Type	Treatment		Pseudo-Control	
	Count	%	Count	%
Food & Drink	3,332	24%	4,517	19%
Professional Services	3,257	23%	5,160	22%
Health & Wellness	2,777	20%	6,079	26%
Misc	2,055	15%	3,800	16%
General Retail	1,736	12%	3,065	13%
Entertainment	626	4%	646	3%
Finance	160	1%	309	1%
<b>Total</b>	<b>13,943</b>	<b>100%</b>	<b>23,576</b>	<b>100%</b>

### 3.5 Interviews

To develop an initial understanding of the experiences of businesses whose streets were pedestrianized, we conducted 38 interviews with business owners and managers. To pick cities in which to interview, we stratified across the following subsets of the database: geographic region, duration of street closure intervention (ranging from a few weeks to over a year), population of city (ranging from 6,000 to 3.6 million), and winter climate (ranging from the Great Lakes to Southern California). After this stratification, we identified as candidate cities those whose closures attracted the most media coverage. With the candidate cities picked, we stratified pedestrian street businesses by business type. We picked interview candidates by randomly sampling across the stratification, oversampling retail (by 3 to 1) because of their potential vulnerability to street closures. Nine interviewees were referred to the first author by other interviewees (a snowball sample approach). By picking candidates from these different groups, we gained qualitative data regarding the attitudes and perceptions of business owners who experienced a wide variety of circumstances during the COVID pandemic. Overall, we identified and attempted to contact (by email, phone, or in person) 120 candidate businesses, and the first author successfully interviewed 38 of them. Thirty-six were conducted via phone or video call, while 12 took place in-person. Table 3 summarizes the interview count by region and business type.

**Table 3.** Interview count by region and business type

	Retailer	Service Provider	Restaurant	Total
San Francisco Bay Area	7	0	2	9
Mountain West	9	3	3	15
Southern California	0	1	1	2
Great Lakes	3	4	1	8
Middle Atlantic	4	0	0	4
<b>Total</b>	<b>23</b>	<b>8</b>	<b>7</b>	<b>38</b>

To recruit interviewees, we started with a small email campaign targeting the identified candidate businesses along each pedestrian street, offering a small gift card incentive to schedule an interview. The majority of candidates, however, were recruited with “cold calls” during the slow business hours of the morning. The 12 in-person interviews occurred in July 2021, when the first author performed a field visit to a mid-sized city in the Mountain West. He spent a morning visiting as many businesses as possible and performing short informal interviews with managers and staff.

We asked open ended questions, encouraging interviewees to recount their experiences and opinions. The questions focused on business operation adaptations, overall impacts on business performance, changes in customer base, parking, deliveries, and potential future street closures. The following is a sample of the interview questions:

- What was your initial reaction to the news of the pedestrian street program?
- How did you adapt your business due to the pedestrian street?
- How do you feel like your business performance was affected due to the street closure?
- What opinions did patrons express of the pedestrian street program?
- Would you be in favor of a more frequent or permanent street closure?

Most interviews were less than ten minutes long and focused on the issues that were most important to the interviewee. Several interviews lasted longer when candidates felt more willing to discuss finer details of their experience. When practical, interviews were recorded and transcribed. When participants wished to not be recorded, or when recording was not practical, the first author recorded a short summary of the conversation after the interview was over. Once interviews were completed, eleven overarching themes were established, representing the most prevalent topics discussed. All interview transcripts and interview summaries were coded and sorted into at least one of the eleven themes.

### 3.6 Survey development

We wrote the survey to answer three primary research questions. The first question was: If located on a pedestrian street, what factors influenced a business’s experience with the program? According to the interviews, many factors contributed to a business’s overall experience with their pedestrian street program. These included parking, safety, access, city involvement, among others. Informed by our interviews, we developed additional survey questions specifically for businesses that operated on pedestrian streets to dive deeper into these issues and gain quantitative insights regarding the factors which shaped a business’s experience.

The second question was: How did attitudes toward commercial street closures differ for businesses located on pedestrian streets versus those on nearby streets that did not close to vehicles? To compare attitudes between businesses abutting pedestrian streets (treatment group) and other businesses in the area whose streets did not close (pseudo-control group), we asked both groups to answer questions about street closures, parking, overall street aesthetics, among others. We made no explicit mention of the treatment group’s pedestrian street program.

The third question was: How did a pedestrian street program impact a business’s revenue and attitude toward commercial street closures, as compared to other businesses in the area, whose streets did not close? In order to compare business performance between the treatment and pseudo-control groups, we asked all respondents to report the percent change in revenue that they experienced in a fiscal quarter during which a pedestrian street program was in effect using the following question: “By your best estimate, how did your revenue change during [study quarter], as compared to the same period in 2019?” Survey respondents used a slider to report the percent change on a scale from -100 to 200%. The study quarter was determined prior to the survey distribution by identifying a fiscal quarter in each city during which a pedestrian street program was in effect. The beginning and end dates of pedestrian street programs were determined, as mentioned before, by contacting local municipalities. Again, we made no explicit mention of the treatment group’s pedestrian street program in asking this question.

### 3.7 Survey distribution

When we indexed businesses abutting pedestrian streets using the Google Maps API, we also received the website URL for the majority of identified businesses. Through these URLs, we were able to obtain contact emails for 33% of all businesses by using a script to parse through business website home and contact pages, extracting text that followed the typical pattern of email addresses (i.e., must contain the @ symbol, .com/net, etc.). In October 2021, we distributed the survey to the business contact emails by sending an initial invitation email, followed by two reminder emails in the subsequent weeks. We incentivized respondents to take the survey by entering them into a raffle for one of ten \$100 Amazon gift cards. We received a total of 598 responses, a response rate of about 7%. Of the 598 survey responses, approximately half were from businesses located on pedestrian streets, with the other half coming from businesses whose street did not close. Only 1.6% of responses came from single weekend special event

pedestrian street programs, while the rest came from longer term programs. About one third of all respondents self-identified as restaurants or entertainment venues. Survey responses were received from businesses in 77 of the 97 cities in our pedestrian-street database. Figure 5 shows the complete workflow by which survey data were obtained.

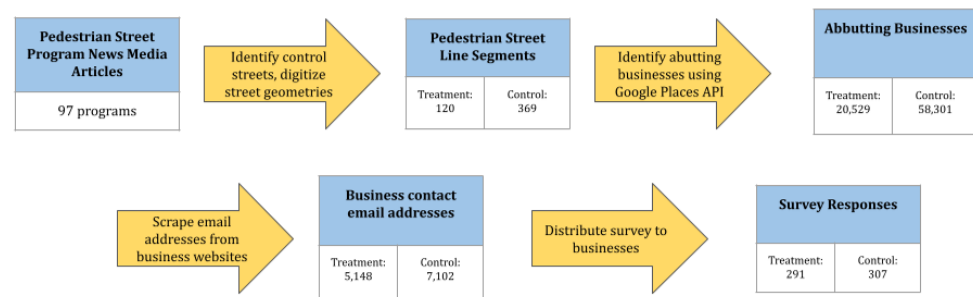


Figure 5. Survey data collection workflow

### 3.8 Survey data analysis

To predict the effects of a pedestrian street intervention on change in business revenue, we utilized multiple linear regression. Table 4 shows the variables used in the model.

Table 4. Model variables

	Description	Mean (SD) or Percent	Range
% Change in Revenue (dependent variable)	The % change in revenue that a business reported for a fiscal quarter during which a pedestrian street was in effect.	-13.23 (56.61)	-100 to 200
Pedestrian street treatment	A dummy variable indicating if a pedestrian street intervention was implemented or not on the business's street.  1 = pedestrian street intervention 0 = no intervention	1: 50.6% 0: 49.4%	0 to 1
Restaurant/Entertainment Venue	A dummy variable indicating if the study business self-identified as a restaurant or entertainment venue. Preliminary analysis revealed a significant difference in survey responses between restaurants/entertainment venues and other business types.  1 = restaurant or entertainment venue 0 = other business type	1: 30.6% 0: 69.4%	0 to 1

	Description	Mean (SD) or Percent	Range
Attitude toward Pedestrian Streets	A 5-point Likert variable indicating a business operator's agreement or disagreement with the statement "Closing commercial streets to cars can be good for businesses". This variable was included because a business operator's attitude toward pedestrian street programs could have an effect on their reporting of business revenue.  1 = Strongly Disagree 2 = Slightly Disagree 3 = Neither agree nor disagree 4 = Slightly Agree 5 = Strongly Agree	1: 10.9% 2: 15.0% 3: 18.6% 4: 26.5% 5: 28.9%	1 to 5
Business Role	A dummy variable indicating if the survey respondent was the business owner, or if they filled a different role (manager, employee, etc.)  1 = owner 0 = other role	1: 65.8% 0: 34.2%	0 to 1
National Walkability Index	A numeric index of a business location's walkability, as described in the methodology section.	15.15 (3.46)	6.5 to 20
Population Density (people/km <sup>2</sup> )	Number of residents per square kilometer in a business's city, calculated by census block group (American Community Survey, 2019)	1,208 (1,309)	63 to 6,281
City Population	Total population of a business's city	1,070,509 (2,452,020)	1,315 to 8,804,190

In addition to the model, we prepared bivariate summaries of many survey questions to assess how survey responses differed by business type. We prepared univariate summaries when survey responses did not differ considerably by business type.

## 4 Results and discussion

The interviews and surveys provide insights into the impacts of pedestrian streets on businesses of different types and point to important issues for businesses during the street closures. It is worth mentioning that while COVID pedestrian streets provided the grounds for a unique natural experiment, the pandemic itself introduced a myriad of confounding factors that make it difficult to isolate the introduction of a pedestrian street as an independent variable. Although the business people interviewed and surveyed may have struggled to separate the effects of the pedestrian street from those of COVID in general, they were able to clearly express their general feelings about the pedestrian-street intervention. The statistical model presented below tests whether the intervention affected business revenue while adjusting for at least some of the other factors that could also have affected revenues.

### 4.1 Question 1: factors influencing feelings about pedestrian streets

The 38 interviews and 291 survey responses collected from businesses located on COVID pedestrian streets reveal valuable insights regarding businesses' experiences with these programs. Interviewees and survey respondents both expressed strong opinions both for and against their pedestrian street programs. While every business faced a unique set of experiences, several prominent issues emerged.

Businesses were split regarding the overall effects of pedestrian street programs, but most were in favor of future interventions. When asked about the overall effect of pedestrian street programs (see Figure 6), businesses were split almost exactly evenly in their responses between “negative” (32%), “no effect” (34%), and “positive” (34%), indicating that while these programs evoked both positive and negative opinions, a large portion of businesses were apathetic or unsure about the removal of vehicles from the street. It is clear that pedestrian street programs affected businesses in a wide variety of ways, but also had little effect on many.

When asked “Would you be in favor of a more permanent or frequent street closure program?” businesses were far less indifferent, with 58% of respondents answering “yes,” 35% answering “no,” and only 6% answering “no opinion.” Half of the respondents who reported that the street closure had “no effect” on their business also indicated that they would be in favor of a more permanent or frequent street closure program. This shows that business owners who did not have much of an economic stake in the closure programs were still in favor of the programs for other reasons, a sentiment that came up several times in interviews with business operators who enjoyed the improved public space on their street.

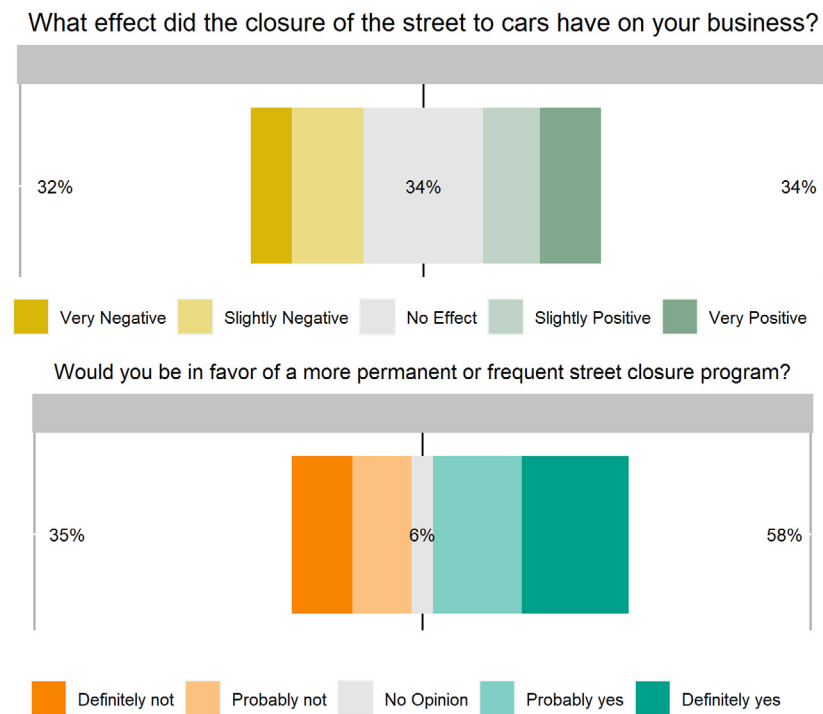


Figure 6. Responses to questions regarding overall program effects and opinions regarding future programs

In both interviews and surveys, restaurants and entertainment venues (mostly art galleries and museums) reported the most positive effects and highest rates of approval of pedestrian street programs. During interviews, nearly every restaurant was in favor of their pedestrian street, reporting that it had provided a substantial boost to business. They valued the additional seating, improved atmosphere, and increased foot traffic that the intervention provided. Prior to the pedestrian street, one restaurant owner had started the process of bankruptcy after suffering months of pandemic-related losses. She credits the pedestrian street program with saving her business by allowing her to install outdoor seating which facilitated on-site dining and in turn increased revenues. To an extent, the survey results agree with the interviews, with 44% of restaurants reporting that closing the street to cars had a positive effect, much higher than the percentages for other business types (see Figure 7).

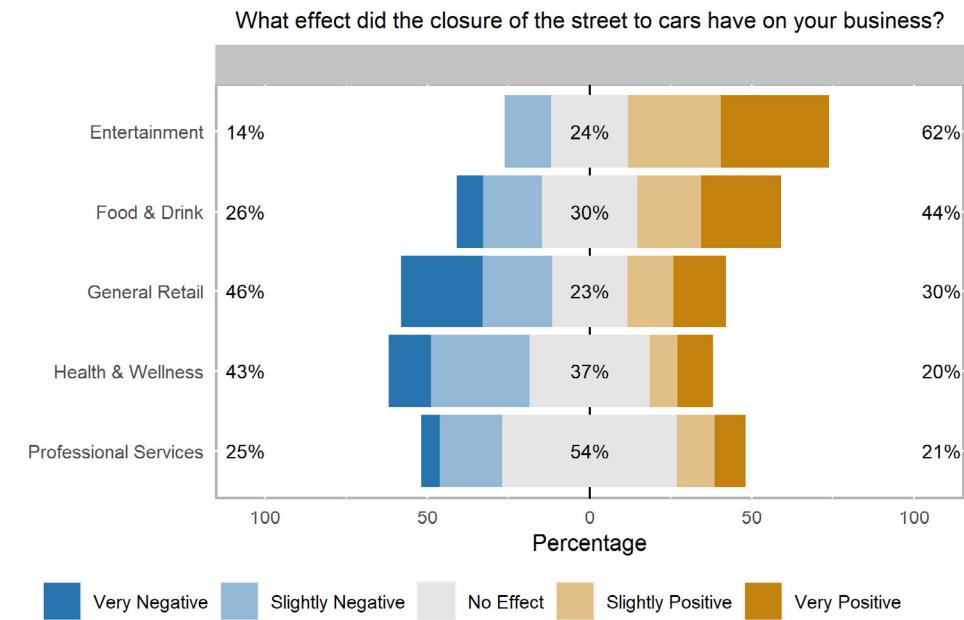


Figure 7. Effect of pedestrian street, by business type

Additional survey questions aid in revealing the reason for which restaurants and entertainment venues reported such positive effects, as shown in Figure 8. The majority of restaurants and entertainment venues agreed with the statement that “I valued the extra street space outside my business for additional seating/merchandise placement,” while the plurality of other business types neither agreed nor disagreed. The same applies to the statements “I saw an increase in new customers” and “Allowing people to consume alcohol in open street areas is a good idea,” indicating that restaurants and entertainment venues took advantage of the newly available street space to seat more customers, sell more alcohol, and in turn brought in new customers.

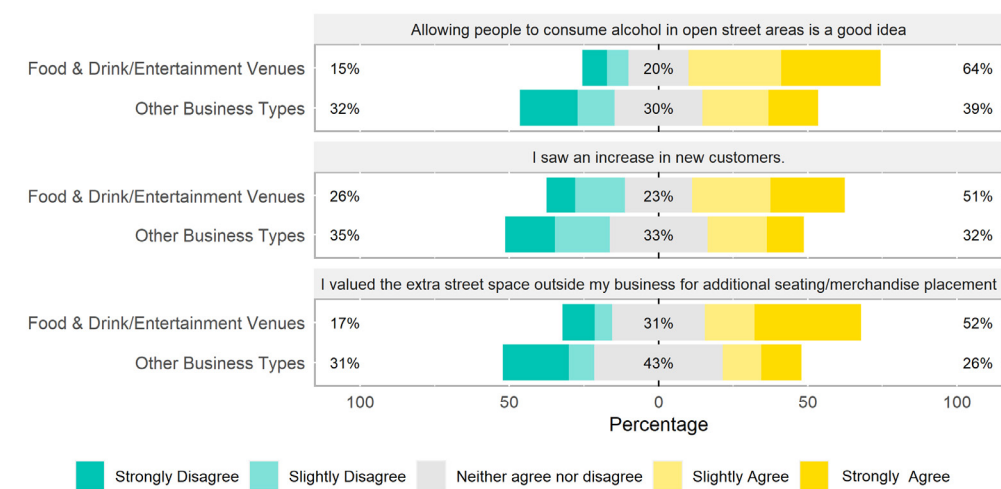


Figure 8. Responses to the other statements, broken down by restaurants/entertainment venues vs. other business types



Pedestrian street programs were not as popular with other business types. In the first few months of pedestrian street interventions, many retailers and service providers saw their street's closure as a necessary sacrifice that needed to be made to save their local restaurants by allowing them to operate outdoors, an opportunity to "be a good neighbor," as an auto mechanic put it. As the months dragged on and the street remained closed to cars, these businesses began to perceive unfair advantages that the program awarded restaurants. Several complained that the pedestrianized areas only filled up at night with diners, and that restricting automobile access throughout the day reduced daytime shopping activities and made the street feel empty and quiet, like a "ghost town", as one retailer put it. While the pedestrian street allowed restaurants to sometimes double their seating capacity, other business types didn't see the same benefits, with one jeweler complaining that the tables and chairs blocked people's view of his window displays. While retailers were also allowed to utilize the street space in front of their stores to sell merchandise, it was rarely practical. "I couldn't just put 200-year-old diamonds in and out of the street every day," said an antiques dealer. Many comments on the survey told the same story:

"A few businesses benefited (those that sell alcohol). Everyone else suffered."

"The street closures were good for restaurants. I am not aware of any other business that is happy with them."

"...the increased foot traffic only slightly increased our sales. Lots of lookers but not so many buyers".

In the survey, 46% of retailers reported negative effects, the lowest among all business types. Health and wellness businesses also reported mostly negative effects, perhaps in part due to the fact that their clientele is more likely to be elderly or disabled and may have struggled to access their business without on-site parking. Professional service businesses (any business that provides services instead of goods) indicated that the pedestrian street had "no effect," more than any other business type, likely due to the fact that these businesses are less likely to directly benefit from increased pedestrian volumes.

There were, however, many businesses that enjoyed a more synergistic relationship with busy neighboring restaurants. Open-air dining brought more people to the area, who in turn visited and supported other businesses. "It keeps people downtown longer," pointed out one retailer, increasing the likelihood of new customers and increased sales. One survey respondent commented, "The restaurant and cafe seating on the street has resulted in more people noticing the shop and coming in to explore what we have."

#### 4.2 Question 2: issues of concern to businesses on pedestrian streets

The interviews and surveys highlight many issues of concern to businesses on pedestrian streets, including parking, new versus long-term clients, changes to the atmosphere of the street, access for clients with mobility limitations, access for deliveries, perceived safety, weather, and the city's process.

Issues surrounding parking were particularly concerning for business owners. An art gallery owner teared up during an interview while telling stories of customers calling to say that they wouldn't be visiting the business because of the parking situation. A shoe store owner only needed one word to describe her reaction to the loss of parking: "dread." She went on to talk about the customers that she was losing: those from other cities who drive long distances to her store and expect an on-site parking space. "People from out of town don't think this is cute," she said, describing the pedestrian street program. Survey respondents agreed with these concerns when they were asked if they agreed or

disagreed with the statement "Adequate parking was provided," with 47% of businesses disagreeing and only 32% agreeing.

While public parking lots were generally available within walking distance of most pedestrian streets, several businesses expressed the same grievance of losing customers who were unwilling to change their driving route and park farther away. Often, navigation systems may not have had the ability to reroute drivers away from street closures and toward available public parking lots, increasing customer frustration. Even some of the most enthusiastic supporters of their pedestrian street admitted that issues with parking were a downside – often the only one – of the program.

On the other hand, several interviewees pointed out that even before the pedestrian street intervention, their street offered very limited on-street parking. When survey respondents were asked about their available parking supply both before and during the period in which the pedestrian street was implemented, only 34% reported losing the on-street parking available to their business, with 8% losing their off-street parking. This may indicate that the perception of lost parking was greater than the actual loss. Interviewees also often explained that anyone who visited on a regular basis (employees, repeat customers, etc.) quickly adapted and found a place to park if needed. Above all, a key determinant of parking satisfaction was the existence of large public parking facilities within close proximity to the pedestrian street.

The businesses in this study depended on both new customers and long-term clients. While pedestrian streets represented an opportunity to attract new customers from the increased pedestrian traffic on the street, they also had the potential to hinder long-term clients from supporting struggling businesses. The majority of business owners interviewed, however, said that most regular customers were determined and emboldened to make their way to the store and support the business. A large majority of survey respondents (79%) agreed with the statement that "My existing customer base continued to support my business," indicating that the pedestrian street program, for the most part, did not hinder businesses' existing customers from reaching their stores.

Pedestrian street programs transformed the overall atmosphere of commercial areas in ways that made for a more pleasurable environment (thereby increasing the PAD metric discussed earlier). Many businesses were proud of their updated streetscapes, increased pedestrian volumes, open air dining, intimate storefronts, and overall atmosphere. Comments on the survey included:

"The open streets program allowed space for those children to safely play and gave peace of mind to the parents"

"it's a blessing that we are able to breathe clean air on the weekends [with less] traffic noise"

"...the street closures provided a vibrancy and energy to downtown that I have not seen before..."

"The quiet atmosphere of the closed street is very favorable to the ambiance of an art gallery. A major selling point for us is the peace engendered by the space"

In some cases, however, the physical design of the street space did not feel like an aesthetic improvement to business owners. For example, a common practice was for cities to block off pedestrian streets with large "road closed" signs, orange barrels, and concrete barricades. As one interviewee put it, "When people see a barricade, they see it as a reason to stay out," suggesting that the barriers might keep even pedestrians away. Comments on the survey included:

“...the temporary barriers in place look pretty sketchy”

“It looks so tacky...”

“The barriers used by the city made the area look like a construction site”

Some businesses did their best to enliven the atmosphere themselves by inviting local artists to set up booths in the sidewalk, putting out sampling stations, and organizing community events. These efforts show that businesses saw themselves as stakeholders in the attractiveness of their pedestrian streets.

Access for patrons with limited mobility was a concern for a good share of the businesses that we interviewed. In interviews, jewelers and hobby-specific shops expressed the most apprehension towards their store’s loss of automobile access, citing the fact that their long-term client base tended to be more elderly. “...A lot of times they’re carrying something, and a lot of times they’re older,” was a music store owner’s description of his clients who had to park farther away from his business. One restaurant even tried to shuttle older patrons from the parking lot and back with a golf cart before the city disallowed it.

In the survey, many respondents agreed with the statement “I was concerned about elderly or disabled people’s access to my business,” but it did not represent a prevalent issue for most businesses. As shown in Figure 9, health and wellness businesses were most concerned with the access of the elderly and disabled, while entertainment venues were the least. Comments in the survey included:

“It created a hardship for my elderly and disabled clients”

“As someone who has a large elderly clientele, it was very awkward to have them visit”

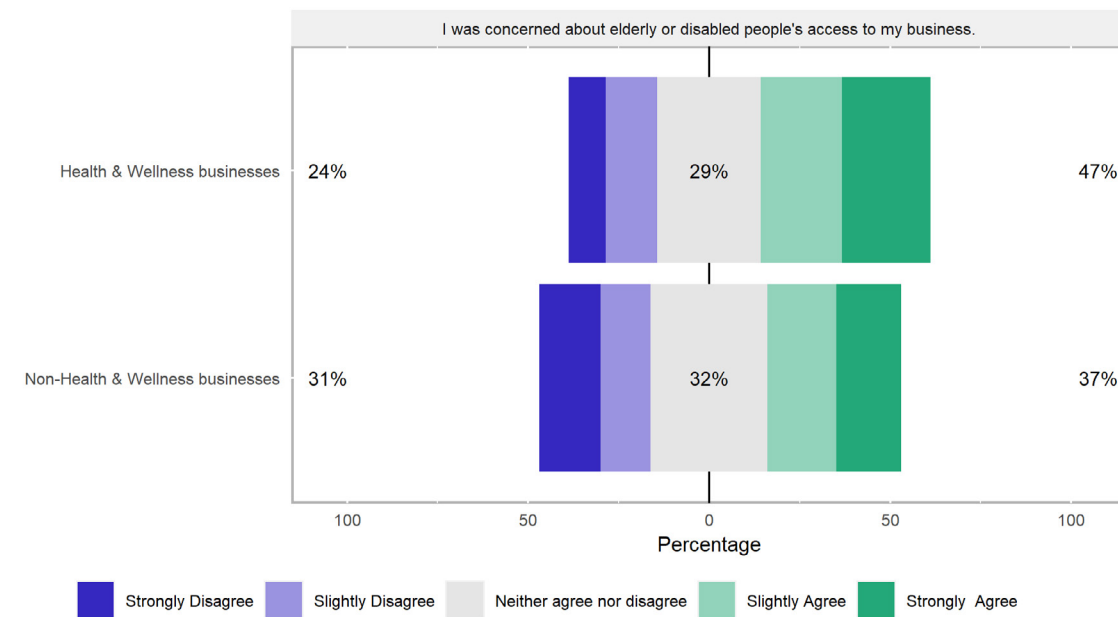


Figure 9. Response to the statement “I was concerned about elderly or disabled people’s access to my businesses”

Several businesses reported challenges related to deliveries, but most did not. A restaurant supply store that received shipments from multiple international agencies had a particularly difficult experience. Outbound deliveries posed their own challenges. “Why were we encouraged to do curbside ordering,”

wondered one retailer, “when our customers had no access to the curb?” For several businesses, especially home goods stores, having a back alley for customers to drive up and collect larger items was essential. In the survey, most businesses did not have issues with deliveries, with 59% indicating no change in their level of inbound delivery convenience. Thirty-three percent, however, did report a decrease in delivery convenience.

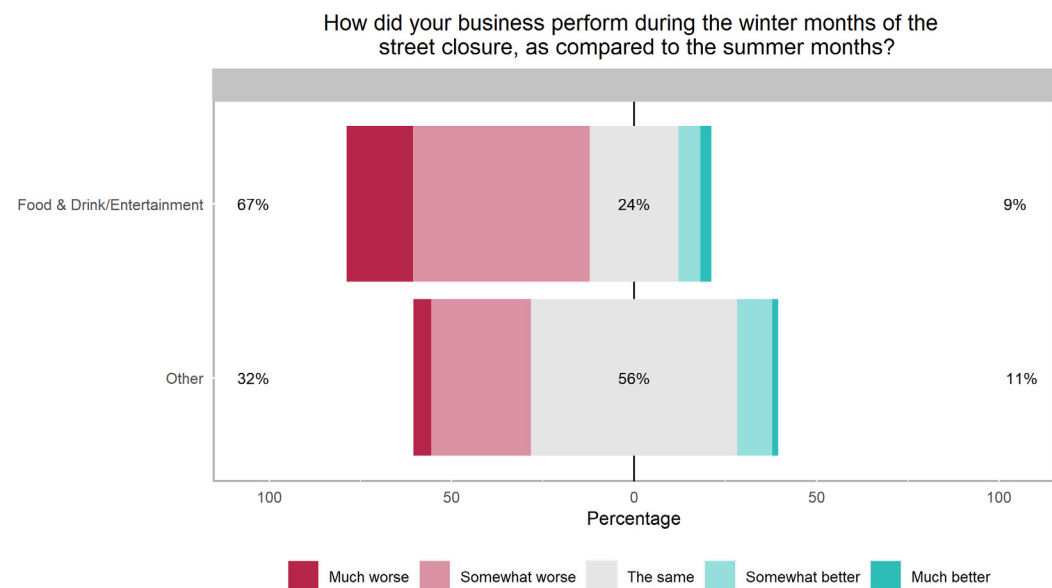
Pedestrian street programs had mixed effects on the perceived level of safety on the street. For some businesses, taking cars from the road and replacing them with foot traffic increased the feeling of safety. A bank manager said that she and other bank employees felt much safer from the threat of robbery since vehicles were banned from the street and pedestrian volumes increased. She said that the additional security was well worth the price of minor losses in vehicle access.

Several retailers, however, had different opinions. As many interviewees from restaurants pointed out, one of the main draws of these pedestrian streets was the option to consume alcohol in the common street areas. But multiple retailers felt that the public alcohol consumption threatened the commercial environment, with interviewees reporting a street brawl in one case and even a fatal shooting in another. They decried the “outdoor parties” and “playgrounds” that the street space had become. “I don’t want drunk people in my shop,” said one retailer, “it’s a knife shop!”

The survey, for the most part, did not reflect the safety concerns mentioned above. We asked survey respondents about the perceived feeling of safety on their pedestrian street. Sixty-two percent of respondents agreed with the statement “My street felt safe before the closure,” while 64% agreed that “My street felt safe after the closure.” This indicates that the pedestrian street program likely did not have a substantial impact on the perceived level of safety on the street. Concerns regarding alcohol consumption in the street were reflected in the survey, however, with only 26% of non-restaurant/entertainment venue businesses agreeing with the statement “Allowing people to consume alcohol in open street areas is a good idea,”. Many comments on the survey highlighted issues surrounding loitering in public areas, noisy parties disturbing businesses and residents, lack of sufficient lighting, and the necessity of a police presence during busier times.

Colder weather impacted some businesses on pedestrian streets more than others. Most programs were established in the summer of 2020, when the warm weather coaxed people outside to enjoy dining and retail experiences after months of COVID lockdown. As the pandemic dragged on into the colder winter months, business in harsher climates had mixed feelings about the persistence of their pedestrian streets. To the pleasant surprise of many, propane heaters and outdoor “igloo” structures attracted a fair number of patrons to the street. One interviewee from a bar recounted fond memories of patrons huddled with their drinks around cozy fires as they took in the evening snowfall. On the other hand, several business owners didn’t see the logic of keeping the streets closed through the winter, viewing the pedestrian street intervention as a temporary boost, not a long-term year-round solution. They said that they didn’t see enough patrons on the street to justify the intervention, especially during the daytime.

Survey respondents located along pedestrian street programs that remained in place during December, January, and February were asked how their business performed during the winter months, as compared to summer. The most common response was that there was no change in performance in the winter (39%), with the next most common response being that the business performed somewhat worse (29%). Figure 10 shows the response by business type, with Food & Drink/Entertainment venue businesses reporting the worst effects.



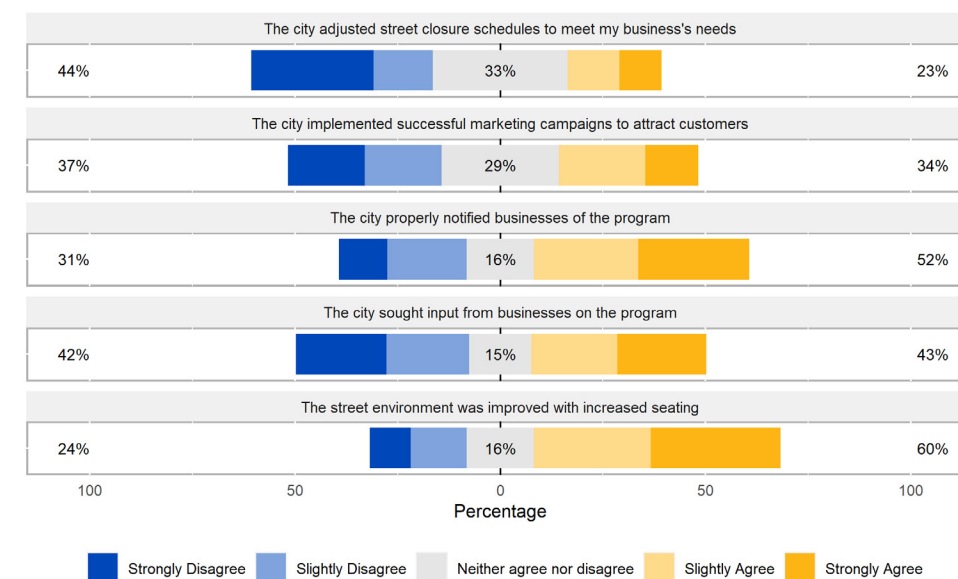
**Figure 10.** Responses to the statement “How did your business perform during the winter months of the street closure, as compared to the summer months?” by business type

Businesses reported mixed opinions regarding their municipality’s involvement in pedestrian street programs. Analysis of interview responses suggested that the more involved a city was in each aspect of the pedestrian street program, the more satisfied businesses were with the process. Interviewees described town hall meetings, opinion polls before and during the programs, and outreach presentations from the city. The decision to close one street was made only after the businesses voted to approve the program. It didn’t hurt, as one bookstore owner in another city noted, that city hall was just one block away, and that city staff were regular customers. Many of the businesses that disapproved of their pedestrian street were disappointed in the lack of outreach and communication by city staff regarding the program, with many learning the news of the intervention by word of mouth. For several businesses, this lapse in correspondence established a poor attitude toward the program from the beginning that didn’t get better over time.

Survey respondents were asked a broad set of questions regarding their city’s involvement in their pedestrian street program, shown in Figure 11. Many respondents were critical of the scheduling of their pedestrian street program, with 44% strongly disagreeing with the statement that “The city adjusted street closure schedules to meet my business’s needs,” agreeing with a survey respondent who wrote: “During hours when pedestrians are present, the closure is pleasant...but during regular weekdays the closure has the opposite effect. The streetscape is depressing and empty, no longer bustles with traffic activity and consumers aren’t present. It is empty and more depressing especially in winter. The ideal closure could be limited to actual times pedestrians want street access, leaving streets open the rest of the time.” Several other respondents also expressed a desire for a more variable closure schedule. However, putting up and taking down barriers and other elements multiple times a week is a burden, and “... temporary closures just mean the set up won’t be as nice,” as one respondent put it.

Respondents were most split regarding the statement that “The city sought input from businesses on the program,” with very few answering “Neither agree or disagree.” Many survey respondents includ-

ed comments to complain about the lack of input solicitation from businesses. This indicates that gathering input from businesses was an important factor in determining business approval of the program.

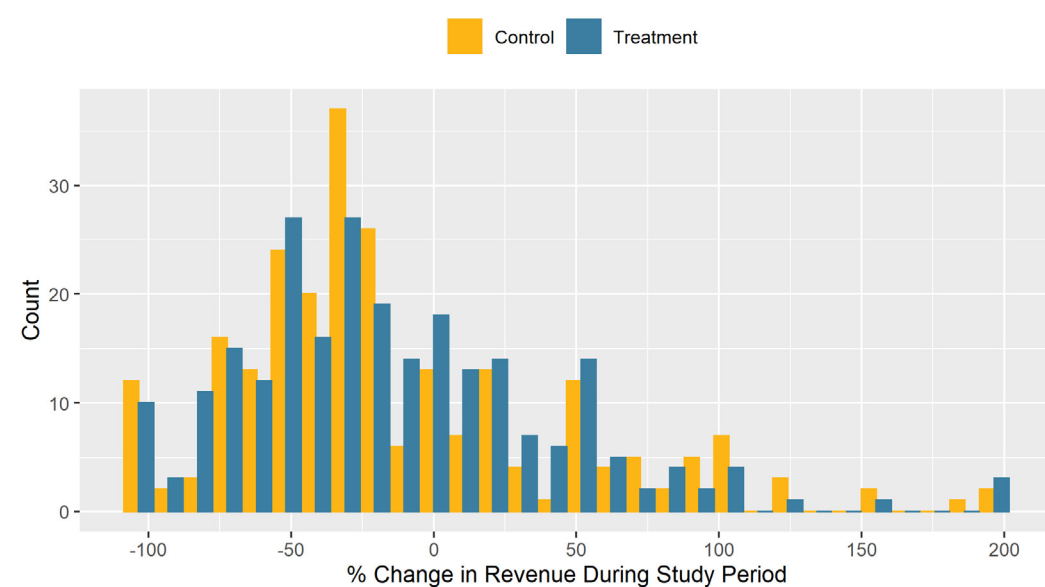


**Figure 11.** Responses to statements regarding city involvement in pedestrian street programs

### 4.3 Question 3: effect of pedestrian street programs on business revenue

The survey asked all businesses surveyed, both those abutting pedestrian streets (the treatment group, n=291) and those located on nearby streets that did not close (the pseudo-control group, n=307), about their attitude toward commercial street closures along with several other questions about their experience during a specific fiscal quarter during which a pedestrian street program was active. Answering these questions accurately may have been difficult for many businesses, as the fiscal quarter was over 1 year in the past for many of the respondents.

Pedestrian street programs do not appear to have affected business revenue significantly. We asked businesses from both the treatment and pseudo-control groups to report their approximate percentage change in revenue during a fiscal quarter during which a pedestrian street program was in place. This was done with the intent of quantifying the effect of pedestrian streets on business revenue. Treatment businesses and pseudo-control businesses reported very similar changes in revenue, as shown in Figure 12. The median change in revenue for treatment businesses was -14%, while that of pseudo-control businesses was -12.5%.



**Figure 12.** Reported change in revenue during study period by treatment and pseudo-control groups

We estimated a multiple linear regression model to predict percent change in revenue as a function of abutting a pedestrian street or not while adjusting for other variables (Table 5). The model shows that, on average, these pedestrian street interventions are more likely to increase than decrease business revenues, predicting their implementation to be between a -7 percentage point decrease and +17 percentage point increase in change of revenue if we replicated this work, assuming a 95% confidence interval (see Table 5 standard errors). The high level of uncertainty associated with this treatment effect may, in part, be a product of a somewhat subjective and biased measurement of change in revenue as reported by business operators (often reporting for a fiscal quarter many months in the past). The uncertainty of the model warrants additional study using more objective measures of business revenue. Additionally, a more complex analysis of this survey data, taking into account the variation between different cities and streets, may aid in explaining this uncertainty.

Because we suspected the effect of a pedestrian street to have a stronger impact on restaurants and entertainment venues than other business types, we tested the interaction effect between a business being both a restaurant/entertainment venue and located on a pedestrian street. The negative coefficient for this parameter indicates that being a restaurant/entertainment venue on a pedestrian street was associated with a drop in the reported change in revenue, but again the standard error is large, indicating inadequate evidence to be confident about the direction and magnitude of the relationship. If the interaction effect in the regression was more precise, the negative relationship is surprising, as it runs counter to our original hypothesis, formed from our interviews, that restaurants and entertainment venues thrived on pedestrian streets. A potential explanation for this contradiction may lie in the fact that restaurants located on pedestrian streets were nearly always situated in the downtown area of cities. The pandemic may have caused fewer people to dine downtown, instead favoring the more peripheral, auto-accessible restaurants on our pseudo-control streets during lockdown. Indeed, this was often the motivation behind pedestrian street interventions.

The model did indicate that several other independent variables had more precise impacts on revenue. Population density is very likely to be positively related to change in revenue. For example, the model predicts that a business in an area with one standard deviation greater population density

(1,309 ppl/km<sup>2</sup>) is expected to increase a business's change in revenue by 7.1 (+/- 7.2) percentage points. Total city population, on the other hand, displayed a negative relationship, with the model predicting a single standard deviation increase in total city population (2,452,020 residents) being expected to lower a business's change in revenue by 9.7 percentage points (+/- 7.1). Additionally, a respondent's agreement or disagreement with the statement "Closing commercial streets to cars can be good for businesses" proved to substantially impact percent change in revenue. The model predicted that a single standard deviation increase on a respondent's 5-point scale response (1.34 points) would expect to be accompanied with a 6.8 percentage point increase in change of revenue (+/- 4.8). It could be that a positive attitude toward the pedestrian street biased respondents estimates of revenue change, or the opposite, that positive revenue changes made the respondent more likely to have a positive attitude. A more precise and unbiased estimate of revenues is needed to disentangle the causality.

**Table 5.** Linear regression model for percent change in revenue

Term	Coefficient	Standard Error	P Value
Intercept	-5.034	5.272	0.340
Pedestrian Street Treatment	5.176	5.903	0.381
Restaurant/Entertainment Venue	-5.364	7.716	0.487
Owner	-8.423	5.215	0.107
National Walkability Index (z-score)	-3.641	2.558	0.155
Population Density [people/km <sup>2</sup> ] (z-score)	7.138	3.655	0.051*
City population (z-score)	-9.708	3.641	0.008***
Attitude toward Pedestrian Streets (z-score)	6.825	2.467	0.006***
Pedestrian Street Treatment × Restaurant/Entertainment	-18.083	10.689	0.091*

\* 10% Significance Level

\*\* 5% Significance Level

\*\*\* 1% Significance Level

## 5 Policy implications

The results of this study point to several actions that cities can take to address the issues identified in the interviews and survey so as to increase the benefits of pedestrian streets to businesses. Pedestrian streets can have benefits beyond a boost to local businesses, but below we focus only on strategies targeting the issues that businesses face. Successful pedestrian streets have policies and plans that carefully balance the goals of local business owners and the public.

- Pedestrian streets appear to benefit food and drink establishments more than other business types. To leverage this finding, municipalities can pay attention to the ratio of restaurant to non-restaurant establishments during site selection. Streets with many dining options are good sites for pedestrian streets and are likely to attract more foot traffic. Because non-restaurant business types are likely to benefit as well, cities can be prepared to adjust the program to accommodate all types of businesses, thus maintaining overall support for the pedestrian street.
- The pedestrianization of a street will often lower the supply of nearby parking spaces, which can deter customers, especially the elderly and disabled. In order for all business types to benefit from pedestrian streets, reliable off-site parking is a necessity. This will allow businesses to retain the long-term clients who are used to driving to their business, as well as to benefit from the new customers who arrive by foot. To accommodate those with limited mobility, cities can provide them with reserved priority parking.

- The potential for alcohol consumption in open street areas can be an important attractor for pedestrian activity but can also lead to disturbances. To increase the overall level of order and comfort on the street, cities can clearly designate areas where alcohol can and cannot be consumed outdoors. Additional law enforcement on busier nights could also be warranted.
- Pedestrian streets can cause complications with inbound and outbound deliveries. Delivery-related headaches can be mitigated by in-advance coordination between businesses and shippers, with the possible permission of delivery vehicle access to the street during off-peak hours. Cities should be especially sensitive to retailers who lack back alleyway access.
- Overall outdoor aesthetics are an important factor in making pedestrian street areas welcoming and attractive. Cities have control over the aesthetics of pedestrian streets and can invest in creating an inviting and vibrant commercial space from end to end, especially during cold winter months. For example, cities can increase the appeal of pedestrian streets by adding more trees and flowers, pedestrian-scale lighting, and cold weather accommodations like propane heaters and outdoor dining structures.
- Businesses are much more likely to support pedestrian street programs when cities keep adequate channels of communication open. One of the most essential measures cities can take is to treat businesses as valued stakeholders throughout the entire pedestrian street program with outreach, regular communication, and opinion gauging throughout. Cities can show that they value business input by implementing requested changes to the route and frequency of pedestrian streets.

## 6 Conclusion

Pedestrian street programs substantially impacted businesses during the COVID pandemic in both positive and negative ways. Individuals interviewed and surveyed for this study highlighted the benefits of pedestrian streets, including increased outdoor seating, improved outdoor atmosphere, and growth in new customers. Although not definitive, our analysis supports the possibility that pedestrian street interventions increased business revenue. Most survey respondents would be in favor of a more permanent or frequent street closure program. Others, however, struggled with issues surrounding parking, safety, deliveries, winter conditions, and city involvement, and were less supportive of such programs in the future. Based on what we heard from businesses, we outline actions planners can take to amplify these benefits and minimize these costs in order to improve the experience of businesses on pedestrian streets.

The 97 COVID-related pedestrian streets across the US represent more than just a trend. They are a signal that cities are starting to reconsider the way they utilize valuable urban street space, and they present an opportunity to implement thriving permanent pedestrian spaces in the post-pandemic future. Our study shows that local businesses, under the right circumstances, can thrive as well.

## Data

Data files available as supplemental materials at <https://jtl.org/index.php/jtlu/article/view/2251>.

## References

- American Community Survey. (2019). *2019 American Community Survey 5-year estimates, Tables 'B01001\_001' and 'B19001\_001' through 'B19001\_017'*. Washington, DC: U.S. Census Bureau.
- Baxandall, P., Dutzik, T., & Hoen, J. (2008). *A better way to go: Meeting America's 21st century transportation challenges with modern public transit*. Denver, CO: U.S. PIRG Education Fund.
- Bohl, P. (2009). The effects of store atmosphere on shopping behavior — A literature review. *Corvinus Marketing Tanulmányok*, 2, 1–24.
- Chaudhuri, A., & Zieff, S. G. (2015). Do open streets initiatives impact local businesses? The case of Sunday streets in San Francisco, California. *Journal of Transport and Health* 2(4), 529–39. <https://doi.org/10.1016/j.jth.2015.07.001>
- Clifton, K. J., Muhs, C., Morrissey, S., Morrissey, T., Currans, K., & Ritter, C. (2013). *Examining consumer behavior and travel choices*. Portland, OR: Transportation Research and Education Center.
- Combs, T., & Pardo, C. (2021). Shifting streets Covid-19 mobility data: Findings from a global dataset and a research agenda for transport planning and policy. *Transportation Research Interdisciplinary Perspectives*, 9, 100322.
- Douglas, G., Weinstein Agrawal, A., Currin-Percival, M., Cushing, K., & DeHaan, J. (2019). *Community benefits and lessons for local engagement in a California open streets event: A mixed-methods assessment of Viva CalleSJ 2018*. San Jose, CA: Mineta Transportation Institute.
- Engelberg, J. K., Carlson, J. A., Black, M. L., Ryan, S., & Sallis, J. F. (2014). Ciclovia participation and impacts in San Diego, CA: The first CicloSDias. *Preventive Medicine*, 69(S), 66–73. <https://doi.org/10.1016/j.ypmed.2014.10.005>
- Federal Highway Administration. (2012). *Bicycle and pedestrian program, accommodating bicycle and pedestrian travel: A recommended approach*. Washington, DC: Federal Highway Administration, Office of Planning, Environment, & Realty (HEP). [http://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/guidance/design.cfm](http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design.cfm)
- Federal Transit Administration. (2021). *Bipartisan infrastructure law*. Washington, DC: Federal Transit Administration. <https://www.transit.dot.gov/BIL>
- Feinberg, R. A. (1991). A brief history of the mall. *Advances in Consumer Research*, 18, 426–27.
- Forkes, J., & Smith, N. L. (2010). *Bike lanes, on-street parking and business, Year 2 Report: A Study of Bloor Street in Toronto's Bloor West Village*. Toronto: Toronto Center for Active Transportation.
- Gregg, K. (2019). Conceptualizing the pedestrian mall in post-war North America and understanding its transatlantic transfer through the work and influence of Victor Gruen. *Planning Perspectives*, 34(4), 551–77. <https://doi.org/10.1080/02665433.2018.1437555>
- Hipp, J. A., Eyler, A. A., & Kuhlberg, J. A. (2013). Target population involvement in urban ciclovias: A preliminary evaluation of St. Louis open streets. *Journal of Urban Health*, 90(6), 1010–1015. <https://doi.org/10.1007/s11524-012-9759-6>
- Jordan, S. W., & Ivey, S. (2021). Complete streets: Promises and proof. *Journal of Urban Planning and Development*, 147(2): 04021011. [https://doi.org/10.1061/\(asce\)up.1943-5444.0000684](https://doi.org/10.1061/(asce)up.1943-5444.0000684)
- Judge, C. E. (2015). *The experiment of American pedestrian malls: Trends analysis, necessary indicators for success and recommendations for Fresno's Fulton Mall*. <https://doi.org/10.13140/RG.2.1.3502.7280>
- Matuke, S., Schmidt, S., Li, W. (2020). The rise and fall of the American pedestrian mall. *Journal of Urbanism*, 14(2), 1–16. <https://doi.org/10.1080/17549175.2020.1793804>
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: The MIT Press.

- National Association of City Transportation Officials. (2013). Neighborhood Main Street. In *Urban street design guide*. New York: NACTO. <https://nacto.org/publication/urban-street-design-guide/streets/neighborhood-main-street/>
- National Restaurant Association. (2021). *State of the restaurant industry report measures virus' impact on business*. Washington, DC: NRA. <https://restaurant.org/articles/news/new-report-measures-pandemics-effect-on-business>
- National Trust for Historic Preservation. (2022). *Celebrating 40 years of Main Street America successes*. Washington, DC: National Trust for Historic Preservation. <https://savingplaces.org/guides/celebrating-40-years-of-main-street-america-successes#.Yl27gOjMJLk>
- Panko, R. (2018). *The popularity of Google maps: Trends in navigation apps in 2018*. <https://themanifest.com/mobile-apps/popularity-google-maps-trends-navigation-apps-2018>
- Pojani, D. (2008). American downtown pedestrian malls: Rise, fall, and rebirth. *Territorio*, 46(3), 173–80. <https://doi.org/10.3280/TR2008-046027>
- Popovich, N., & Handy, S. L. (2014). Bicyclists as consumers mode choice and spending behavior in downtown Davis, California. *Transportation Research Record*, 2468, 47–54. <https://doi.org/10.3141/2468-06>
- Project Open Streets. (2021). *Open streets initiatives*. <https://openstreetsproject.org/map-of-open-streets-initiatives>
- RetailNext. (2021). *Retail performance pulse: April 2021 store results*. <https://retailnext.net/en/benchmark/retail-performance-pulse-april-2021-store-results/>
- Shoup, D. (2005). *The high cost of free parking*. Chicago: American Planning Association.
- U.S. EPA. (2021). *National walkability index*. Washington, DC: U.S. EPA. (<https://www.epa.gov/smartgrowth/smart-location-mapping#walkability>)
- Volker, J. M. B., & Handy, S. (2021). Economic impacts on local businesses of investments in bicycle and pedestrian infrastructure: A review of the evidence. *Transport Reviews*, 41(4), 401–31. <https://doi.org/10.1080/01441647.2021.1912849>
- Von Schneidmesser, D., & Betzien, J. (2021). Local business perception vs. mobility behavior of shoppers: A survey from Berlin. *Transport Findings*. <https://doi.org/10.32866/001c.24497>