Field Experiments

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1 Introduction

In urban environments, the safety and experiences of older pedestrians at intersections are of paramount importance. As cities continue to grow and evolve, understanding the unique challenges faced by older individuals when navigating through pedestrian spaces becomes increasingly critical. Factors such as age-related physical limitations, cognitive decline, and changes in mobility patterns can significantly impact older pedestrians' safety and mobility.

This report aims to provide a comprehensive analysis of older pedestrians' experiences, perceptions, and safety concerns at intersections in urban settings. By examining data collected through surveys distributed at intersections, we seek to gain insights into how older individuals interact with traffic signals, moving vehicles, e-bikes, scooters, and other pedestrians. Additionally, we aim to understand the factors influencing their reliance on traffic signals, their attitudes towards pedestrian safety, and their transportation habits within the city.

The report begins with a problem statement that outlines the gaps in existing knowledge regarding older pedestrians' experiences and safety concerns at intersections. It underscores the importance of addressing these gaps to develop evidence-based strategies aimed at enhancing pedestrian safety and mobility for older individuals.

Following the problem statement, the report provides a detailed description of the dataset used for analysis. This includes an overview of the survey questions, demographic information of the respondents, and key variables related to pedestrian safety and behavior.

Subsequently, the report presents data visualizations and interpretations, highlighting key findings from the survey responses. Visualizations include graphs illustrating the distribution of respondents based on demographic factors such as origin, gender, and age, as well as their reported levels of nervousness, reliance on traffic signals, incident history, and transportation habits.

The data interpretations section delves deeper into the survey responses, providing insights into older pedestrians' perceptions, behaviors, and safety concerns. This includes an analysis of factors influencing nervousness levels, adherence to traffic signals, incident severity, and mode of transportation.

2 Problem Statement

In urban environments, the safety and experiences of older pedestrians at intersections are of paramount importance. However, there is a lack of comprehensive understanding regarding their perceptions, behaviors, and challenges when navigating through city streets, particularly concerning interactions with moving vehicles, e-bikes, scooters, and other pedestrians. The existing data on pedestrian safety primarily focuses on general trends without specifically addressing the unique concerns of older individuals.

Moreover, while traffic signals are designed to regulate pedestrian movement, the extent to which older pedestrians rely on them and how they interpret signal cues remain unclear. Additionally, incidents such as collisions, accidents, or falls are not uncommon, highlighting the potential risks faced by this demographic group. Understanding these factors is crucial for developing targeted interventions and infrastructure improvements aimed at enhancing the safety and mobility of older pedestrians.

Therefore, the problem statement revolves around the need for a comprehensive assessment of older pedestrians' experiences, perceptions, and safety concerns at intersections, with a specific focus on their interactions with traffic signals, moving vehicles, e-bikes, scooters, and other pedestrians. This assessment will serve as the foundation for devising evidence-based strategies to improve pedestrian safety and urban mobility for older individuals.

3 Data description

3.1 Interview older pedestrian

The dataset captures responses from individuals regarding their experiences, perceptions, and behaviors as pedestrians, particularly focusing on older individuals, at urban intersections. Each entry in the dataset includes a timestamp indicating when the response was recorded, along with several key variables. These variables provide valuable insights into the respondents' attitudes towards traffic safety and their interactions with urban infrastructure. Notably, respondents indicate their level of nervousness while crossing streets, their reliance on traffic signals, and whether they have experienced collisions, accidents, or falls at intersections and the severity of such incidents. Additionally, respondents identify their biggest safety concerns as pedestrians, ranging from interactions with vehicles to distractions or other pedestrians. The dataset also captures respondents' transportation habits, including how often they rely on walking versus driving in the city. Furthermore, demographic information such as gender identity and approximate age is provided,

offering context to the responses. Overall, this dataset serves as a comprehensive resource for understanding the complex dynamics of pedestrian safety and behavior in urban environments, particularly from the perspective of older individuals, and can inform targeted interventions to improve traffic conditions and enhance pedestrian safety.

3.2 Traffic Volume Measure

The Traffic data provides insights into the modes of transportation chosen by individuals at the intersection of Broadway and 106th Street in New York City (NYC). The data captures the volume of different transportation modes, including pedestrians, older pedestrians, bicycles, and cars, in four cardinal directions: North-South (NS), East-South (ES), South-South (SS), and West-South (WS).

Modes of Transportation:

Pedestrians: Individuals traveling on foot. Pedestrians (Older): Individuals categorized as older pedestrians, typically indicating an older demographic traveling on foot. Bicycles: Individuals commuting using bicycles. Cars: Individuals commuting using motor vehicles.

4 Data visualization and Interpretation

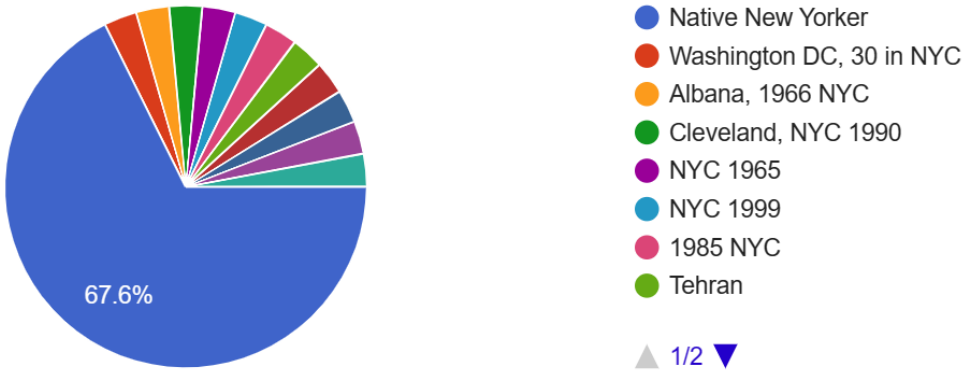
4.1 Interview older pedestrian

The respondents' demographic information reveals a diverse group of older individuals, primarily from New York City, with varying ages, gender identities, and origins. Among them, the majority identify as native New Yorkers, with ages ranging from approximately 50 to 85 years old. Gender distribution is relatively balanced, with both men and women represented across the sample. Additionally, respondents come from a range of places outside of New York City, including Washington DC, Cleveland, Tehran, Mali, Massachusetts, and Florida, indicating a varied background and life experiences among the participants. Figures 1, 2, and 3 display an overview of participant demographic information, illustrating their origin, gender distribution, and age distribution, respectively.

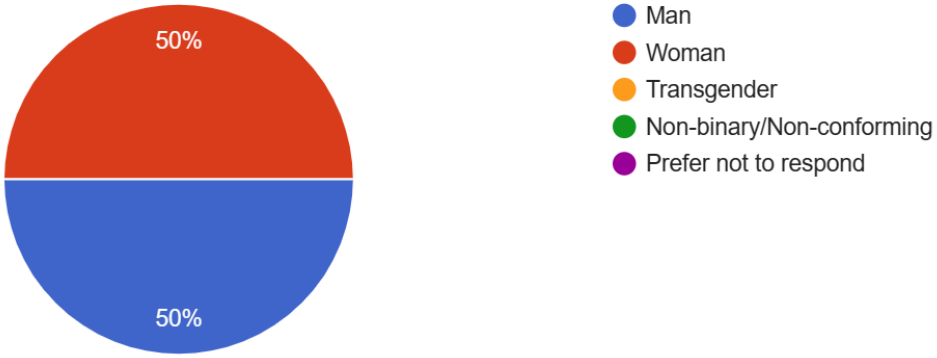
4.1.1 Understanding Nervousness in Older Pedestrians During Street Crossings

The dataset presents a comprehensive picture of pedestrian experiences and behaviors when navigating city streets. As can be seen in Figure 4 it reveals a spectrum of emotions, from heightened nervousness to relative calmness, during street crossings.

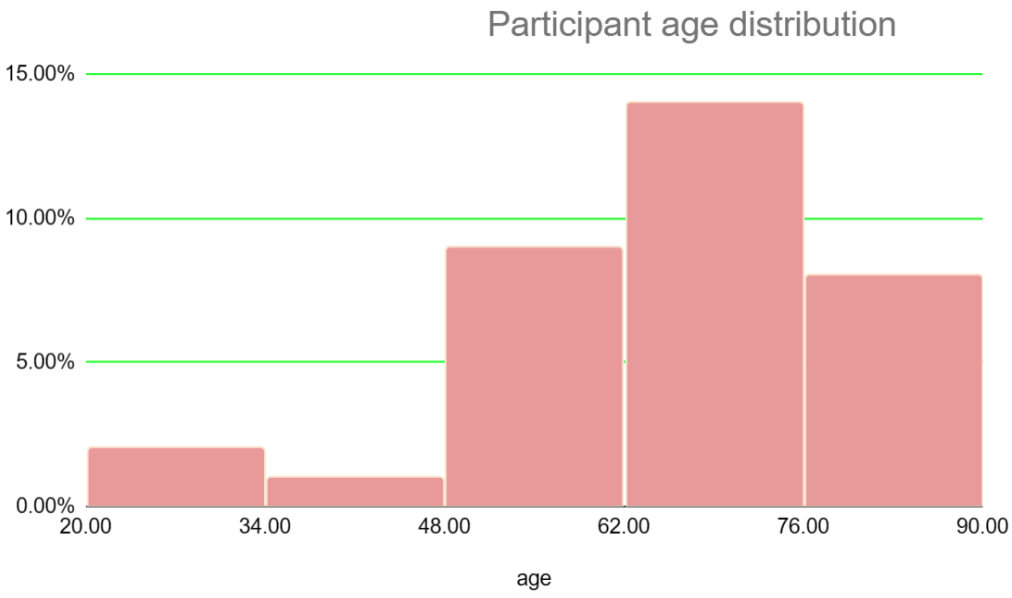
Given that the respondents of "How nervous individuals feel while crossing the streetäre older individuals, their reported levels of nervousness while crossing the street may be influenced by several factors commonly associated with age:



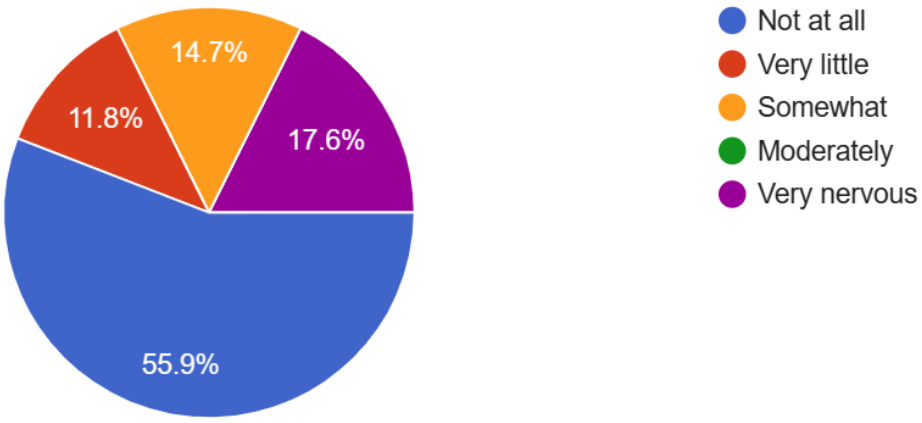
Figur 1: Participant Demographic Information-Origin



Figur 2: Participant Demographic Information-Gender Distribution



Figur 3: Participant Demographic Information-Age Distribution



Figur 4: Nervousness in Older Pedestrians During Street Crossings

1. **Somewhat (x3):** Older individuals may experience a moderate level of nervousness due to factors such as reduced mobility, slower reaction times, or concerns about navigating busy intersections. While they may still possess confidence in their ability to cross safely, they may exhibit heightened caution compared to younger pedestrians.

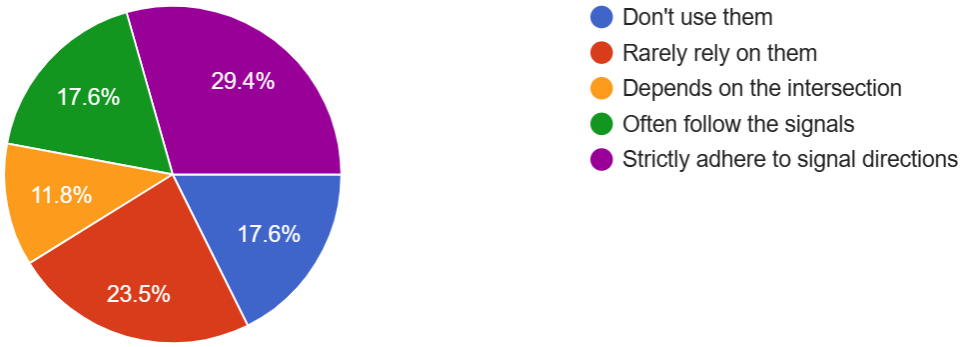
2. **Not at All (x14):** The majority of older respondents reported feeling no nervousness at all while crossing the street. This may suggest that they have developed a sense of familiarity and confidence in navigating pedestrian environments over time. However, it could also indicate a potential underestimation of risks due to age-related declines in sensory perception or cognitive function.

3. **Very Nervous (x4):** A few older individuals expressed feeling very nervous while crossing the street. This indicates a heightened level of anxiety or fear, potentially influenced by factors such as high traffic volume or perceived risks associated with crossing intersections. Age-related physical limitations, such as reduced visual acuity or mobility impairments, could contribute to their heightened anxiety.

4. **Very Little (x13):** Several older respondents reported feeling very little nervousness while crossing the street. This suggests a minimal level of anxiety or apprehension, potentially influenced by factors such as perceived safety of pedestrian infrastructure or a sense of familiarity with the area. Older individuals with a history of safe pedestrian experiences may feel more at ease when crossing streets.

Consideration of Age-Related Factors:

Consideration of Age-Related Factors: Age-related declines in physical function, such as diminished balance or muscle strength, can impact older individuals' ability to navigate street crossings safely. As a result, their reported levels of nervousness may be influenced by concerns about their own vulnerability to accidents or injuries.



Figur 5: Pedestrian Safety and Traffic Signal Adherence Among Older Individuals

Implications for Urban Planning:

Implications for Urban Planning: Understanding the nervousness levels of older pedestrians is essential for designing age-friendly pedestrian infrastructure that accommodates their unique needs and promotes safe mobility. Urban planners and policymakers should prioritize measures such as improved crosswalk visibility, extended crossing times, and pedestrian-friendly signalization to enhance safety for older individuals crossing the street.

4.1.2 Pedestrian Safety and Traffic Signal Adherence Among Older Individuals

As seen in Figure 5, while some individuals strictly adhere to traffic signals for guidance, others rely more on their judgment, influenced by the specific characteristics of the intersection.

The question "How closely do you rely on traffic signals when crossing the street?focuses on understanding the behavior and attitudes of older pedestrians towards traffic signals, with the aim of improving pedestrian safety and designing age-friendly pedestrian infrastructure.

1. **Strictly Adhere to Signal Directions (x10):** Older individuals who strictly adhere to signal directions demonstrate a cautious approach to street crossing, likely prioritizing safety and following established traffic rules. This behavior suggests a conscientious attitude towards obeying traffic regulations, which may stem from a desire to minimize risks associated with crossing busy intersections.

2. **Depends on the Intersection (x4):** Some older pedestrians indicated that their reliance on traffic signals varies depending on the specific intersection. This adaptive behavior could be influenced by factors such as visibility of traffic signals, pedestrian crossing times, or the complexity of the intersection layout. It reflects a pragmatic approach to street crossing, where individuals adjust their behavior based on situational factors.

3. **Often Follow the Signals (x9):** Older individuals who often follow traffic signals demonstrate a moderate level of adherence to established traffic regulations. While they may not strictly adhere to signal directions in every instance, they generally respect traffic signals as a guide for safe crossing. This behavior suggests a balance between following traffic rules and exercising judgment based on situational factors.

4. **Rarely Rely on Them (x6):** A subset of older respondents reported rarely relying on traffic signals when crossing the street. This behavior may stem from factors such as perceived safety of the crossing environment, past experiences of successfully crossing without signals, or a preference for using personal judgment instead of relying solely on traffic signals. It reflects a level of independence and confidence in their ability to assess crossing situations autonomously.

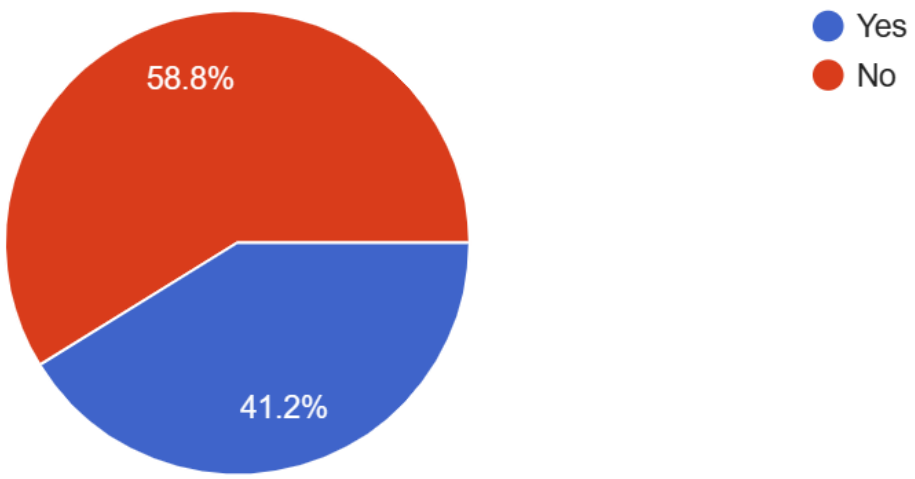
5. **Don't Use Them (x5):** Older individuals who indicated that they don't use traffic signals when crossing the street likely rely on alternative strategies or cues to navigate intersections. This behavior may be influenced by factors such as familiarity with the area, perceived pedestrian priority, or reliance on visual and auditory cues from traffic flow. It suggests a degree of self-reliance and adaptability in crossing streets, potentially influenced by past experiences and personal preferences.

4.1.3 Intersection Incident History of Older Pedestrians

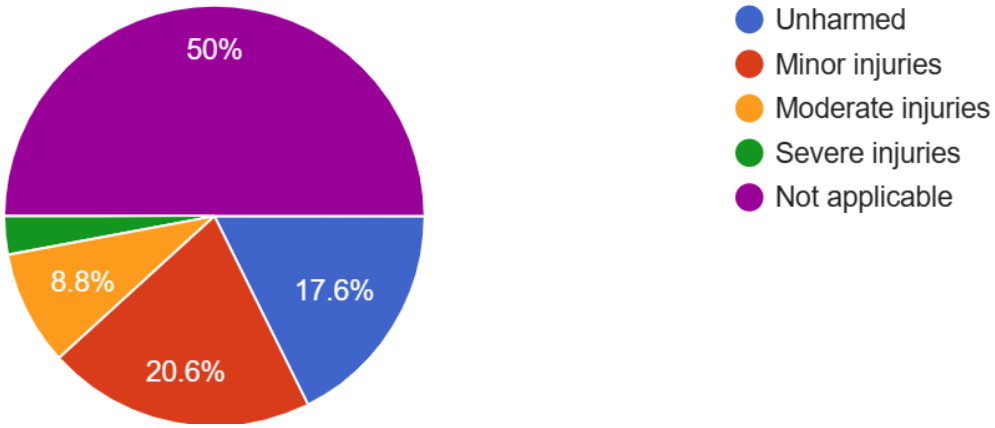
This section delves into the intersection incident history of older pedestrians, exploring whether they have experienced collisions, accidents, or falls in such environments. As shown in Figure 6, incidents such as collisions, accidents, or falls are not uncommon, with varying degrees of severity reported, underscoring the potential risks pedestrians face. Safety concerns primarily revolve around interactions with cars and other vehicles, as well as with bikes, especially during nighttime. Distractions like phones also emerge as a notable risk factor.

1. **No (x13):** Older individuals who reported no incidents in intersections may have developed effective strategies or cautionary habits over time, contributing to their ability to navigate intersections safely. However, this could also indicate a level of luck or a lower frequency of exposure to potentially hazardous situations due to more conservative behavior.

2. **Yes (x21):** For older individuals who have experienced collisions, accidents, or falls in intersections, age-related factors such as diminished mobility, slower reaction times, or sensory impairments could have played a role. This highlights the vulnerability of older pedestrians to accidents in busy urban environments and underscores the importance of targeted interventions to improve intersection safety for this demographic.



Figur 6: Intersection Incident History of Older Pedestrians



Figur 7: Incidents experienced by older pedestrians in intersections and the severity of these occurrences

4.1.4 Experience of Incidents in Intersections Among Older Pedestrians

As shown in Figure 7, the following responses capture the incidents experienced by older pedestrians in intersections and the severity of these occurrences.

1. **Not Applicable (x16):** For respondents who indicated Not Applicable,"it suggests that they have not experienced collisions, accidents, or falls in intersections. This could imply that they have been fortunate to avoid such incidents, have limited exposure to busy intersections, or have developed effective safety strategies over time.

2. **Minor Injuries (x7):** Individuals who reported minor injuries likely experienced incidents that resulted in relatively minor physical harm, such as bruises, scrapes, or minor cuts. Despite sustaining

injuries, they may have been fortunate to avoid more severe consequences due to factors such as timely medical attention or luck.

3. **Unharmed (x8):** Respondents who reported being unharmed after incidents in intersections suggest that they escaped without any physical injuries. However, it's essential to consider potential emotional or psychological impacts, as even seemingly minor incidents can leave lasting effects, especially for older individuals.

4. **Moderate Injuries (x3):** For those who reported moderate injuries, it indicates that they experienced incidents that led to more significant physical harm, such as fractures, sprains, or concussions. Age-related factors, such as decreased bone density or slower healing rates, may exacerbate the severity of injuries for older pedestrians.

4.1.5 Safety Concerns of Older Pedestrians

Asking older individuals about their biggest safety concerns as pedestrians reveals valuable insights into the specific challenges they face while navigating urban environments.

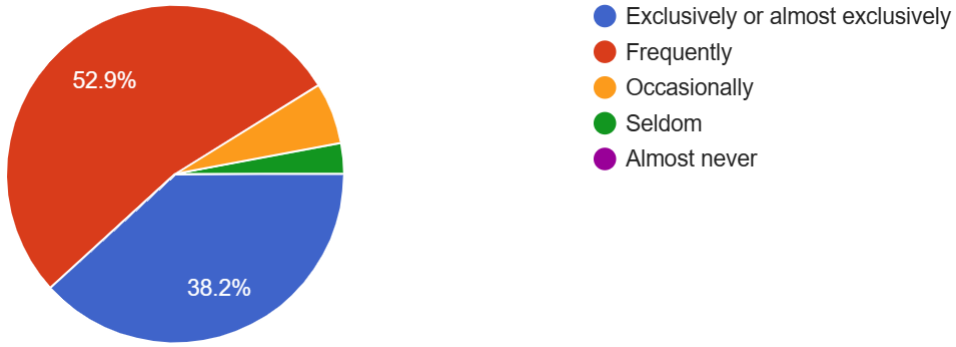
1. **Bikes, e-bikes, scooters, etc. (x18):** Older individuals expressing concerns about bikes, e-bikes, and scooters likely reflect worries about sharing the road with these increasingly prevalent modes of transportation. This concern may stem from the potential for collisions due to the speed and unpredictability of cyclists and scooter riders, posing a particular risk to older pedestrians who may have reduced mobility or slower reaction times.

2. **Cars and other personal vehicles (x9):** Concerns about cars and other personal vehicles are common among older pedestrians, reflecting the longstanding hazards posed by traditional motor vehicles. This may include worries about speeding, failure to yield to pedestrians, distracted driving, and the risk of serious injury or fatality in the event of a collision. Age-related vulnerabilities, such as decreased agility or slower walking speeds, can amplify these safety concerns.

3. **Car, not seeing his 8 YO son:** This response highlights a specific scenario where an older pedestrian's safety concern is tied to family or caregiving responsibilities. The fear of not being seen by drivers, especially in the context of protecting a child, underscores the importance of visibility and attentiveness on the part of both pedestrians and motorists.

4. **Everything, bikes at nights:** Expressing a broad concern about "everythingänd specifying worries about bikes at night suggests a heightened sense of vulnerability during low-light conditions. Older individuals may perceive reduced visibility and increased risks of accidents involving cyclists and other road users during nighttime, prompting a generalized concern for overall safety.

Figur 8: Safety Concerns of Older Pedestrians



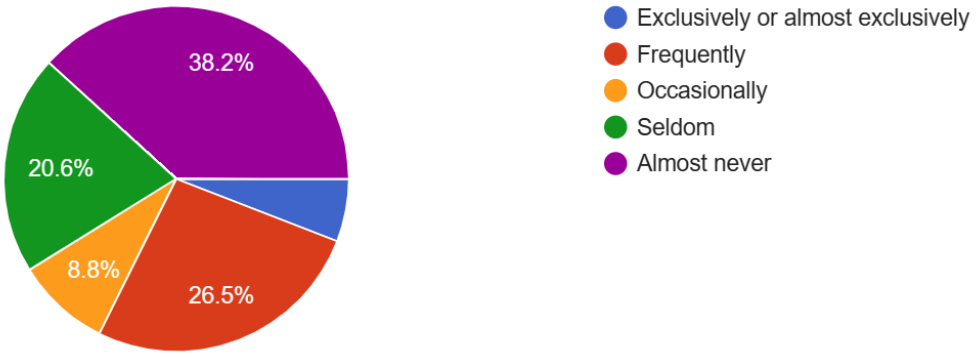
Figur 9: Transportation Habits of Older Individuals in Urban Environments

5. **Other pedestrians (x3):** Concerns about interactions with other pedestrians may indicate apprehensions about crowded or congested pedestrian areas. Older pedestrians may feel vulnerable in environments with high foot traffic, where the risk of collisions, tripping hazards, or altercations with other pedestrians is heightened.

6. **Phones, distractions:** The mention of distractions such as phones underscores the impact of modern technology on pedestrian safety concerns. Older individuals may perceive distracted walking as a growing risk factor, with pedestrians of all ages potentially being less attentive to their surroundings due to smartphone use while walking.

4.1.6 Transportation Habits of Older Individuals in Urban Environments

As shown in Figure 9, Walking emerges as the predominant mode of transportation, with many relying on it frequently, often complemented by the occasional use of bikes, e-bikes, or scooters.



Figur 10: Driving Habits of Older Individuals in Urban Settings

1. Frequently (x14): Older individuals who rely on walking frequently likely prioritize this mode of transportation for its health benefits, cost-effectiveness, and accessibility. Regular walking may also be a preferred means of staying active and maintaining independence in their daily routines.

2. Exclusively or Almost Exclusively (x17): Respondents who exclusively or almost exclusively rely on walking for transportation may do so out of necessity or preference. This could indicate limited access to alternative modes of transportation, such as driving or public transit, or a deliberate choice to incorporate walking into their lifestyle for its physical and mental health benefits.

3. Occasionally (x3): Some older individuals rely on walking occasionally, suggesting that while they may prefer walking as a mode of transportation, they also utilize other transportation options when necessary or convenient. This could be due to factors such as inclement weather, long distances, or the availability of alternative transportation modes.

4. Seldom (x1): A minority of respondents rely on walking seldom, indicating that they may have access to other transportation options or face mobility challenges that limit their ability to walk frequently. This could include relying on vehicles, public transit, or assistance from others for transportation needs.

4.1.7 Driving Habits of Older Individuals in Urban Settings

As shown in Figure 10, driving appears to be less prevalent, with some individuals exclusively depending on it while others seldom engage in it. The following responses shed light on how often older individuals rely on driving as a mode of transportation in city environments.

1. Seldom (x7): Older individuals who rely on driving seldom may do so due to various reasons, such as limited access to a vehicle, preferring alternative modes of transportation like walking or public transit, or choosing to drive only when necessary for longer trips or specific errands.

2. Almost Never (x15): Respondents who rely on driving almost never likely have minimal dependence on personal vehicles for transportation in the city. This could indicate a conscious decision to forego driving altogether, perhaps due to concerns about safety, environmental impact, or the availability of alternative transportation options.

3. Exclusively or Almost Exclusively (x1): A single respondent who exclusively or almost exclusively relies on driving for transportation in the city may have limited mobility or other reasons that necessitate the use of a personal vehicle as their primary mode of transportation.

4. Occasionally (x6): Some older individuals rely on driving occasionally, suggesting that while they may have access to a vehicle, they prefer other modes of transportation for most of their travel needs. This could be due to factors such as convenience, cost, or personal preferences.

4.2 Traffic Volume Measure

The intersection at 106th Street and Broadway serves as a dynamic hub within the Upper West Side, catering to the diverse needs of its residents, students, and visitors.

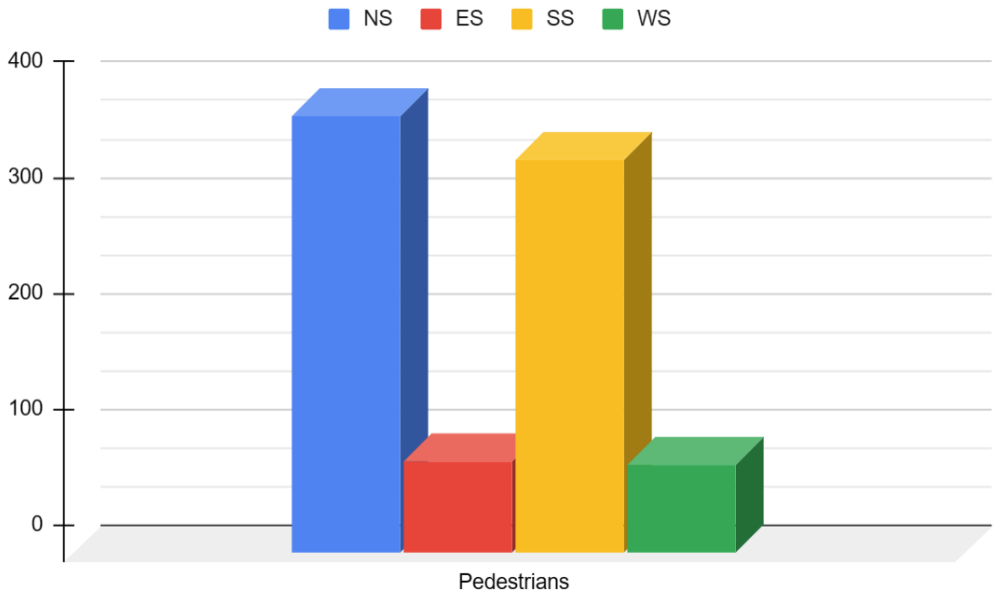
4.2.1 Interpretation of Pedestrian Activity at Intersections (Broadway and 106th Street)

As shown in Figure 11 The total pedestrian count at an intersection at 106th Street and Broadway in New York City (872) indicates a significant presence of pedestrians in the studied area.

1. **North-South (NS) Intersection (377 pedestrians):**
   Situated in the heart of Manhattan's Upper West Side, this intersection likely serves as a bustling thoroughfare connecting the residential area with nearby amenities like restaurants, shops, and public transportation hubs. The high pedestrian count reflects the vibrant urban environment of this neighborhood.

2. **East-South (ES) Intersection (79 pedestrians):**
   Located along Broadway, the pedestrian count at this intersection might be influenced by factors such as nearby Columbia University campus buildings or residential complexes. While pedestrian traffic is lower compared to NS, it's still notable, possibly indicating a mix of students, residents, and visitors in the area.

3. **South-South (SS) Intersection (339 pedestrians):**
   Positioned at the convergence of Broadway and another major thoroughfare, the SS intersection likely experiences significant pedestrian activity. With nearby attractions like Riverside Park, restaurants, and cultural venues, it serves as a focal point for both local residents and tourists, contributing to the higher pedestrian count.



Figur 11: Number of Pedestrians at Intersection

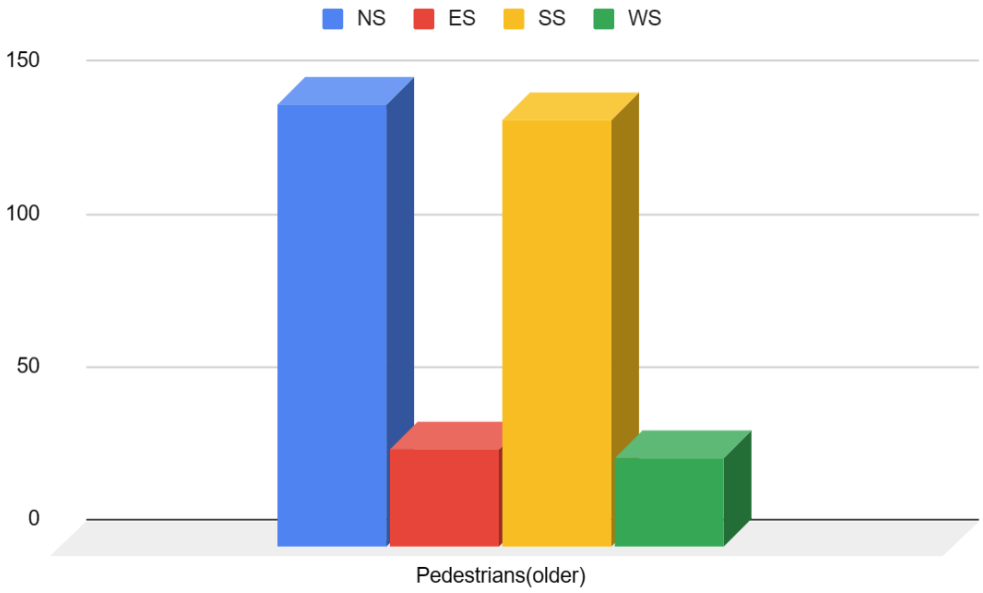
4. **West-South (WS) Intersection (77 pedestrians):**
   As part of the Upper West Side neighborhood, the WS intersection may have slightly lower pedestrian traffic compared to NS and SS. However, it still sees a considerable number of pedestrians, likely comprising residents, commuters, and visitors navigating the area's mix of residential and commercial spaces.

4.2.2 Interpretation of Older Pedestrian Activity at Intersections (Broadway and 106th Street)

As shown in Figure 12 The total pedestrian count at an intersection at 106th Street and Broadway in New York City (346) indicates a significant presence of older pedestrians in the studied area.

1. **North-South (NS) Intersection (145 older pedestrians):**
   Located at Broadway and 106th Street, the NS intersection experiences a significant presence of older pedestrians. This suggests that this intersection is frequented by individuals who may be residents of the nearby neighborhood or visitors to the area. The higher count of older pedestrians underscores the importance of providing pedestrian-friendly infrastructure and ensuring accessibility for all age groups in this urban environment.

2. **East-South (ES) Intersection (32 older pedestrians):**
   At Broadway and 106th Street, the ES intersection registers a lower count of older pedestrians compared to NS. This might indicate that while the ES intersection still sees older pedestrians, it may not be as heavily frequented by this demographic as other nearby intersections. Factors such as nearby amenities,



Figur 12: Number of Older Pedestrians at Intersection

residential complexes, and the layout of pedestrian infrastructure could influence the pedestrian activity at this intersection.

3. **South-South (SS) Intersection (140 older pedestrians):**
   Positioned at Broadway and 106th Street, the SS intersection observes a substantial number of older pedestrians. This suggests that this intersection serves as a vital link for older individuals accessing amenities, recreational spaces like Riverside Park, or community resources in the vicinity. Urban planners should consider the needs of older pedestrians when designing infrastructure and implementing safety measures at this intersection.

4. **West-South (WS) Intersection (29 older pedestrians):**
   As part of the Broadway and 106th Street area, the WS intersection records a relatively lower count of older pedestrians compared to NS and SS. However, the presence of older pedestrians still highlights the importance of ensuring accessibility and safety measures at this intersection. Enhancements such as well-marked crosswalks, curb ramps, and pedestrian signals can contribute to a pedestrian-friendly environment for all age groups.

4.2.3 Interpretation of Bicycle Activity at Intersections (Broadway and 106th Street)

The total count of bicycles across all intersections (196) indicates a moderate level of bicycling activity in the vicinity of Broadway and 106th Street.

1. **North-South (NS) Intersection (70 bicycles):**
   Located at Broadway and 106th Street, the NS intersection exhibits a moderate presence of bicycles. This suggests that bicycling is a mode of transportation utilized by individuals in the area, either for commuting or leisure purposes. The relatively higher count of bicycles at this intersection could indicate the availability of bike lanes or bike-friendly infrastructure in the vicinity.

2. **East-South (ES) Intersection (19 bicycles):**
   At Broadway and 106th Street, the ES intersection records a lower count of bicycles compared to NS. This might suggest that bicycling activity is less prevalent at this intersection, potentially due to factors such as traffic patterns, road conditions, or the presence of alternative transportation options. Urban planners could explore strategies to promote bicycling and improve bike infrastructure in this area to encourage active transportation.

3. **South-South (SS) Intersection (84 bicycles):**
   Positioned at Broadway and 106th Street, the SS intersection experiences a notable number of bicycles. This indicates that bicycling is a popular mode of transportation or recreation in this urban environment. The higher count of bicycles at this intersection could be attributed to factors such as proximity to bike paths, parks, or bike-sharing stations, making it convenient for cyclists to traverse the area.

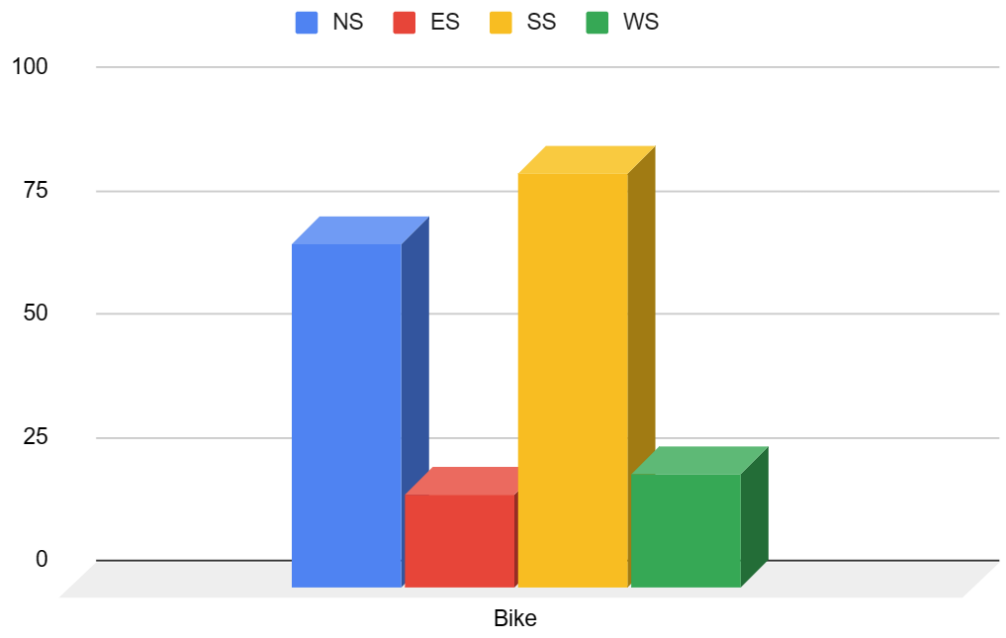
4. **West-South (WS) Intersection (23 bicycles):**
   As part of the Broadway and 106th Street area, the WS intersection observes a relatively lower count of bicycles compared to NS and SS. However, the presence of bicycles still highlights the role of bicycling as a mode of transportation in the neighborhood. Urban planners may consider infrastructure improvements, such as designated bike lanes or bike parking facilities, to further support bicycling activity at this intersection.

4.2.4 Interpretation of Car Activity for Each Turning Movement at Broadway and 106th Street

The total count of cars across all intersections (894) indicates a notable presence of vehicular traffic in the vicinity of Broadway and 106th Street.

1. **North (NL) Direction (38 cars):**
   This direction, likely representing traffic heading north on Broadway, observes a relatively lower count of cars compared to other directions. Factors such as one-way streets, alternate routes, or the presence of public transportation options may influence the lower car count in this direction.

2. **North (NR) Direction (15 cars):**
   Similar to NL, this direction represents traffic moving north on Broadway but perhaps along a different



Figur 13: Number of Bikes at Intersection

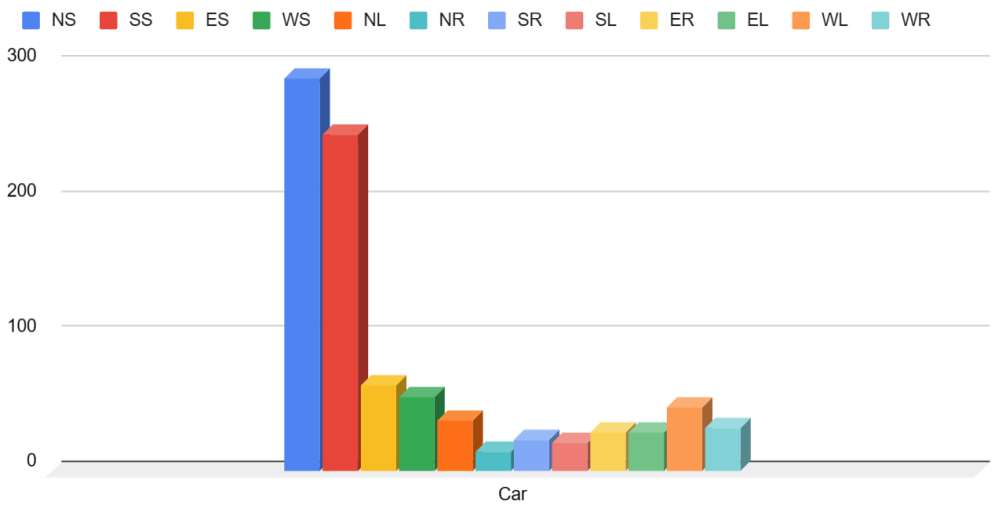
segment or lane. The lower car count suggests a moderate volume of traffic in this direction, possibly due to factors such as traffic signal timing, lane configurations, or time of day.

3. **South (SR) Direction (23 cars):**
   This direction, likely representing traffic heading south on Broadway, registers a moderate count of cars. It may serve as a key route for commuters, residents, and visitors traveling towards downtown Manhattan or accessing other parts of the city. The car count indicates a steady flow of traffic in this direction.

4. **South (SL) Direction (21 cars):**
   Similar to SR, this direction also represents traffic moving south on Broadway but may pertain to a different segment or lane. The car count suggests a relatively consistent volume of traffic, reflecting the ongoing movement of vehicles along this route.

5. **East (ER) Direction (29 cars):**
   This direction, representing traffic moving east, experiences a moderate count of cars. It may indicate vehicles traveling towards destinations east of Broadway, such as residential neighborhoods, commercial areas, or transportation hubs. The car count highlights the importance of this direction in the overall traffic flow.

6. **East (EL) Direction (29 cars):**
   Similar to ER, this direction also represents traffic moving east but may pertain to a different segment or



Figur 14: Number of Car at intersection

lane. The car count suggests a comparable volume of traffic, indicating a steady flow of vehicles in this direction.

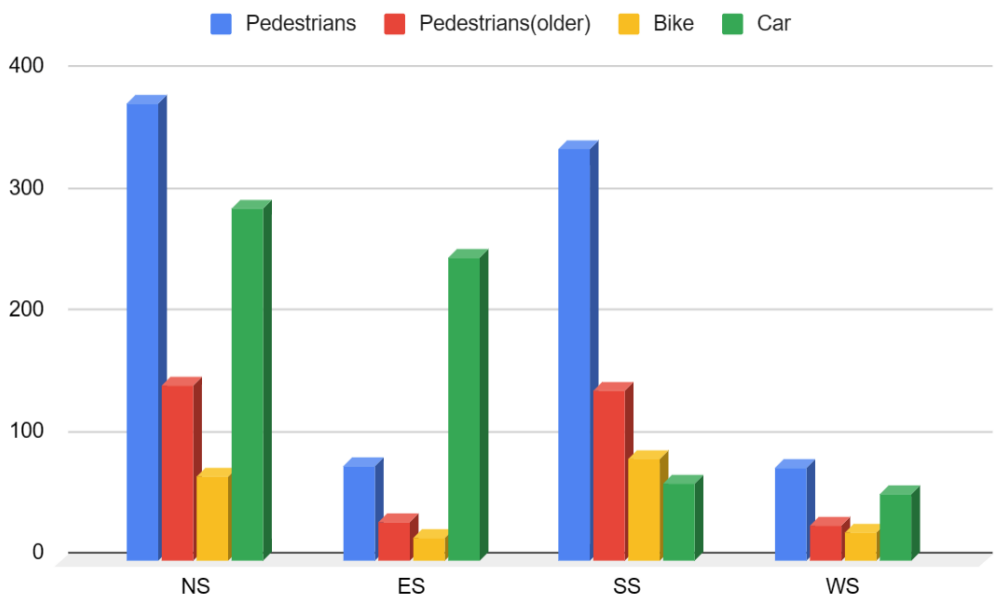
7. **West (WL) Direction (47 cars):**
   This direction, likely representing traffic moving west on cross streets intersecting Broadway, observes a relatively higher count of cars. It may serve as a major route for vehicles accessing Broadway from westbound streets or traveling towards destinations west of Broadway, such as Riverside Park or other neighborhoods.

8. **West (WR) Direction (32 cars):**
   Similar to WL, this direction also represents traffic moving west but may pertain to a different segment or lane. The car count suggests a moderate volume of traffic, reflecting the movement of vehicles towards destinations west of Broadway.

4.2.5 Comparative Analysis of Transportation Modes Across Intersection Directions

1. **North-South (NS) Direction:**
   This direction exhibits the highest count of pedestrians (377) and older pedestrians (145), indicating significant foot traffic, possibly due to the presence of nearby amenities or residential areas. The moderate count of bicycles (70) suggests some level of cycling activity, while the substantial count of cars (291) highlights the importance of vehicular traffic flow in this direction, potentially serving as a major thoroughfare.

2. **East-South (ES) Direction:**
   In this direction, the count of pedestrians (79) and older pedestrians (32) is comparatively lower, suggesting



Figur 15: Comparative Analysis of Transportation Modes

a lesser volume of foot traffic. The low count of bicycles (19) indicates limited cycling activity, while the substantial count of cars (250) reflects significant vehicular traffic flow, possibly serving as a primary route for commuters or connecting to other parts of the city.

3. **South-South (SS) Direction:**
   This direction registers a high count of pedestrians (339) and older pedestrians (140), indicating substantial foot traffic, likely influenced by nearby attractions or residential areas. The significant count of bicycles (84) suggests a notable level of cycling activity, while the relatively lower count of cars (64) may indicate less congestion or slower traffic flow compared to other directions.

4. **West-South (WS) Direction:**
   In this direction, the count of pedestrians (77) and older pedestrians (29) is moderate, suggesting a moderate level of foot traffic. The count of bicycles (23) indicates some cycling activity, while the count of cars (55) suggests a relatively lower volume of vehicular traffic flow compared to other directions, possibly due to its location or road configuration.

5 Policy Making and Validation

Policy Making

1. **Enhanced Intersection Design:** Implement wider pedestrian crossings, countdown timers, and refuge islands to prioritize older pedestrians' safety.

2. **Improved Traffic Signal Visibility:** Ensure clear visibility of traffic signals with high-contrast colors, optimal placement, and minimal obstructions.

3. **Age-Friendly Infrastructure:** Develop age-friendly pedestrian infrastructure, including benches, adequate lighting, and minimized trip hazards.

4. **Public Education and Awareness Campaigns:** Launch campaigns to educate older pedestrians about safety measures and resources through workshops and digital platforms.

5. **Enforcement of Traffic Laws:** Strengthen enforcement of traffic laws to deter risky behaviors by motorists and pedestrians through increased police presence and penalties.

6. **Community Engagement and Consultation:** Involve older residents in decision-making processes through advisory committees to ensure policies address their needs.

7. **Accessibility Improvements:** Invest in curb cuts, tactile paving, and audible signals to improve accessibility for older individuals with mobility impairments.

Validation

1. **Incident Rates:** Monitor changes in pedestrian incidents at intersections, with a focus on reducing frequency and severity among older pedestrians.

2. **Compliance with Traffic Signals:** Measure the increase in older pedestrians' adherence to traffic signals to gauge the effectiveness of education and enforcement efforts.

3. **Perceived Safety:** Assess older individuals' perceptions of safety at intersections post-policy implementation through surveys or focus groups.

4. **Accessibility Ratings:** Evaluate pedestrian infrastructure accessibility for older individuals and track improvements in age-friendly features.

5. **Transportation Habits:** Monitor changes in walking frequency and mode choice among older individuals to measure the impact of policy interventions on mobility patterns.

6 Conclusions and Potential Future work

In conclusion, our analysis highlights the critical importance of prioritizing the safety and mobility of older pedestrians at urban intersections. By implementing policy interventions such as enhanced intersection design, improved traffic signal visibility, and age-friendly infrastructure, cities can significantly contribute to creating safer pedestrian environments for older individuals. Public education campaigns, enforcement of traffic laws, and community engagement initiatives are also essential components in fostering a culture of pedestrian safety. Moving forward, longitudinal studies, exploration of technology-driven solutions, and continued community collaboration will be key in refining policies to meet the evolving needs of older pedestrians and ensuring their well-being in urban settings.

7 Each team member's Role and Contributions

Question Preparation:

- **Mike:** Question preparation and survey creation
- **Ethan, Sophie, Mike, Boshra:** Surveying and asking questions

Taking Video:

- **Mike, Boshra:** Recording the video

Counting Modes of Transportation:

- **Ethan and Sophie:** Collecting traffic data from video

Report and Analysis:

- **Boshra** Report writing
- **Boshra, Mike, Sophie, Ethan:** Analysis process