



Car Dependence in Los Angeles

A collaborative approach to come up with new solutions

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**BMW
GROUP**

ITS UC DAVIS
Institute of Transportation Studies

KIT
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This study is carried out by researchers at the University of California, Davis, and the Karlsruhe Institute of Technology, Germany, with support from the BMW Group. Stakeholders working on mobility, transportation policy, and sustainable mobility transformation in Los Angeles are invited to reach out to the project team to access current findings from the study, discuss future directions, and develop opportunities for collaboration.

BMW Group's commitment to sustainable transportation

The BMW Group has ambitious greenhouse gas reduction targets and is on track to achieve them. The BMW Group partners with research organizations and local stakeholders to explore how sustainability options can be introduced in cities and regions around the world. In 2023, the share of all-electric vehicles sold across the United States (US) was 12.5%. However, while zero-emission vehicles can help address climate change issues, they cannot alone solve other transportation issues that cause traffic congestion in urban areas across the globe. The BMW Group supports free choice in transportation modes and acknowledges the urgent need for more human-centered cities, and we believe that both are possible. With this study, we contribute to a data-driven and needs-based approach for a long-term sustainable mobility transformation in Los Angeles.

About this study

Developing a sustainable transportation system in the car-centric megacity of Los Angeles (LA), California, USA poses many challenges. The build-out of an integrated and equitable transportation system requires collaboration among all stakeholders because it must meet the needs of diverse people and communities with durable solutions. Providing sustainable alternatives inevitably means providing Angelenos with something they desire, i.e., if not with private vehicles, at least solutions offering comparable advantages.

With a survey-based data collection, this study centers human mobility experiences and seeks to understand individual behaviors, preferences and attitudes, societal norms, and other factors affecting mode choice. This allows us to identify alternatives that will appeal to specific groups of residents. To study mobility patterns in LA and identify possibilities for more environmentally sustainable and socially equitable transportation, we designed and administered a detailed survey capturing Angelenos' current travel choices, mobility needs, and mobility-related attitudes. The detailed survey design was largely built on a previous mobility study that was applied to various cities worldwide, such as Berlin, Shanghai, and San Francisco¹. The survey uses an efficient approach to collect comprehensive information on respondents' sociodemographic characteristics, vehicle ownership, home/work locations, and activity and mobility patterns. Every-day and occasional long-distance travel were assessed, as were attitudes towards transportation modes, technology use, environmental concerns, and other factors likely to affect travel choices. In contrast to more traditional activity/travel diary approaches used in transportation planning, which require individuals or households to record detailed travel activities over a short time period, our study asked respondents to describe their typical travel behavior, including the frequency of use of various means of transportation.

The unique survey design helps define and understand different traveler profiles. These include current mobility patterns, the main determinants of travel choices, and the potential that individuals might have for adjusting travel behaviors. The proposed approach provides an efficient tradeoff between the need to collect comprehensive information and reducing the response burden for survey participants.

The study area includes most of the City of LA and several surrounding cities in LA County. The survey was administered through an online opinion panel between mid-June and early September 2023. Quota sampling was used to ensure that respondents' traits mirror the distribution of sociodemographic and geographic characteristics of the population in the study area. Variables included in the quota sampling plan were age, race,

¹ Please see the project website for information about previous studies: mobilitaetsskelett.ifv.kit.edu/english

ethnicity, gender, work status, annual household income, vehicle ownership, and residential location. A two-stage weighting process based on the same list of variables was applied to reduce any remaining deviations from the distributions of these variables in the local population. The final sample includes information from 1,555 local residents.

Studying car dependence in the region

The private car is the predominant means of transportation in LA, so our primary analysis quantified how car-dependent Angelenos are. A two-dimensional view of car dependence allows car owners to be categorized into four car-dependence types (Figure 1). An “objective” car dependence score was calculated for each car owner based on individual mobility needs, availability of means of transportation (e.g., the availability of public transit), and travel behavior. Scores ranged from zero (not dependent) to one (highly dependent). Car dependence is also influenced by individuals’ attitudes towards various means of travel and their perceptions of their own mobility needs. For example, car owners who enjoy driving and have a tight schedule are more likely to feel car-dependent. Accordingly, a “subjective” car dependence score was determined for each car owner, with scores ranging from zero (low) to one (high).

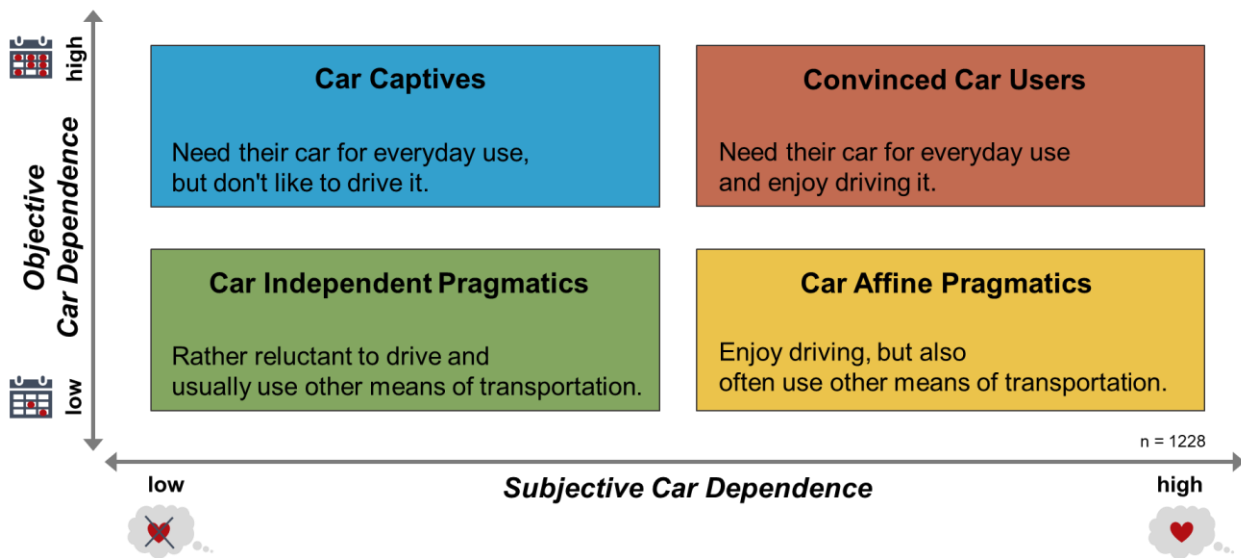


Figure 1. The four car-dependence types. N=1,228 car owners. Non-car owners and respondents with missing data on relevant variables were not considered.

More than three-quarters of car owners in LA are highly car-dependent “Convinced Car Users,” while only 4% of car owners are “Car Independent Pragmatics.” These patterns are observed across all regions of the study area despite different levels of accessibility and availability of transportation services. This is in stark contrast to other major cities where the same analysis was conducted in 2017. In Berlin, San Francisco, and Shanghai, both objective and subjective car dependence of car owners were considerably lower, resulting in shares of only about one-third for “Convinced Car Users,” and around 40% for “Car Independent Pragmatics” (Figure 2).

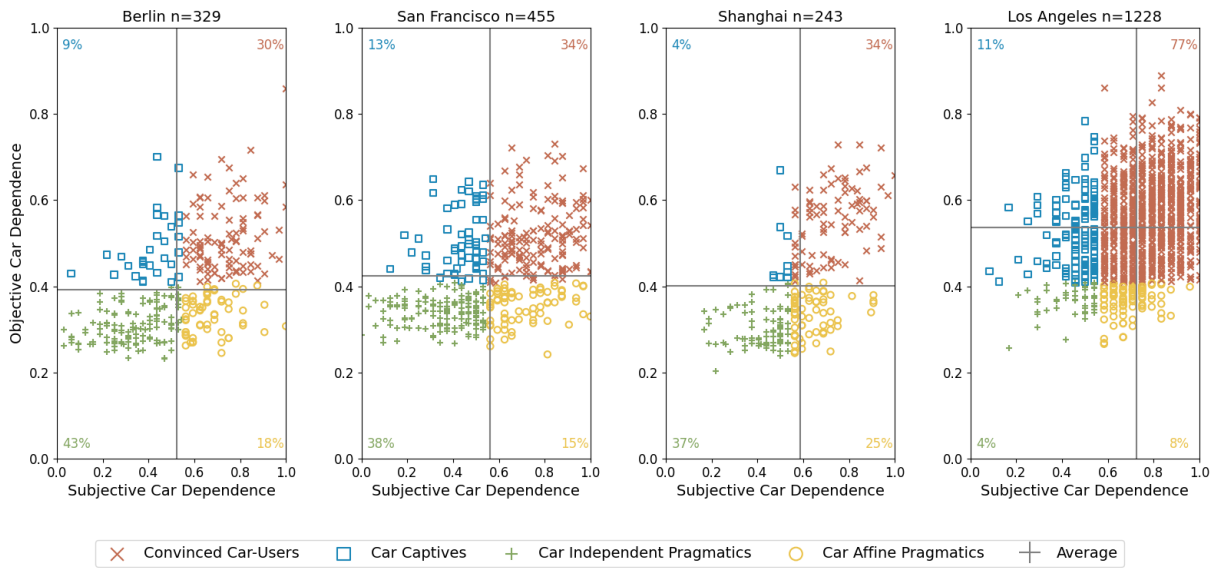


Figure 2. Car dependence types for Berlin, San Francisco, Shanghai, and Los Angeles residents.

A key reason for the high subjective car dependence in LA in comparison to other cities is the generally positive attitude of Angelenos towards cars (Figure 3). While most Angelenos have a positive attitude towards cars, in other cities surveyed, positive and negative attitudes are about equally common.

One of the main contributors to the mostly positive attitude of Angelenos is the symbolic meaning of the car. To various degrees, 85% of respondents agree with the statement that “driving a car means freedom.” Of all the questions on an individual’s attitude towards cars, this is the statement with the highest level of agreement.

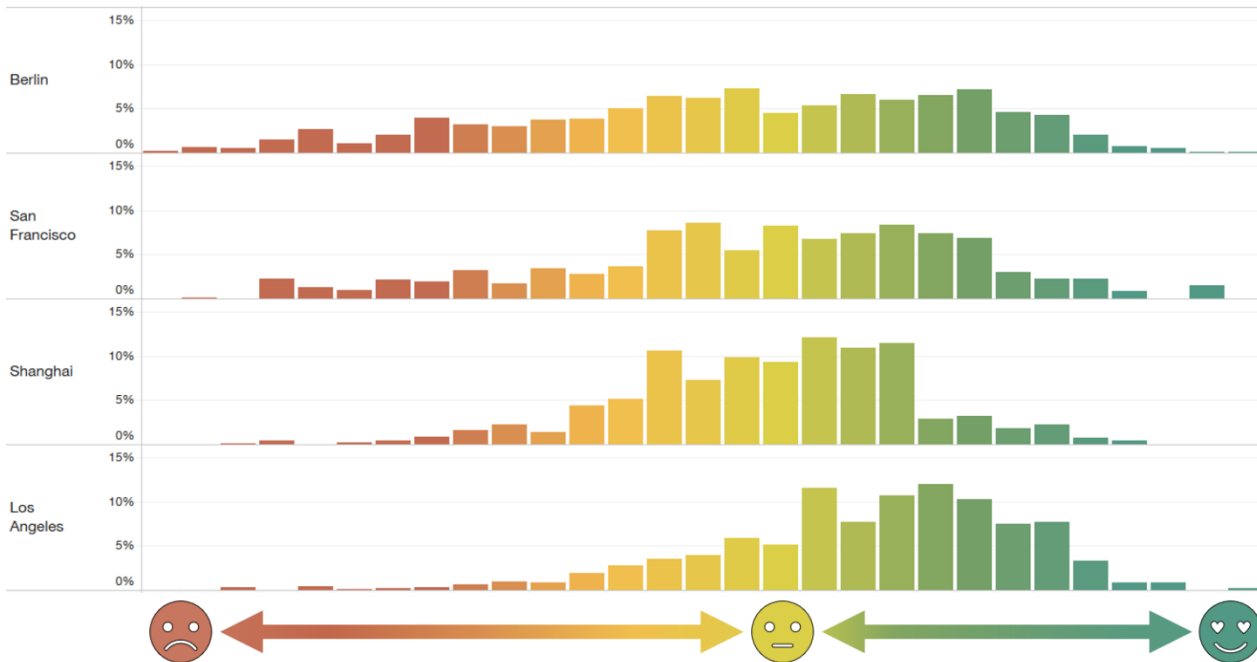


Figure 3. Attitudes towards cars of Berlin, San Francisco, Shanghai, and Los Angeles residents. The frequency distribution of attitudes towards cars, ranges from negative (red) to positive (green).

Identifying different traveler groups in LA

We classify individuals into groups based on their self-reported trip frequency by various travel modes, and group membership is established with their characteristics. The summaries below represent the average characteristics of group members. Some individuals may deviate from the average profile of their respective group.

Car-centric Lower-mobile Travelers

Accounting for 37% of the sample, members of this group are predominantly older adults, non-Hispanics, and non-students who reside in smaller households. They live in peripheral regions with low housing density, have high vehicle ownership rates—less than 1% of them live in non-car households and 21% live in three-or-more car households—but not very high needs for travel. They exhibit unfavorable attitudes towards public transit, cycling, and environmental protection.

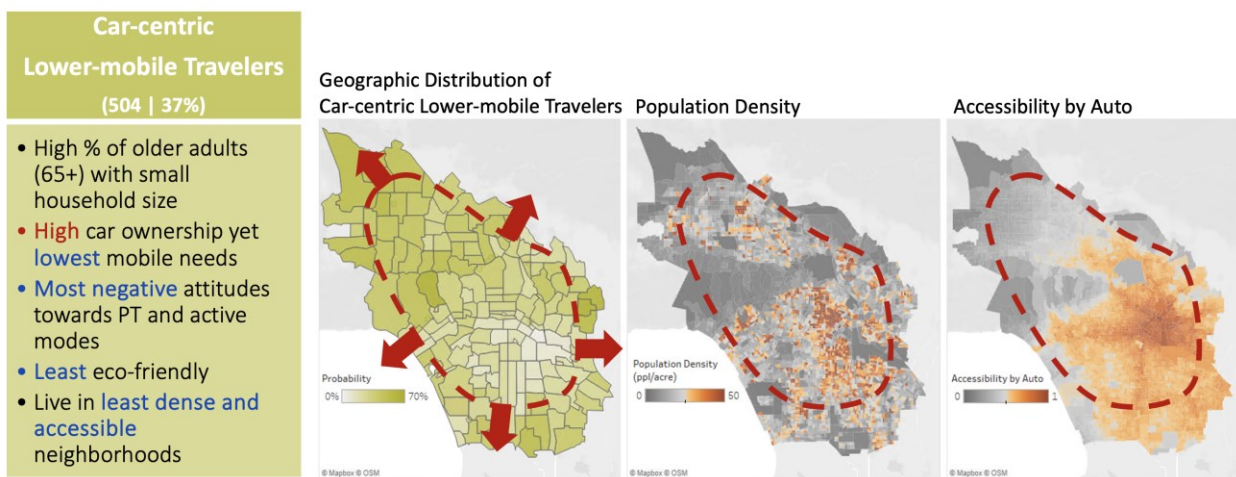


Figure 4. Car-centric lower-mobile travelers, characteristics and geographic distribution. The dashed circle with arrows on the left map indicates that car-centric lower-mobile travelers predominately reside in the peripheral regions of the study area, which coincide with regions characterized by lower population density (middle) and reduced accessibility by auto (right).

Car-centric Higher-mobile Travelers

Comprising nearly a quarter (24%) of the sample, members of this group are predominantly younger adults and White individuals. They display an affinity for cars, tend to live in multi-car households—less than 1% of them live in non-car households and 22% live in three-or-more car households—and reside in affluent neighborhoods that are not walkable. They have high socioeconomic status with 44% living in households that earn an annual household income of over \$100,000. They have high mobility needs and exhibit positive attitudes toward cycling and environmental protection.

**Car-centric
Higher-mobile Travelers**
(333 | 24%)

- **Highest** socioeconomic status
- High mobile needs
- **Highest** car ownership
- **Most** car-enthusiastic
- See cars as status symbols
- Live in **least walkable** neighborhoods
- Alternative mode users at their discretion

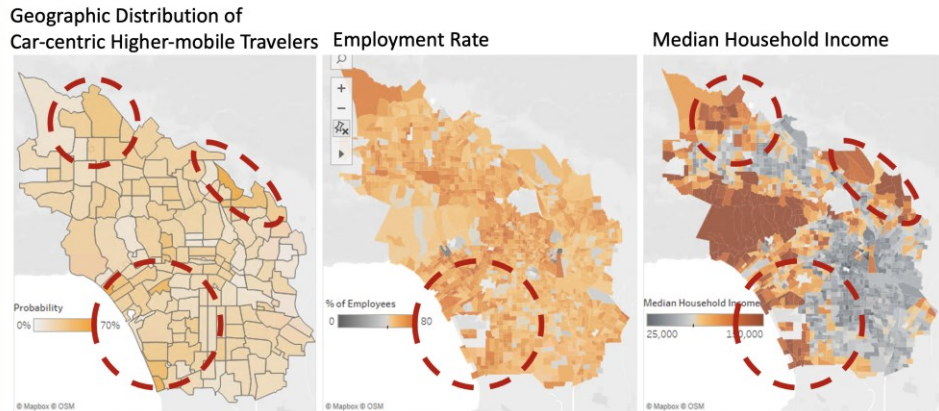


Figure 5. Car-centric higher-mobile travelers, characteristics and geographic distribution. Members of this group are found all over the study area, with the dashed circles highlighting areas with a higher share of car-centric higher-mobile travelers. These coincide with regions characterized by higher employment rate (middle) and higher median household income (right).

Multimodal Travelers

Multimodal travelers account for 20% of the sample. Members of this group are often younger Hispanic adults with higher educational attainment and lower driver’s license rates. They reside in larger households in densely populated areas, have lower car ownership than other groups (6% of them live in non-car households) and high mobility needs. They exhibit positive attitudes towards public transit and cycling, and own bikes, scooters, and public transport passes.

Multimodal Travelers
(277 | 20%)

- Highly educated young adults (18-34)
- **Highest** % of hybrid workers
- **Most positive** towards PT and active modes and **highest** % of owning a bike/scooter/PT pass
- **Highest** needs to be mobile
- **Most** eco-friendly
- Live in **densest and most accessible** neighborhoods

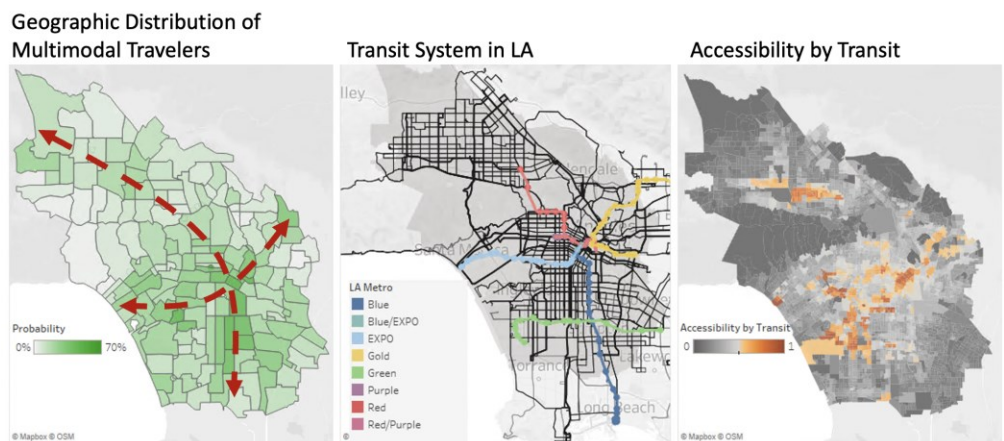


Figure 6. Multimodal travelers, characteristics and geographic distribution. Dashed arrows on the left map indicate areas with a higher share of multimodal travelers. These overlap with areas better served by the current transit system in LA (middle) and regions with higher accessibility by transit (right).

Car-light Travelers

Less car-reliant travelers comprise 19% of the sample. Members of this group are often non-White females with lower socioeconomic status. Two-thirds of the people in this group live in households earning an annual income

of less than \$50,000. They reside in neighborhoods with high population density and transit coverage, and have lower vehicle ownership (19% live in non-car households) and employment levels. They express less enthusiasm for cars, negative attitudes towards cycling, and positive attitudes towards public transit.

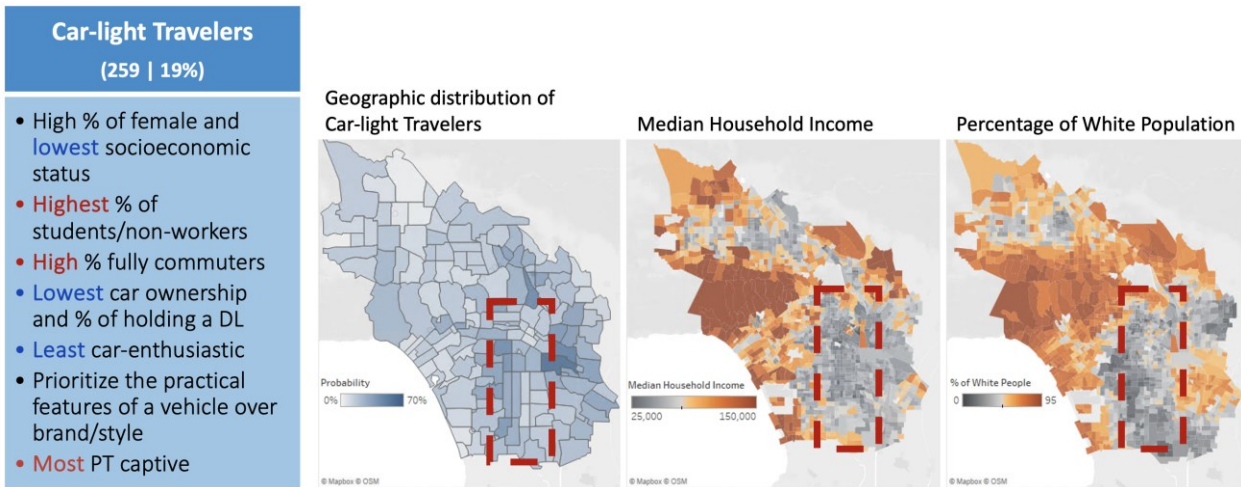


Figure 7. Car-light travelers, characteristics and geographic distribution. The dashed square indicates areas with a higher share of car-light travelers, which coincide with regions characterized by lower median household income (middle) and lower percentage of White population (right).

What this study tells us

Several conclusions can be drawn from this study:

- The car culture and car-centric built environment in LA foster car-dependence among Angelenos across all neighborhoods. For most individuals, a car means individual freedom, enjoyment, and safety. Car dependence is strong even among those who are open to multimodal travel. For a meaningful shift towards alternative modes of transportation, such alternatives must offer comparable benefits to those provided by private cars.
- The higher proportion of car-light travelers in LA (20%), in particular among lower-income households, suggests that the car-light lifestyle is often a result of constraints, not a choice. Solutions that aim to promote sustainable transportation must address societal factors beyond mobility to be equitable and effective.
- Despite ongoing efforts to improve public transit in LA, a significant portion of Angelenos remain hesitant to use it also due to its negative public image and safety concerns. This highlights the need for comprehensive initiatives aimed at improving the public transit system through technological solutions as well as neighborhood and street design to encourage the use of non-car travel solutions.
- There is a notable positive attitude towards cycling, particularly among younger Angelenos. The frequency of riding a bike remains relatively low, however. Residents’ perceived safety concerns are a primary reason for this. This suggests that cycling could be promoted through improvements in cycling infrastructure and by addressing safety and security concerns. On-road safety and secure storage facilities would be helpful.
- A substantial portion of Angelenos (39%) are less dependent on cars compared to other residents. About half of these individuals are multimodal travelers (20%) and they are more receptive to multimodal transportation options. The other half are car-light travelers (19%), who are captive riders of public

transit due to their lower socioeconomic status. The integration of on-demand mobility services with public transit and other modes of travel could help encourage multimodality among both groups of car-dependent individuals. This would provide an attractive solution in low-density areas that are difficult to serve with conventional public transit. Facilitating this change would require fostering positive attitudinal changes toward multimodality.

Recommendations and next steps

The research provides multiple insights about transportation solutions for more sustainable transportation in the region.

In a relatively low-density, car-dependent region with high traffic congestion such as LA, investments in mixed land uses remain an important strategy to bring job locations closer to homes to reduce commute distances and enhance the use of alternative modes of transportation, such as cycling, walking, and public transit. Further, targeted actions that cater to the diverse needs of distinct traveler groups in the LA region are required.

The LA region is receiving substantial investments to improve mobility and upgrade public transportation services. For instance, the LA Metro's newly approved \$9 billion budget for the 2024 Fiscal Year includes key capital investments intended to put Metro's customers first. The region will further be under the spotlight as it prepares to host the upcoming Olympic Games in 2028. This provides an opportunity to capitalize in the momentum of this major event. It will be bringing business opportunities and putting pressure on the transportation system. Planners can gauge interests from a variety of stakeholders and coordinate transportation initiatives both for residents and tourists. This event can serve as a litmus test for the success and scalability of transportation innovations and policies aimed at enhancing mobility and sustainability.

This study shows that Angelenos need and, in many cases, like to use their cars. Expecting a large portion of local residents to give up vehicle use in the short term is unrealistic. For a meaningful mode shift, sustainable alternative modes of transportation must offer comparable benefits to those provided by private cars. This will require novel approaches and collaboration among multiple stakeholders beyond planning agencies and traditional transportation suppliers such as LA Metro and other transit agencies. By working together with the private sector, these entities can address the huge blank space between private vehicles and public transit. In this way, the advent of sustainable transportation can function as a social integrator by creating equitable mobility.

When it comes to providing new, innovative, and appealing solutions, public transit and active modes are important. However, their presence alone will not meaningfully reduce car use in such a car-dependent region in the foreseeable future. Pricing strategies—including piloting solutions based on mobility wallets and expanding the new California Integrated Travel Project (Cal-ITP) and related integrated payment system to all public and non-public transportation providers—can make multimodal options more appealing to travelers. This will encourage them to explore and adopt other modes of transportation, rebalancing mode choice. This also opens the door to testing local solutions. For example, portions of road spaces could be converted to pedestrian infrastructure and bike lanes, and transportation micro-hubs could be created to serve residents.

Policymakers can prioritize providing Angelenos with the conveniences associated with car usage through alternative means. This can be realized by collaborating with the private sector and mobility providers to expand new, innovative, and appealing options to complement existing public transit services. One example is on-demand mobility. Investments in urban and street design can help make neighborhoods and streets a more welcoming place for public transport, shared mobility users, pedestrians, and users of other active means of travel such as bikes, e-bikes, and e-scooters. This can be a game-changer for shorter trips, especially when coupled with mixed-use zoning and other related investments.

As the study shows, Angelenos need and, in many cases, like to use their cars. Car dependence is, on average, very high for multiple reasons. These include current planning policies, a car-centric built environment, and a

strong car culture. These constraints affect mode choice regardless of an individuals' socio-economic status, access to a car, driving patterns, etc.

To generate a substantial mode shift, alternatives must appeal to a broad range of travelers. Mobility solutions must be designed to address the needs of Angelenos in disadvantaged communities. At the same time, more affluent Angelenos who are open to shifting away from private vehicle use need options that work for them. By considering a variety of users, solutions for sustainable mobility can function as a social integrator and create more acceptance. For a meaningful shift to alternative modes of transportation, benefits comparable to those of private cars must be made available. Otherwise, changes will not be successful. Change must be driven by demand, not supply.

This study provides initial guidance on addressing barriers to sustainable transportation in a large urban area with many car-dependent residents. More in-depth analyses of the collected data and follow-up developments of the study focusing on specific sub-segments, e.g., cycling enthusiasts, multimodal lifestyle lovers, etc., will help support the development of potential policy solutions that can work in specific parts of the region.

Contact Information

To receive more information on this study and to discuss opportunities for cooperation and further developments of this work, please contact:

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For more information, please visit the LA project website: <https://3rev.ucdavis.edu/los-angeles-car-dependence-study>