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TRANSPORT RESEARCH ARENA
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Critical travel time impact factors at the implementation of the Athens Great Walk

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Together with:
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Introduction

Makri A., *Petraki V., & Yannis G.*

- Urban centers increasingly face **problems caused by road transport**
- **Sustainable urban mobility** envisions an urban environment that meets modern needs of road users promoting Public Transport, active and innovative travel modes, and controlling the use and ownership of private cars
- The **city of Athens**:
  - is the **18th most congested** city in Europe
  - has a **large share 69% of motor vehicles**
  - has limited and degraded **active travel infrastructure**

Background

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- Travel time data is useful for a wide range of **transportation analyses**
- The travel time is affected by several **factors** related to:
  - traffic conditions
  - behavior of the driver
  - vehicle technology
  - road environment
  - weather conditions
- The travel time **data collection** is conducted by several techniques, including:
  - Test Vehicle Techniques
  - License Plate Matching Techniques
  - ITS Probe Vehicle Techniques
  - Emerging and Non-Traditional Techniques

Objective

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The identification of the **critical factors affecting travel time** in the city center of Athens

during the pilot implementation of **Athens Great Walk**

The Athens Great Walk

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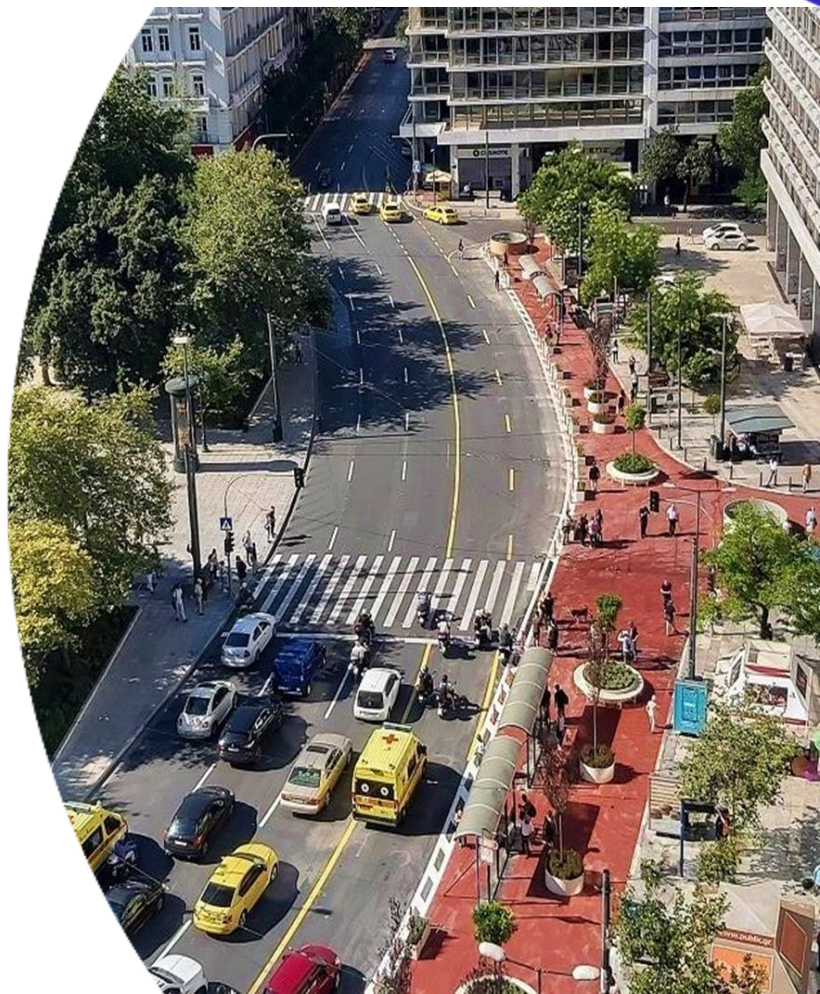
- Since Autumn of 2019, a series of novel **traffic and parking interventions** for the center of Athens were examined called as the **Athens Great Walk**
- The proposed interventions are part of the new mobility policy of the City of Athens, and are harmonized with the **Athens SUMP**
- The objective of the new mobility interventions is to achieve **Safe, Green, Efficient transport for all**
- In June 2020, a **pilot implementation** of a subset of the new mobility interventions was decided, including the increase of sidewalks on Panepistimiou St.



Methodology

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- Selection of the **examined time period** → 15/6 to 23/10/20
- Selection of the **study area** → 12 routes in the intervention area
- **Collection** of travel time data, traffic volumes and road geometry characteristics for the examined routes
- Development of **5 linear and lognormal regression models** to determine the factors that affect the travel time on:
  1. Panepistimiou St.
  2. Central road axes
  3. Entry road axes (routes towards the city center)
  4. Exit road axes (routes from the city center)
  5. Ring road axes

Data Collection

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Variable	Data Source	Routes/ Points	Time Period
Travel Time (sec)	Google Maps API	12 routes	15/6 - 23/10/20 Monday-Friday 08:00-10:00 14:00-15:00
Traffic Flow (veh/hour) - Passenger cars - Taxi - Buses - Trucks - Motorcycles - Mopeds - Pedestrians	Field measurements	12 points	15/6 - 23/10/20 every Thursday 08:00-10:00 14:00-15:00
Road Geometry - Number of traffic lanes - Existence of bus lane	Autopsy & OASA	12 routes	

The Examined Routes

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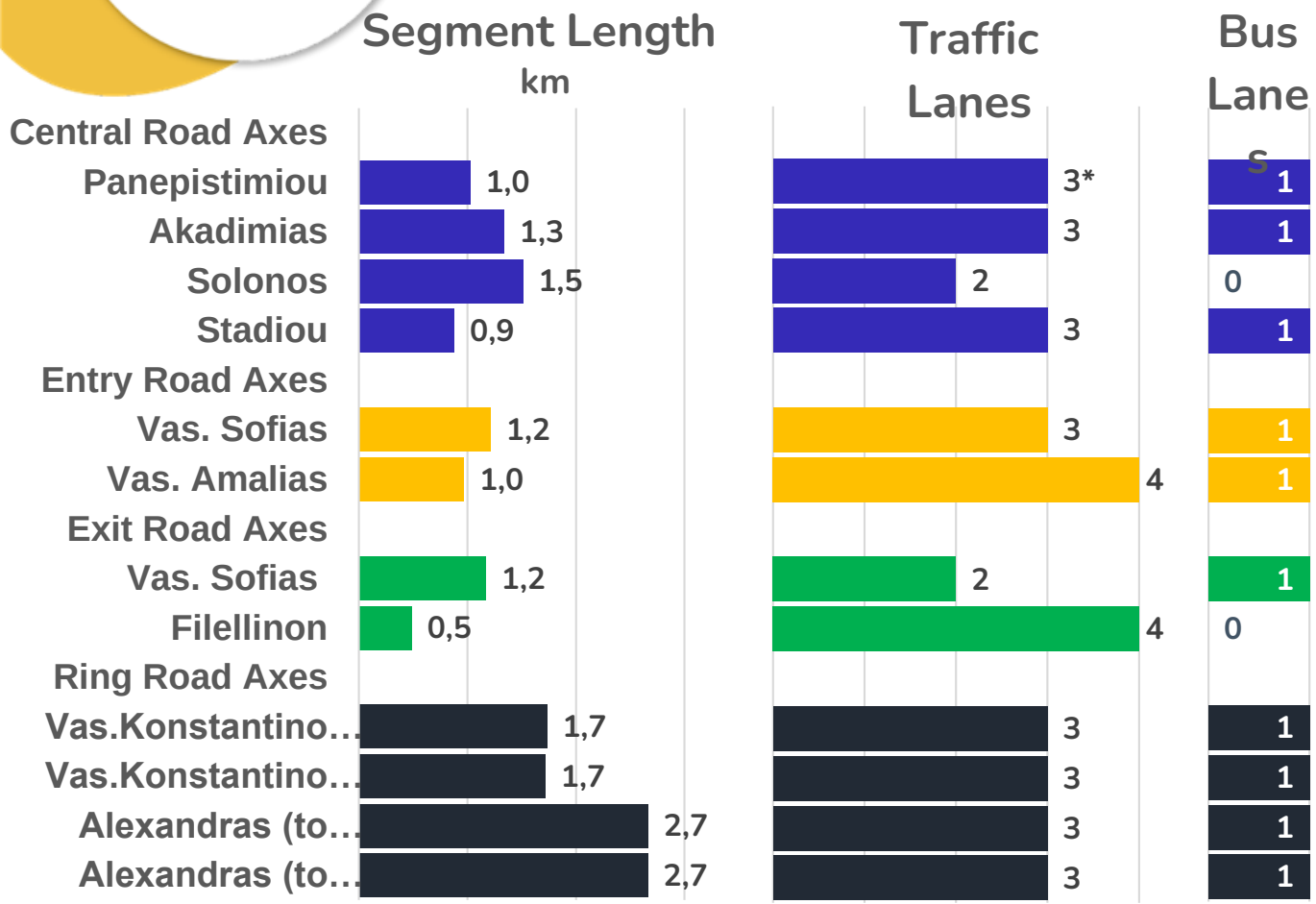

- The 12 examined routes were grouped into **4 categories** taking into account their location and direction
- The examined **segments length** is between 0.5 and 2.7 km
- There is a **bus lane** on the majority of the examined segments
- The examined route on **Panepistimiou St.** was investigated separately from the other ones due to the increase of the sidewalks in the context of the AGW (*)
  - **1st Phase**: Increase of sidewalks and decrease of traffic lanes to 3 (until 3/8/20)
  - **2nd Phase**: 4 traffic lanes (after 3/8/20)

Descriptives – Travel Time

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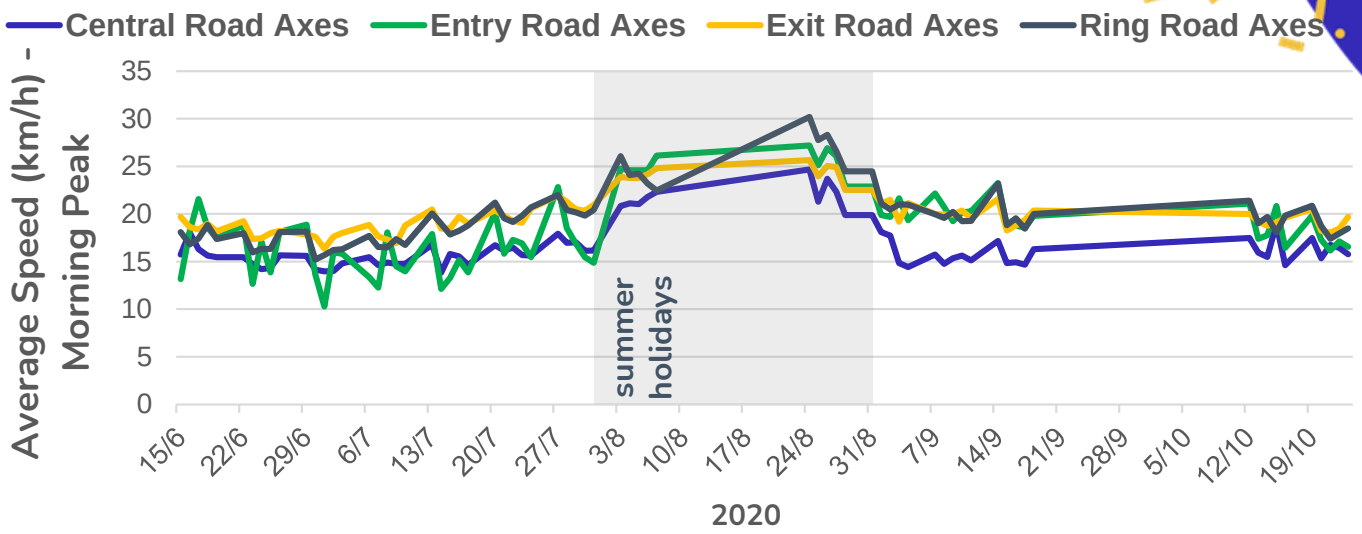
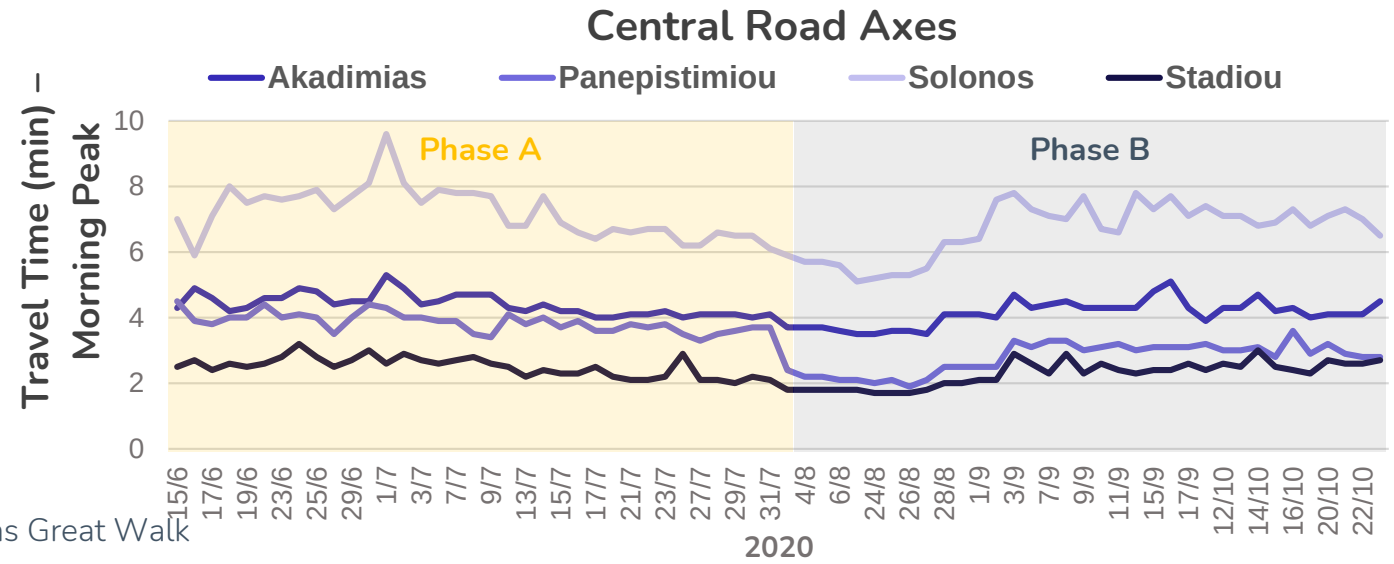
- **Before August** the lowest average traffic speed is observed on central and entry routes while after August the average speed on entry routes increases
- **During August** there is a significant travel time decrease and average traffic speed increase on the examined routes, possibly due to the summer holidays
- The **maximum travel time on Panepistimiou St.** is 4.5 min and it is observed in the 1st week of AGW pilot operation





Descriptives – Modal Share

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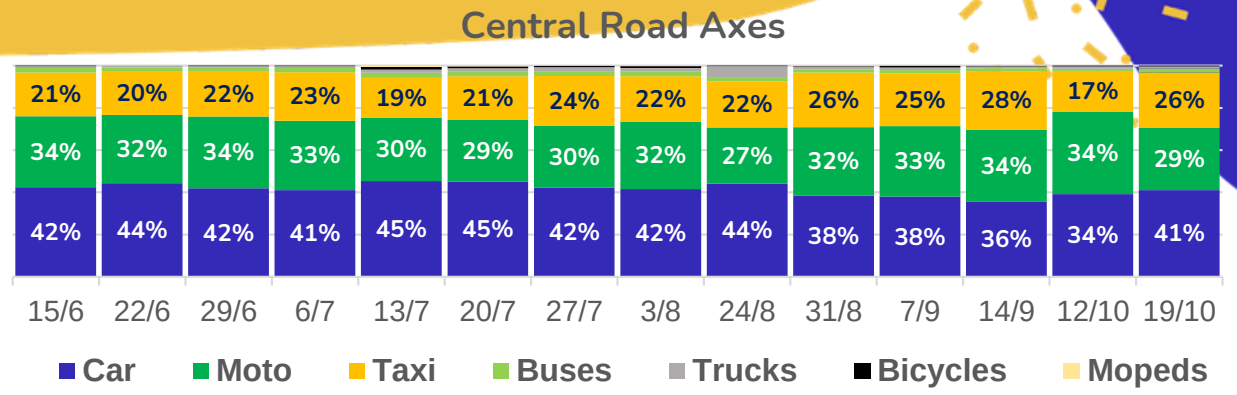
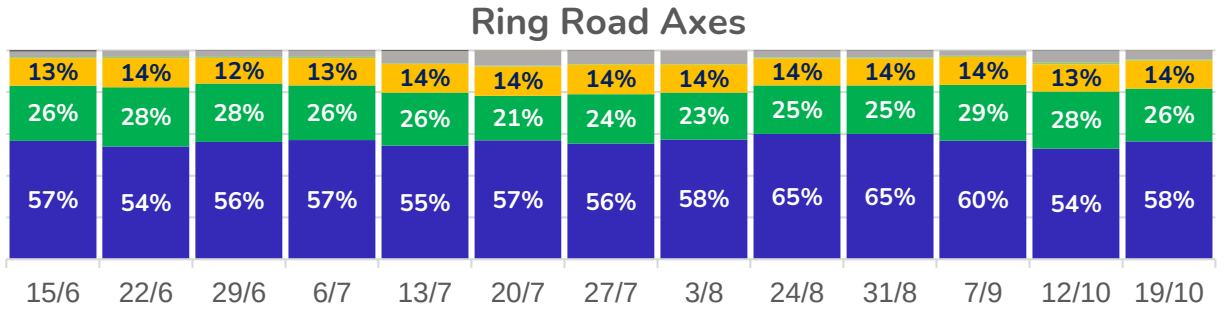
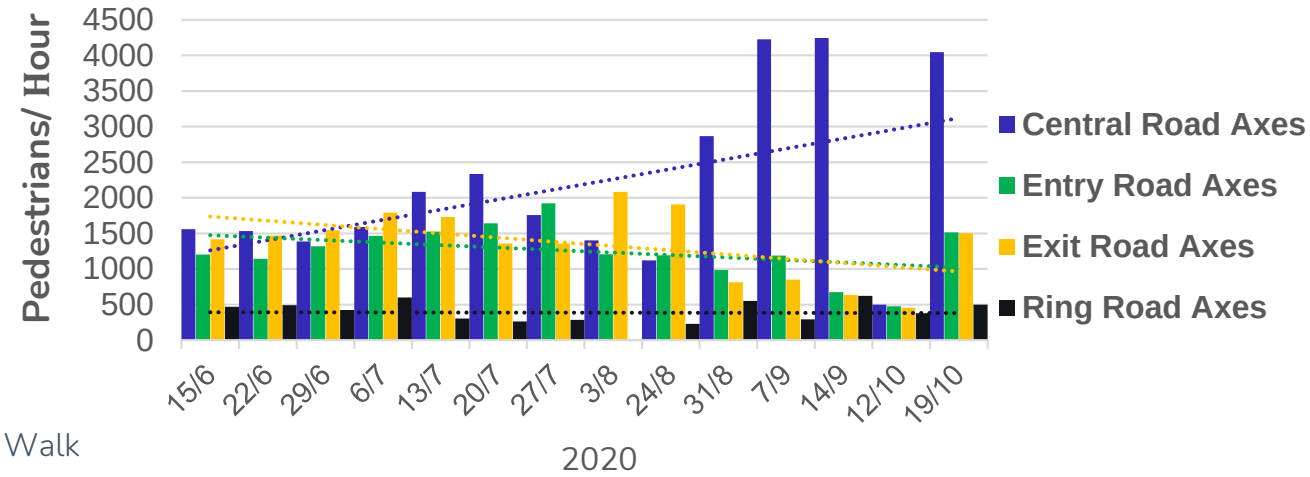
- During peak period, the **higher modal share** is occupied by passenger cars, motorcycles and taxis while bicycles and mopeds present the lowest share (~0-1%)
- After September on the **central road axes**, a reduction in the share of passenger cars and a simultaneous increase in the use of taxis and motorcycles is observed
- On the **ring road axes**, no significant differentiation is observed in the modal split
- On the central road axes (including Panepistimiou St.) **pedestrian traffic** shows an upward trend







Statistical Analysis

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- Central, Entry and Ring Road Axes: **log-normal regression**
- Panepistimiou St. and Exit Road axes: **multiple linear regression**
- The final models present an adequate R^2 **from 0.3** (Entry Road Axes) **to 0.8** (Central Road Axes)
- The explanatory variables are **statistically significant** at the typical 95 % level
- An **elasticity analysis** was conducted to quantify the influence of each independent variable on travel time

Results

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	Variable	Description	Panepistimiou St.			Central Road Axes			Entry Road Axes			Exit Road Axes			Ring Road Axes		
			βi	t	ei*	βi	t	ei*	βi	t	ei*	βi	t	ei*	βi	t	ei*
Traffic Flow	**Moto_Flow**	Number of motorcycles per hour	**0.001**	**5.86**	**2.12**												
	Truck_Flow	Number of trucks per hour										0.002	2.30	2.73	-0.005	-4.26	-12.88
	Bicycle_Flow	Number of bicycles per hour										0.01	1.93	1.00			
	Pedestrian_Flow	Number of pedestrians per hour	0.0004	5.77	1.00	0.000	3.28	1.00	0.0001	2.86	1.00						
Modal Share	**Car_Share**	The modal share (%) of private cars	-2.78	-5.03	-1.97	-0.37	-5.13	-5.25	-0.48	-3.81	-3.50				**-0.92**	**-11.22**	**-118.63**
	Bus_Share	The modal share (%) of buses	23.54	3.05	1.00	7.23	14.50	4.07							2.66	2.22	3.10
	Taxi_Share	The modal share (%) of taxis													1.81	10.69	56.01
	Moto_Share	The modal share (%) of motorcycles										**1.25**	**2.16**	**4.70**			
	Bicycle_Share	The modal share (%) of bicycles													4.21	2.23	1.00
Road Geometry	**Traffic_Lanes**	Number of traffic lanes				**-0.48**	**-36.40**	**-43.19**	**-0.16**	**-8.19**	**-9.08**						
	Bus_Lanes$_1$	**0**: Non-existence/ **1**: Existence										**-3.03**	**-30.47**	**1.00**			
Other	**Panep_AGW$_1$**	**0**: 1st Phase/ **1**: 2nd Phase	**1.11**	**8.62**	**1.00**												
	Peak_Period$_1$	**0**: Morning/ **1**: Afternoon				**-0.10**	**-10.04**	**1.00**	**0.12**	**5.92**	**1.00**				**0.10**	**7.93**	**1.00**

Conclusions

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- The factors affecting travel time in the city center of Athens during the pilot implementation of AGW are significantly related to the **motorized traffic, active mobility, number of traffic lanes and the time of the day**
- **Passenger cars and motorcycles dominate in the city center** of Athens while active travel modes present the lowest modal share
- The **increase of traffic lanes** and the decrease of sidewalks on **Panepistimiou St.** led to a travel time increase
- The **car share** affects significantly the travel time in four of the five models
- The **bus share** has a positive relationship with the travel time in three of the five models
- The **pedestrian flow** correlates positively with the travel time of motorized traffic on the central and entry examined routes
- **Central and entry road axes** present similar factors that affect travel time

Limitations & Future Challenges

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Limitations

- Traffic data are collected during **peak periods**
- Travel time data are collected for **12 specific routes**
- Traffic flow is collected for **one point per route**
- The examined time period is limited to **5 months including August**
- The **COVID 19 pandemic** is not taken into account in the analysis

Future Directions

- The investigation of the critical factors affecting travel time in the city center of Athens should be **further explored**
- Mobility policies that have a positive impact on the environment and society must be integrated into a **more general strategic plan** adapted to the characteristics of each city

Thank you!

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