



The New Traffic Safety Paradigm



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Presented
Does Less Driving Mean Safer Traffic?

Parliamentary Advisory Council for Transport Safety

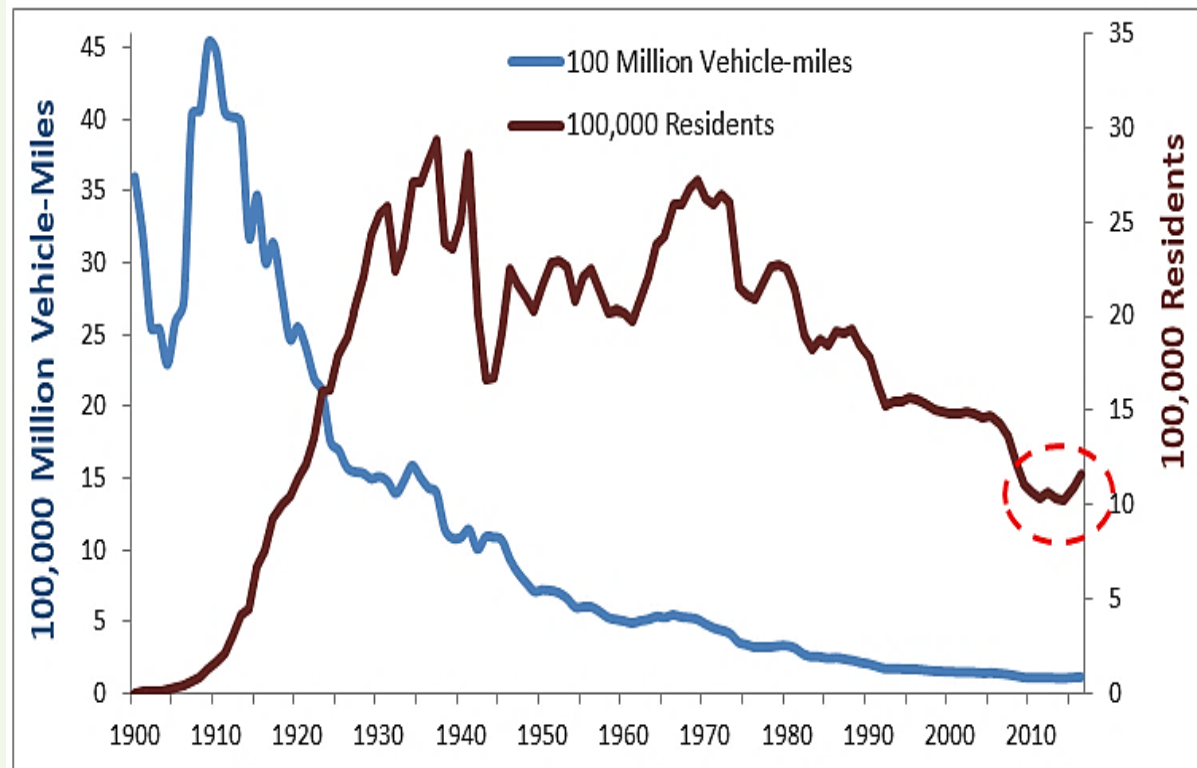


London
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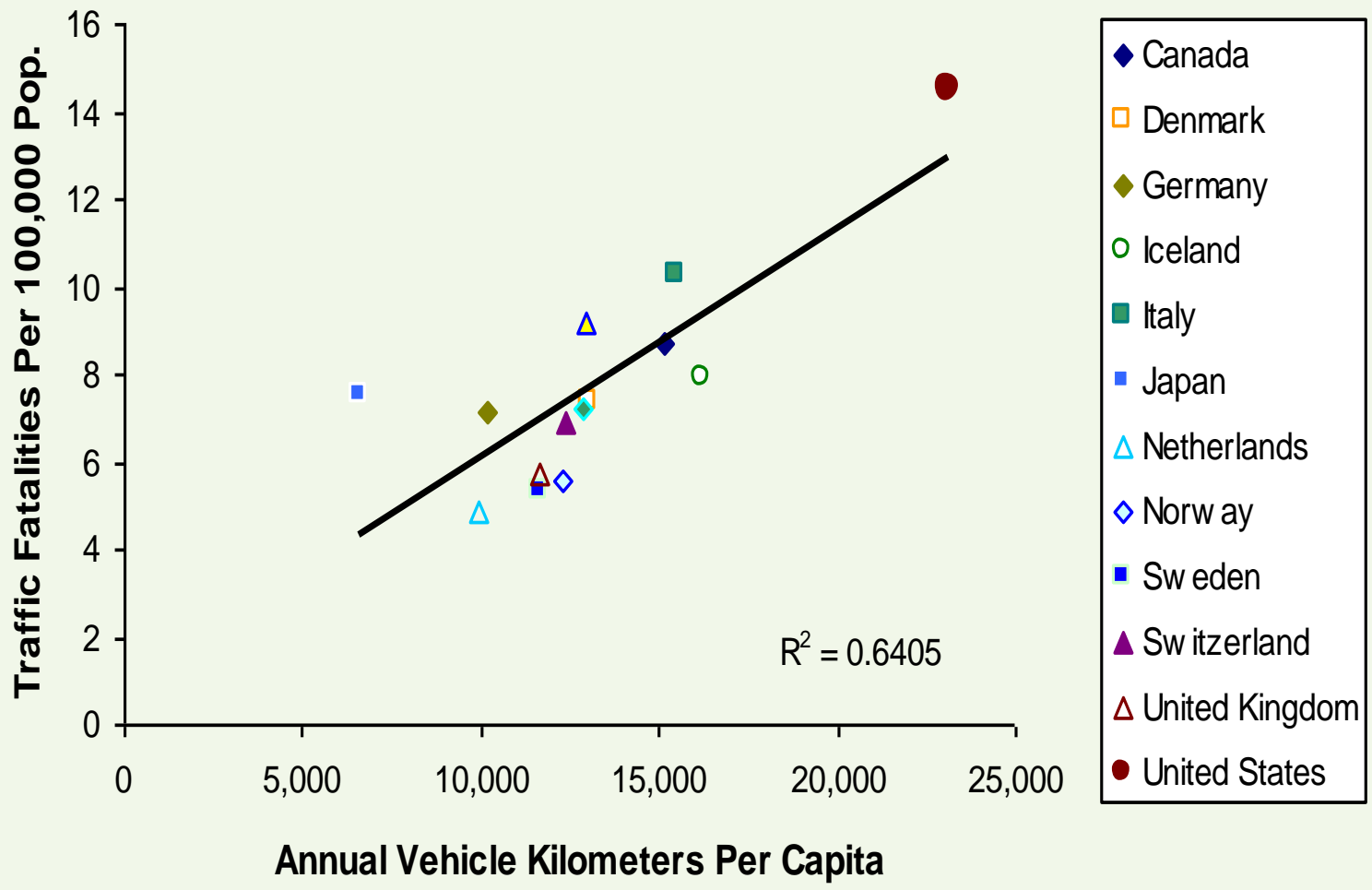
U.S. Traffic Death Trends

Deaths per vehicle-mile declined significantly during the last century, due to improved roads, vehicles, emergency response and safety programs, but this decline stopped after 2010.

New strategies will be needed to achieve ambitious new safety goals such as Vision Zero.



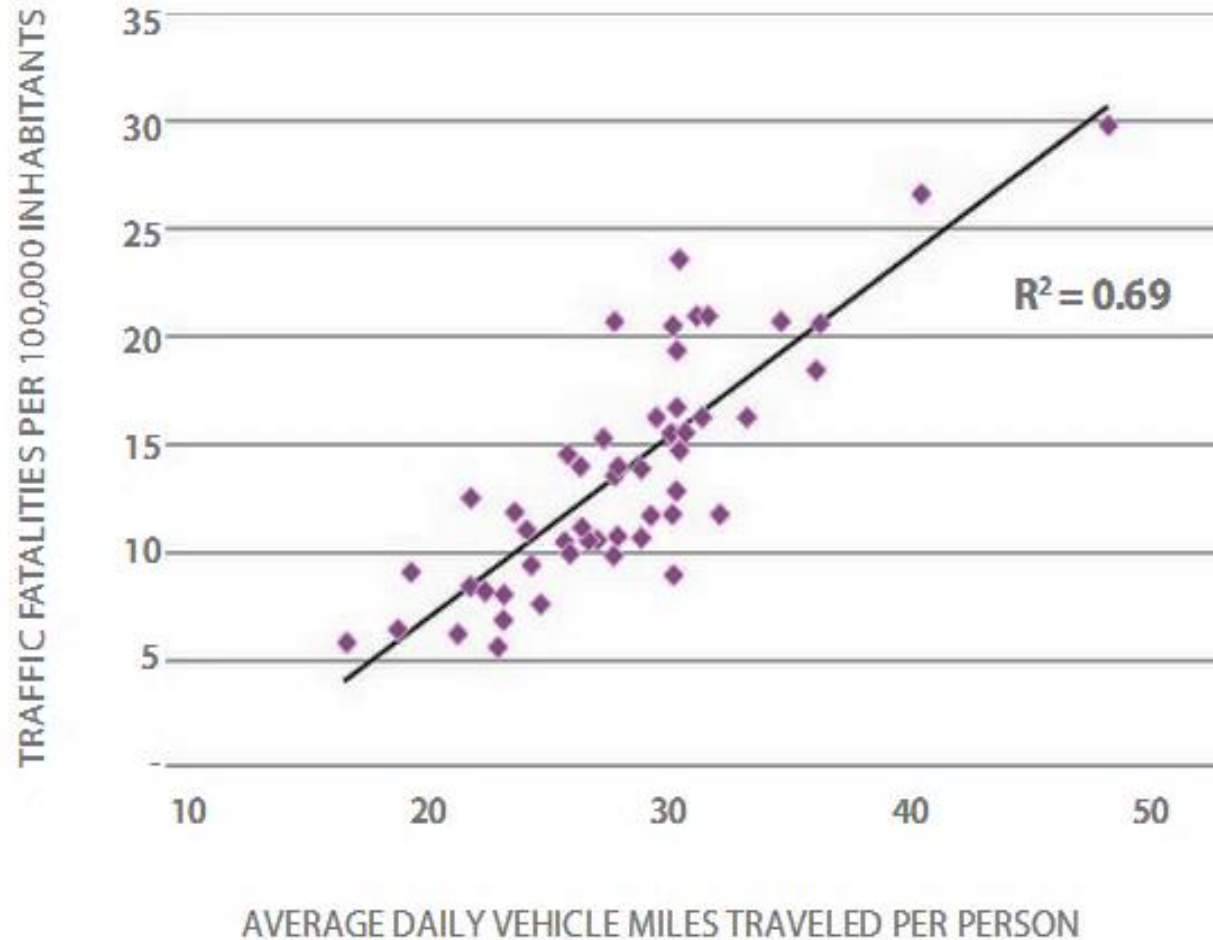
Vehicle Travel Vs. Traffic Deaths



US Cities Traffic Death Rates

Among U.S. urban regions, and other geographic areas where data are available, there is a strong positive relationship between per capita annual mileage and traffic death rates.

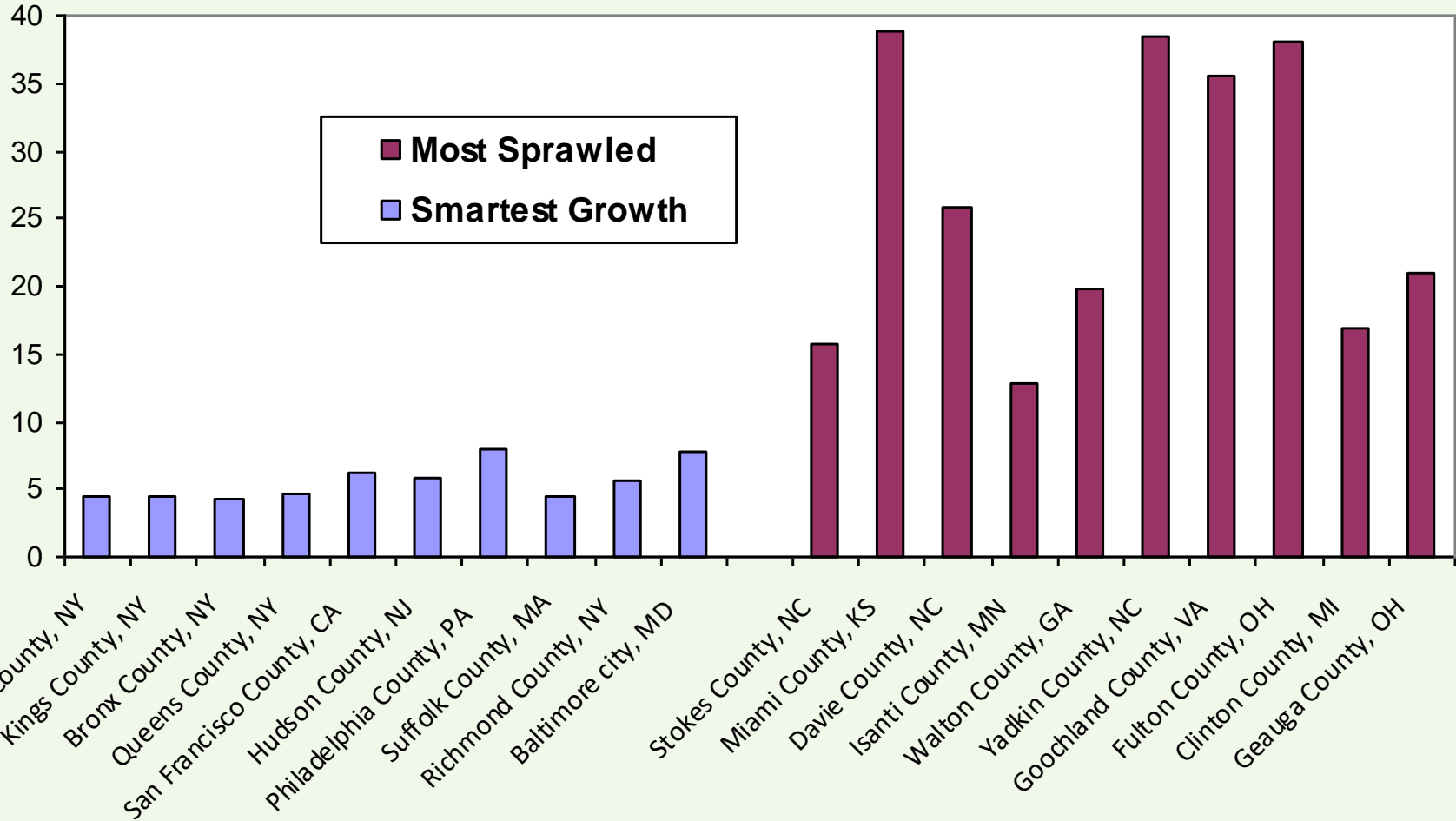
(EMBARQ 2012)



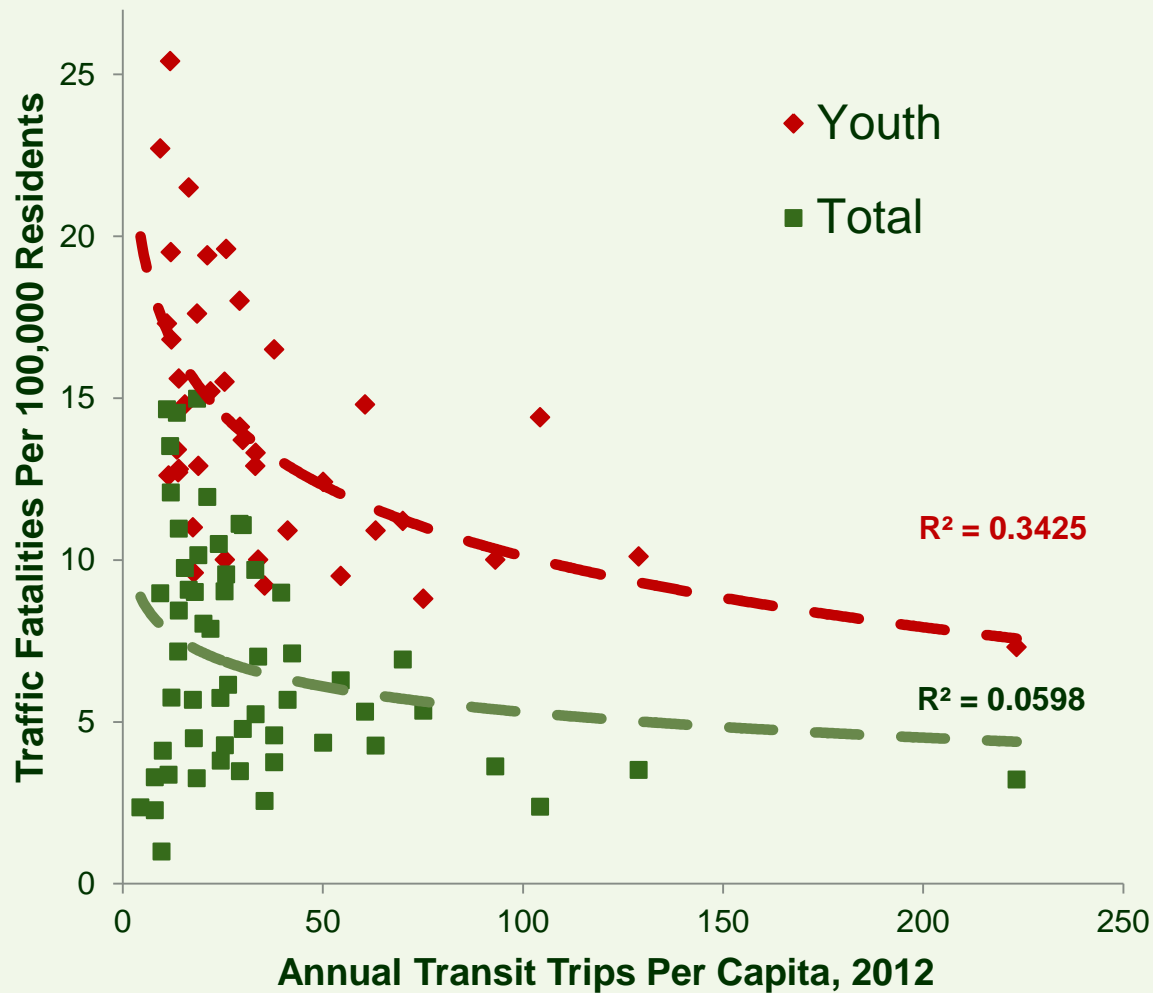
SOURCE: US FHWA 2008, EMBARQ analysis

Smart Growth Safety Impacts

Annual Traffic Deaths Per 100,000 Res.



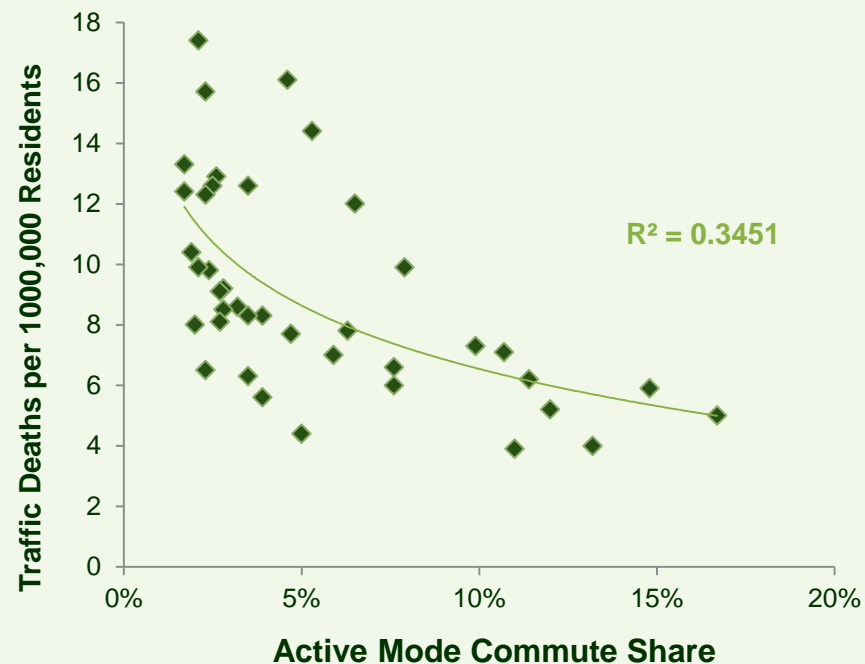
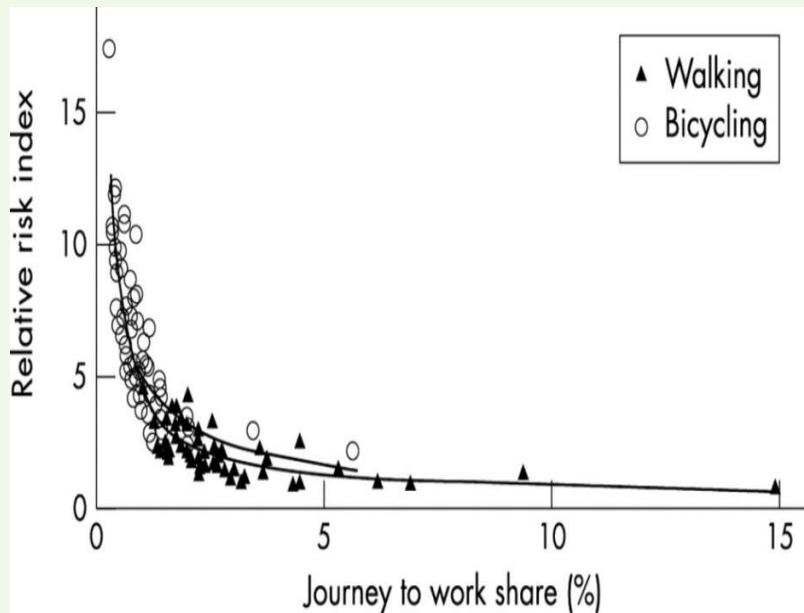
Traffic Fatalities



Both total and youth fatality rates decline with increased transit ridership. Transit-oriented cities have about half the average Youth and Total traffic fatality rates as more automobile-oriented cities.

Youths (15-25 years old) have about twice the traffic fatality rates as the total population average.

Safety In Numbers



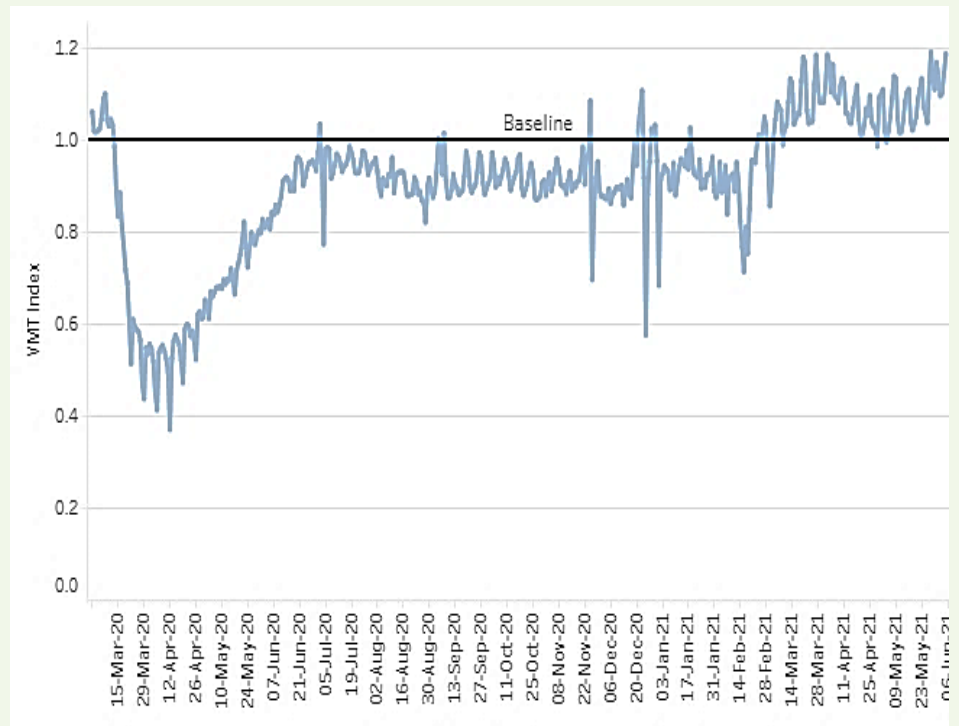
Per capita traffic death rates tend to decline as active (walking and cycling) commute mode shares increase in U.S. urban regions.

This and other research indicate that more active travel tends to increase overall traffic safety.

U.S. Pandemic Impacts

- Vehicle travel declined 13%.
- Total crashes and insurance claims declined 15-30%.
- Traffic deaths increased 7%, due to less congestion leading to faster traffic speeds, plus increases in other higher-risk driving (e.g. impaired).
- This indicates that mileage affects crash rates, but other risk factors, such as speed and impairment have greater effects on casualties.

US Vehicle Miles Travelled, March 2020-May 2021



www.bts.gov/covid-19/daily-vehicle-travel

Old and New Safety Paradigms

	Old	New
Goal	Make vehicle travel safer.	Make transportation systems safer.
Risk measurement	Distance-based, such as casualties per billion vehicle-kms	Total (all mode) traffic casualties per capita.
Solutions considered	<p>Targeted strategies reduce special risks:</p> <ul style="list-style-type: none"> • Hotspot roadway improvements. • Anti-impaired and distracted driving campaigns . • Graduated licenses and senior driver testing. • Vehicle design improvements. • Seatbelt and helmet requirements 	<p>Strategies that reduce special risks, plus vehicle-travel reduction strategies that reduce risk exposure:</p> <ul style="list-style-type: none"> • Multimodal planning (improved walking, cycling and public transit). • Efficient road, parking, vehicle and insurance pricing • Transportation demand management programs • Smart Growth development policies
Analysis scope	Program costs and traffic safety benefits	All economic, social and environmental impacts

Factors Affecting Vehicle Travel

- Fuel Prices.
- Parking supply and pricing.
- Vehicle taxes and insurance price structures.
- Development density and mix.
- Roadway supply and conditions.
- Roadway network connectivity.
- Quality of non-auto modes (walking, bicycling, public transport, ridesharing, carsharing, etc.).
- Employer location, parking and commute policies.
- Driver's licensure requirements.



Traffic Safety Impacts

Increases crashes:

- Roadway expansions
- Low fuel prices
- Unpriced roads
- Unpriced vehicle parking
- Sprawled development



Reduces crashes:

- Vehicle travel reduction plans
- Walking, bicycling and public transit improvements.
- Traffic speed reductions
- Commute trip reduction programs
- Fuel, road and parking price increases
- Distance-based pricing
- Smart Growth development policies



Traffic Safety Strategies

Conventional Strategies

- Anti-impaired and distracted driving campaigns
- Graduated driver's licenses
- Special senior driver testing
- Roadway improvements
- Vehicle improvements
- Vehicle occupant crash protection

New Paradigm Strategies

- More multimodal planning (improved walking, cycling and public transit)
- More efficient transport pricing (distance-based insurance and registration fees, parking fees, road tolls and higher fuel taxes)
- Reduced parking supply and subsidies
- Smart Growth development policies
- Complete streets policies
- TDM programs (such as commute trip reduction)

Distance-Based Pricing



Motorists pay by the vehicle-kilometre, so a \$600 annual premium becomes 3¢/km and a \$2,000 annual premium becomes 10¢/km. This gives motorists a significant financial incentive to drive less, but is not a new fee at all, simply a different way to pay existing fees.

Motor Vehicle Travel Reduction Benefits

Improved Mobility Options	More Non-Auto Travel	Reduced Automobile Travel	More Compact Development
<ul style="list-style-type: none"> • More convenience and comfort for existing users, increasing user satisfaction. • Improved economic opportunity for non-drivers. • Equity benefits (since existing users tend to be disadvantaged). • Improved operating efficiency (if service speed increases). • Improved security (reduced crime risk) 	<ul style="list-style-type: none"> • User enjoyment (particularly walking and bicycling) • Increased public fitness and health. • Local economic development. • Increased fare revenue and cost recovery. • Increased security as more non-criminals ride transit and wait at stops and stations. 	<ul style="list-style-type: none"> • Reduced traffic congestion. • Road and parking facility cost savings. • Consumer savings. • Reduced chauffeuring burdens. • Traffic safety. • Local economic activity • Energy conservation and pollution reductions. 	<ul style="list-style-type: none"> • Additional vehicle travel reductions (“leverage effects”). • Improved accessibility (particularly for non-drivers). • Increased economic productivity. • Energy savings and emission reductions. • More efficient public infrastructure and services. • Farmland and habitat preservation.

Benefits

Planning Objectives	Traditional Safety Strategies	New Safety Strategies
Reduce traffic congestion		✓
Road & parking facility savings		✓
Consumer savings		✓
Improve mobility for non-drivers		✓
Improve traffic safety	✓	✓
Energy conservation		✓
Pollution reduction		✓
Land use objectives		✓
Public fitness & health		✓

What About Autonomous Vehicles?



How will autonomous vehicles affect people's lives, and transport planning issues such as crash rates?

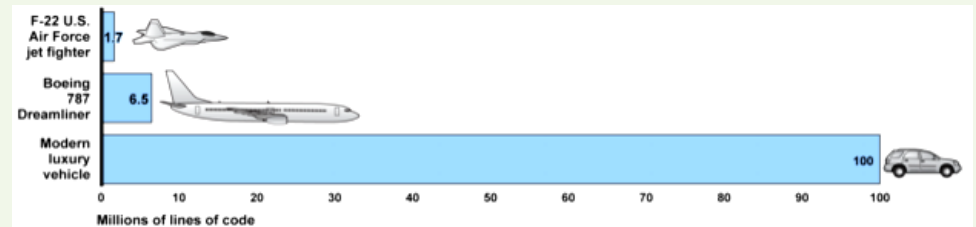
Safety Impacts

Advocates predict that, because human error contributes to 90% of all traffic crashes, autonomous vehicles will reduce crashes by 90%.

This overlooks additional risks these technologies introduce.



Hardware and software failures. Complex electronic systems can fail. Self-driving vehicles will certainly have errors that cause crashes; the question is how frequently.



Malicious hacking. Self-driving technologies can be manipulated for amusement or crime.

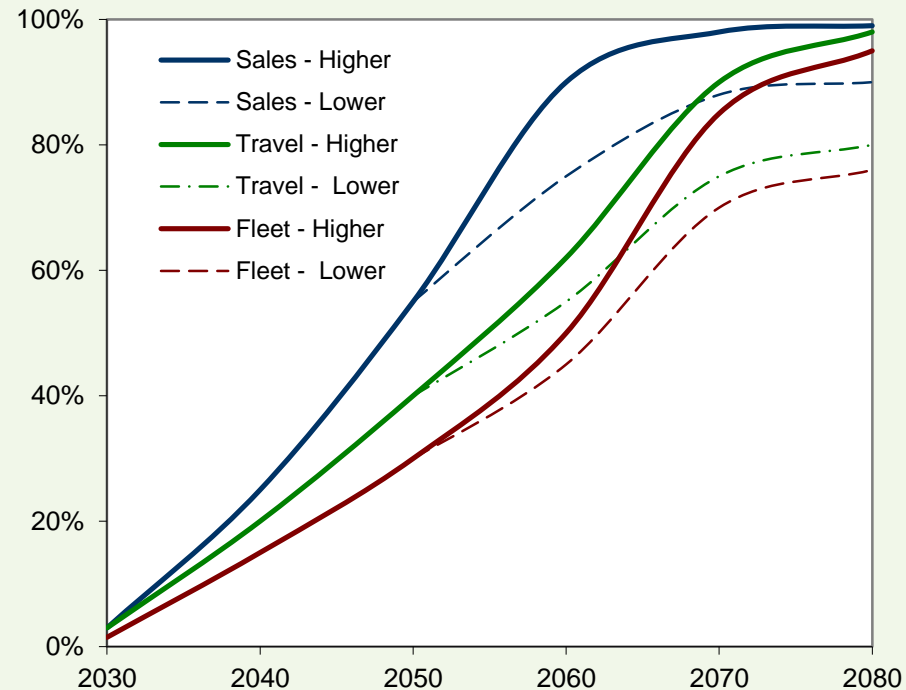
Increased risk-taking. When travellers feel safer they tend to take additional risks, for example, reduced seatbelt use and less caution by other road users.

Platooning risks. Many potential benefits, such as reduced congestion and pollution emissions, require platooning. This can introduce new risks.

Increased total vehicle travel. Autonomous driving may increase total vehicle travel and therefore crashes.

Autonomous Vehicle Implementation

- During the 2020-30s they are likely to be expensive and limited in ability. It will probably be the 2040s before most middle-income families can purchase reliable and affordable autonomous vehicles, and longer for lower-income households.
- Benefits, costs and travel impacts are uncertain. Net benefits will probably be smaller than optimists predict
- With current policies, autonomous vehicles are likely to increase total vehicle travel by 10-30%, increasing traffic congestion, pollution, and possibly accident risks.



If autonomous vehicles follows previous technologies it will take one to three decades for them to dominate new vehicle sales, and one or two more decades to dominate vehicle travel, and even at saturation a portion of vehicle travel may continue to be human operated, indicated by dashed lines.

Conclusions

- Traffic death rates have started to increase. New strategies are needed to achieve ambitious safety goals such as Vision Zero.
- Recent research improves our understanding of traffic risks. Numerous studies indicate that **exposure** - the amount people travel – is a critical risk factor: all else being equal, increased travel increases crashes.
- A new paradigm recognizes that all vehicle travel incurs risks, so policies that stimulate vehicle travel increase crashes and those that reduce travel provide safety.
- New safety strategies complement existing programs, which become more effective, equitable and acceptable if implemented with improved mobility options that help higher-risk travellers reduce driving and risk exposure.
- New safety strategies tend to provide co-benefits, and so are supported by comprehensive analysis.





“Safe Travels: Evaluating Mobility Management Traffic Safety Benefits”

“Not So Fast: Better Speed Valuation for Transport Planning”

“The Hidden Traffic Safety Solution: Public Transportation”

“Toward More Comprehensive and Multi-Modal Planning”

“Autonomous Vehicle Implementation Predictions”

“Pandemic Resilient Community Planning”

“Transportation Pricing for Traffic Safety”

“A New Traffic Safety Paradigm”

“Online TDM Encyclopedia”

and more...

www.vtppi.org