MONASH University

Smart Public Transport Lab Seminar
TU Delft Netherlands
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Long Term Post-Pandemic Impacts of the COVID-19 Crisis on Travel – Early Results

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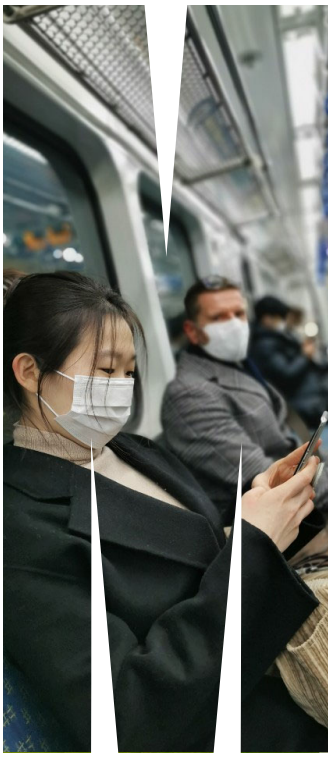
PTRG PUBLIC TRANSPORT RESEARCH GROUP
GROUP OF EIGHT AUSTRALIA
MONASH INSTITUTE OF TRANSPORT STUDIES



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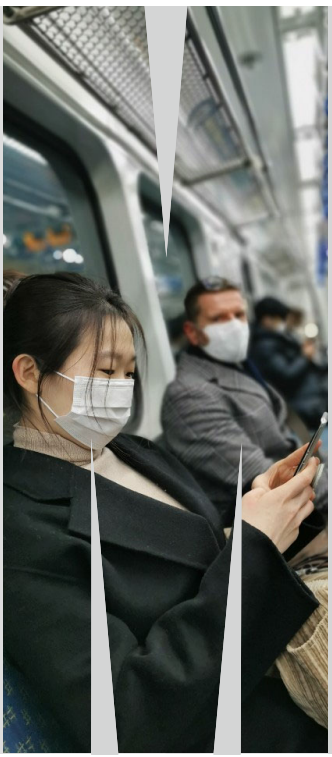
Lessons from Literature

Monash PTRG Approach

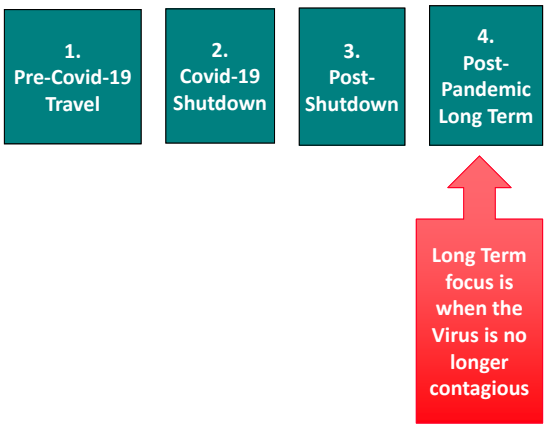
Early Results



This presentation discusses EARLY FINDINGS of research program exploring the Long Term Impacts of the Covid-19 Pandemic on Travel

- Objective:
  - Understand how C-19 has impacted travel including long term effects.
- Tasks
  a. Research Literature/Practice Review
     - Travel Impacts of Disruptions
     - Forecasting Travel Impacts of Disruptions
  b. Secondary Travel Data
  c. Primary Survey
     a. Qual/Quantitative Online Interview/Surveys
     b. Shutdown Phase
     c. Post-Shutdown/Pandemic Phase
  d. Strategic Forecasting
- Focus:
  - Melbourne, Australia

Phases of Covid-19



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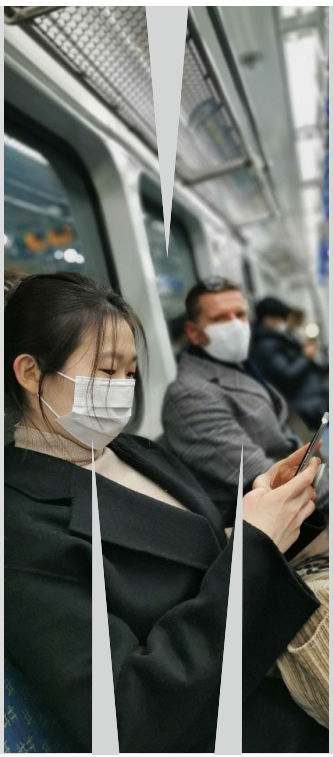


Most travel behaviour [research] is habitual – but research has considered how DISRUPTIONS affect travel and much of this is relevant to understanding Covid-19 Impacts

- Humans like routine! We ignore or undervalue alternatives that aren't habitual (Goodwin 1977).
- Disruptions cause a routine to be broken and alternatives to be discovered or re-evaluated more rationally
- When public transport is compromised, most riders shift to private car (Nguyen-Phuoc et al. 2018, Exel and Rietveld 2001)

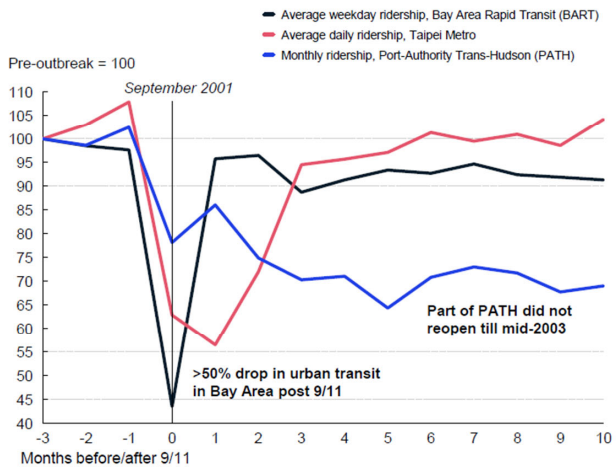
Disruptions in Travel Behaviour Research

Personal health concerns	Security threats	Planned disruptions	Unplanned disruptions	Economic crises
SARS (2003) MERS (2012)	9/11 Terror attacks (2001) London, Madrid bombings 2005	Major events (London Olympics) Infrastructure works	Natural disasters Infrastructure fault Strikes	Global financial Crisis e.g. 2007
Fear/dread avoidance Social distancing	Fear/dread avoidance	Availability of options changes Encouragement to change travel	Availability of options changes Unknown duration	Long duration Macro/structural impacts Reduced latent demand

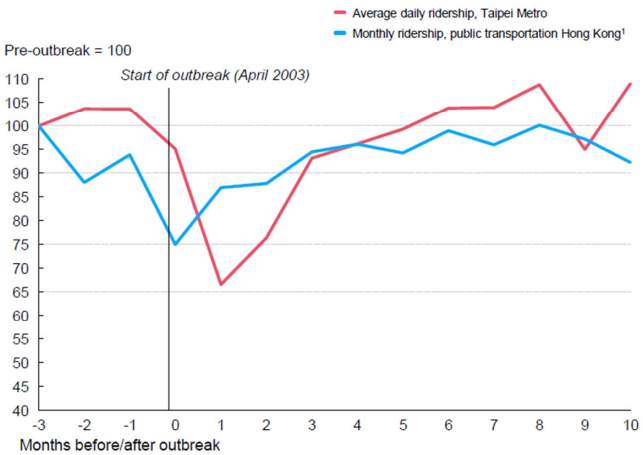
SARS/9-11 Safety shocks had big transit ridership impacts but recovery within 3-6 months of crisis start – no suggestion of residual fear impact (but these events were relatively short term)

Impact of historical crises on urban transit ridership

Effect of safety crises – 9/11



Effect of health crises – SARS 2003



1. Includes various modes of transportation, such as bus, rail, and ferry; does not include taxi

Source: Bay Area Rapid Transit, Taipei Metro, New York State Open Data (data.ny.gov), Hong Kong Census and Statistics Department

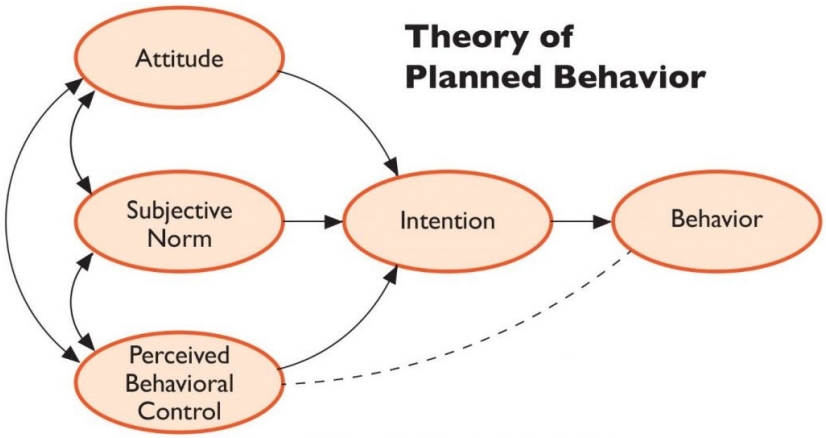
But interestingly most of evidence on the scale of medium term changes from previous disruption impact studies are that they are quite small

London Olympics: Only **6%** of survey respondents sustained a change made 2 months after the event	Parkes et al. 2016
SARS: PT ridership decline sensitive to reported cases; **rebounded on average 28 days** after each reported case	Wang 2014
Natural disaster: Mean time to return to normal work location/schedule after Hurricane Sandy landfall: **10/ 7 days**	Kontou et al 2017
Economic crisis: Transit ridership declined by 20% at the peak of unemployment in the US, **two years after financial crash it recovered**	McKinsey & Company 2020a
Infrastructure collapse: Traffic conditions **took 5 weeks to equilibrate** on streets surrounding the I-35W bridge in Minneapolis following its collapse as individuals settled in to alternate routing patterns	Zhu and Levinson 2010
Infrastructure schemes: Duration of disruption affects quantum of change: reduction in road traffic volumes for infrastructure schemes lasting more than 1 year was -26.3%, compared to -18% for schemes lasting less than 1 year	Cairns et al. 2002
Unplanned disruptions: Rate of change varies with disruption type and trip type	Marsden et al, 2020

…but, evidence of **long-term** impacts is limited

Studies of disruption typically analyse change during an event ('shutdown') or in the weeks and months following ('restrictions easing').

A pervasive model in travel behaviour research is the Theory of Planned Behaviour…



Ajzen I 2005

…which has also been adapted to DISRUPTION contexts..

Attitudes	Internal motivation or value alignment is associated with higher rate of change during disruption.	London Olympics	Parkes et al. 2016
	Individuals who had already contemplated making a change were significantly re more likely to sustain change 2 months after disruption.	London Olympics	Parkes et al. 2016, Prochaska & DiClemente 1982
Perceived control	**Individual capability:** Familiarity with alternative modes ('multimodality') increases likelihood of remoding.	Natural disaster, London Olympics	Parkes et al. 2016, Marsden 2020,
	Pre-existing health concerns predict intention to switch to car.	Hypothetical transit disruption	Nguyen-Phuoc et al. 2018
	Personal threat posed by disruption affects likelihood of change.	SARS outbreak, Security threats	Wang 2014, Prager and von Winterfeldt 2010
	External capability: Flexible work hours and ability to work at home significantly associated with stated ease of remoding in the event of an	Hypothetical disruption	Marsden et al 2020
	Uptake of change in response to infrastructure works higher in urbanized areas with more alternatives than rural or intraurban	Multiple inf. disruptions	Cairns et al. 2002
Adaptability	**Individual traits** Physical and psychological resources, self-regulatory capacity and coping mechanisms are associated with increased maintenance of change.	Adoption of health interventions	Kwasnicka et al. 2016
	Experience with past disruptions: Individuals who had experienced the same disruption many times in the past were twice as likely to work from home.	Flood	Marsden et al. 2020
Norms	"Car culture" impacts the likely rate of mode shift to car when alternatives become unavailable	Security threats; Transit strike	Prager & von Winterfeldt 2010; Exel &Rietveld 2001
Implementation and quality	Travel disruptions with well coordinated TDM more likely to see no net increase and potential reduction in overall traffic volumes	Multiple inf. Disruptions	Cairns et al. 2002

…and which has suggested psychological and contextual contexts for increased impact

- **Internal** factors (attitudes and values) are more important than **external** ones (access to equipment, job suitability, norms) for maintaining change (Mokhtarian and Salomon 1994)
- **The Transtheoretical Model** - If an individual has contemplated a particular change **before** the disruption they are more likely to sustain it **after** the disruption (Parkes et al 2016, Prochaska and DiClemente 1982)
- Change is largely dependent on **situational factors.** Individuals perceive different ease of change depending on trip purpose, and capabilities, which depend on the type of change (Marsden et al. 2020)
- Some individual traits and experiences predispose the individual to **maintain** change (Kwasnicka et al 2016, Marsden et al. 2020, Parkes et al. 2016)

The Transtheoretical Model

User Adjustment to Change

Pre-contemplation
Contemplation
Preparation
Action
Maintenance

(Parkes et al 2016, Prochaska and DiClemente 1982)

	Most factors affecting change are **Situational**	Some factors are **Generalisable**
The type of change is	Important	Not important
	1. Attitudes 2. Perceived Control 4. Norms 5. Implementation	3. Adaptability • Wellbeing, self-regulation and coping • Past experience
Example: telework	*My job can be done at home*	*I can make adjustments and deal with challenges that arise as I get used to this change.*

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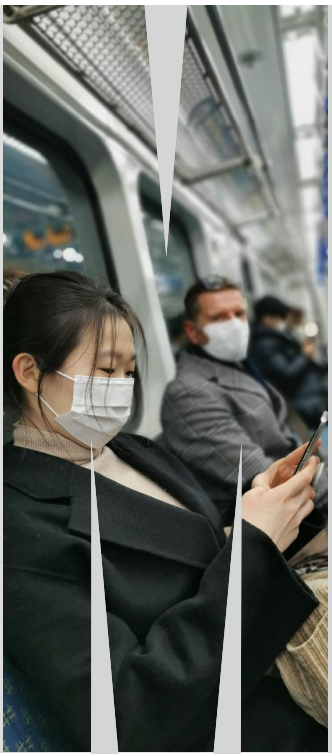
Lessons from Literature

Shutdown Impacts

Monash PTRG Approach

Early Results

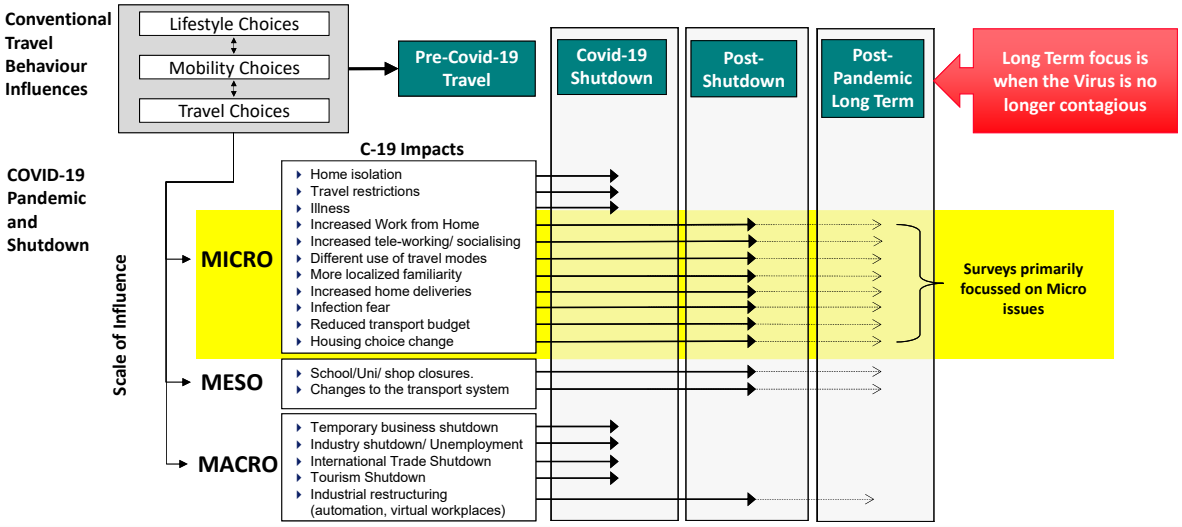


The Monash PTRG research has developed a NEW model to explore COVID-19 DISRUPTION and how it might impact travel – using the 4 phases of Covid-19

Pre-Covid-19 Travel | Covid-19 Shutdown | Post-Shutdown | Post-Pandemic Long Term ← Long Term focus is when the Virus is no longer contagious

Impacts are explored at three levels; behavioural research focusses on the MICRO scale but MACRO and MESO are also significant

An Integrated Framework of Factors Influencing Travel Behavior Before, During and After the Covid-19 Crisis.



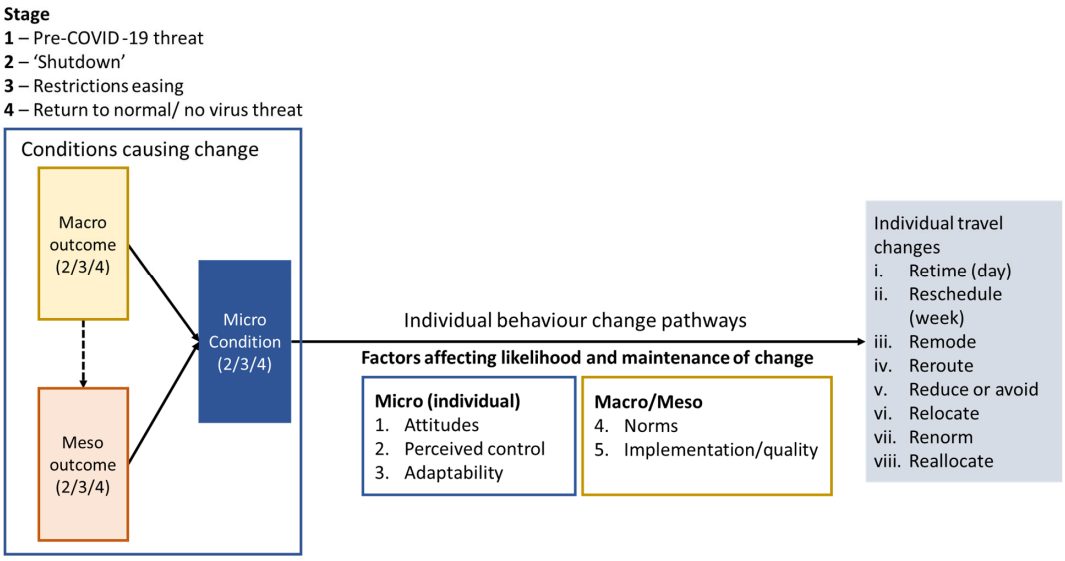
Note: This framework is developed by the research team from a review of previous research literature and also from a workshop with staff from the Victorian Department of Transport

The research will focus on how Macro/Meso and Micro Impacts create LONG TERM CHANGES in Travel Choices

	Condition for change	Travel behaviour response	
Micro	Fear/dread avoidance	Remode	Switch from public transport o active travel or car
	Social distancing imperative	Reduce	Work/socialise/conduct appointments from home
	Restrictions to movement	Relocate	Move trip destination: e.g. localisation of activity
	Reduced income	Reduce	Reduced ability to participate in activities
	No longer employed	Reduce	No need to travel to work
	Social influences	Renorm	Discussion among colleagues about changing travel
Meso	Schools and businesses closed	Reduce	No trip "attractors"
	Food services take-away only	Reallocate	Increased food deliveries
	Social distancing imperative	Renorm	Reduced public transport capacity
	Advice to avoid travel	Reduce	Restricted movements
Macro	Unemployment	Reduce	Fewer work trips
	Reduced incomes	Reduce	Fewer entertainment/ leisure trips
	Business restructuring	Reallocate	Delivery-oriented businesses
	International travel ban	Reduce	Migration dlow-down
	Tourism industry shut down	Reduce	Fewer tourism trips
	Institutional restructuring	Renorm	Adaptation and changes expectation around ability to work from home

Source: Travel behaviour responses adapted from *Parkes et al. 2016* and *Marsden et al 2020*

The research will focus on how Macro/Meso and Micro Impacts create LONG TERM CHANGES in Travel Choices for each of the Covid-19 phases



Primary research Includes: 1. Online interviews in Melbourne (Complete) and 2. an Online Panel Survey (Underway)

C-19 Travel Impacts – 1. Online Interview Survey

- Objective:
  - provide qualitative detailed narratives of how C-19 shutdown has impacted the lives of respondents and to provide inputs to long term forecasting of impacts.
- Aims:
  a. Understand personal experiences of C-19 Shutdown on life, work and travel – notably differences between pre-shutdown and shutdown (in their words)
  b. Ask for respondents personal views on how life, work and travel might change in a post-C-19 shutdown – will anything have changed? (in their words)
  c. Explore specific issues which might affect long term travel with respondents (in their words)
- Approach
  - 18 interviews - 40 mins - online/by phone

Table 1 – Sample Frame – Online Interviews

	Regions of Melbourne								
Personal Income	Inner			Middle			Outer		
	Age			Age			Age		
	Low*	Medium	High	Low	Medium	High	Low	Medium	High
Low	1[2]	-	1	1[2]		1	1[2]		1
Medium	1	1[2]		1	1[2]		1	1[2]	
High		1	1[2]		1	1[2]		1	1[2]

*No surveys are undertaken of anyone aged under 18
[2]Respondents who used Public Transport in Melbourne equal to and also more frequently than 1-2 days a week

Interviews explore 4 issue sets – Pre-Shutdown , Shutdown, Post-Pandemic and Specific Issues which might affect long term travel (from the framework)

DISCUSSION GUIDE – Areas for Questioning

A. Pre - Shutdown
- i. Weekday activities
- ii. What did you do (work, study, retired etc)
- iii. How did you get around

B. Shutdown
- i. [OPEN] How affected
- ii. How affected activities
- iii. How affected getting around

C. Post - Pandemic
- i. [OPEN How do you expect what you do and how you get around will change when the virus has gone?
- ii. How affected activities
- iii. How affected getting around
- iv. Will C-19 change getting around in future; why. how

D. Exploring Specific Long Term Impact Issues

Working from Home
- i. During shutdown - WFH? Doing More?
- ii. Post Shutdown – how will this change number of times Why?

Tele-Video Conferencing
- i. During shutdown - Involved for work, study social? Doing More?
- ii. Post Shutdown – how will this change number of times Why?

Travel Modes
- i. During shutdown changed how get around ? Doing More?
- ii. Post Shutdown – how will this change getting around, How? Why?

D. Exploring Specific Long Term Impact Issues **CONTINUED**

Local Travel
- i. During shutdown – activities more local? What? How do you get around?
- ii. Post Shutdown – will you do more local activities - Why?

Home Deliveries
- i. During shutdown – had more? What? Why?
- ii. Replaced out of home travel?
- iii. Post Shutdown – how will this change deliveries - Why?

Residual Public Transport Fear
- i. [OPEN] After shutdown – will you use PT? Why?
- ii. When infection risk gone – will you have concerns about infection on PT in future? How will this affect PT use? Why?

Impact of Lower Income
- i. After shutdown – will income be less? Why?
- ii. How will this affect going to activities?
- iii. How will this affect how you get around?

Car Ownership
- i. After shutdown – will the C-19 Crisis affect how you own and use a car? How? Why?

Residential Housing/Location
- i. After shutdown – will the C-19 Crisis affect where you want to live? Where? Why?

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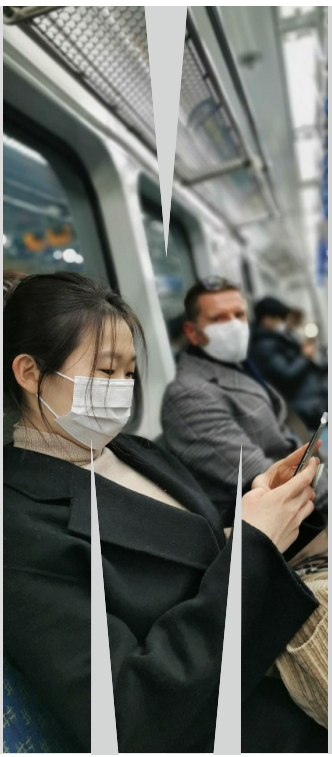


Post-Pandemic; EVERY respondent said they would do activities and travel the same way they did Pre-Pandemic

Preliminary Results

C. Post - Pandemic

How do you expect what you do and how you get around will change when the virus has gone?

- Go back to normal
- No get back to normal
- Will drift back into same as we used to
- I'll travel by public transport again
- Not much change
- Go back to normal
- Go back to normal
- Just go back to normal
- It will all be the same; don't expect to change anything
- Will soon go back to how it was
- Expect it will go back to normal
- Go back to how it was before the virus came about

Post-Pandemic; the only important travel issues are work/study from home which is likely to have a longer term impact – but impact scale will be small – other impacts are minor

Preliminary Results

D. Exploring Specific Long Term Impact Issues	When the Virus has gone – how will this change how you get around?			
Working/Study from Home	Affects 6/18	Half – will go back to work/study	Half – would like to do some W/S FH in future	boss said it was good; it makes life so much easier; im going to try and negotiate it
Tele-Video-Phone Conferencing/Meeting	Affects 15/18	About a third will continue Post-Pandemic; most only a little		Will continue to use telehealth ; quite like it means I don't have to travel to the doctor
New Travel Modes/Patterns	Almost all Travel Differently during shutdown	Little Post-Pandemic change in travel expected		Would like to walk more for health but expect I'll go back to before the virus
More Localised Travel	Most haven't changed range of local travel	Few expect to be more local in travel		Will go back to same travel as before shutdown
Impact of home delivery - online shopping	10/18 had more home deliveries during shutdown	Only 2 expect to continue post pandemic – small travel impact		Prefer eating out
Impact of Lower Income	3/18 had some income impact in shutdown	None expect a long term impact on activities or travel		No, income should return to normal
Car Ownership	None expect a long term impact on car ownership/use			
Residential Housing Preference & Location	None expect a long term impact on housing/location	I don't think there will be any affect. Quite used to living in the city center	I never liked high density inner living; this makes me think im right (outer area resident)	

Post-Pandemic; EVERY respondent using public transport Pre-Pandemic said they would us public transport Post-Pandemic; occasional PT users also agreed

Preliminary Results

D. Exploring Specific Long Term Impact Issues

Post Pandemic will you use public transport?

- Yes
- Yes
- Yes no problem with it
- Yes will use public transport
- Yes I would
- Im not scared to use public transport ; I use trams even now
- Yes
- See no reason why not; yes
- Yes I have no choice

D. Exploring Specific Long Term Impact Issues

Post Pandemic will you have concerns about infection on public transport?

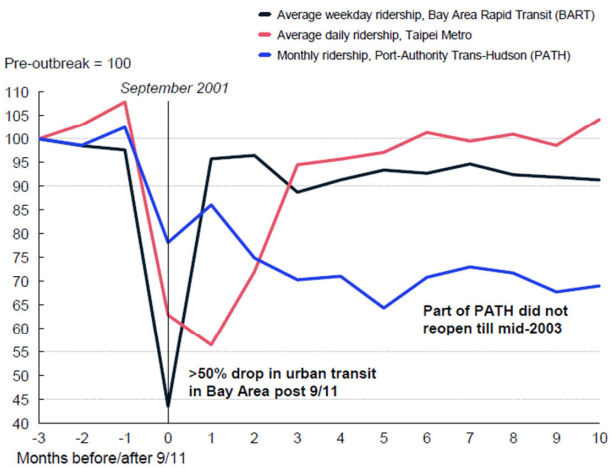
Majority – No concern – some noted concern

- No more than usual; we have the annual flu concern but not a problem
- A little apprehensive but no not real concerns; have to have a bit of confidence when things go back; ill be careful; get a flu shot
- As long as risk has gone ill be ok

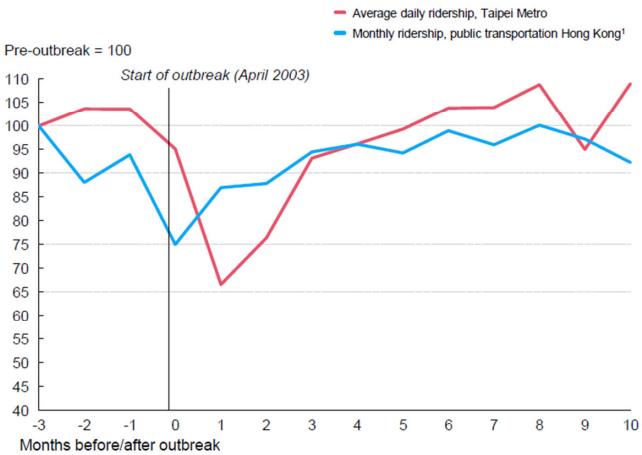
This matches findings from SARS/Safety shock impact on mass transit ridership – recovery within 3-6 months of crisis start – no suggestion of residual fear impact (but these events were relatively short term)

Impact of historical crises on urban transit ridership

Effect of safety crises – 9/11



Effect of health crises – SARS 2003



1. Includes various modes of transportation, such as bus, rail, and ferry; does not include taxi

Source: Bay Area Rapid Transit, Taipei Metro, New York State Open Data (data.ny.gov), Hong Kong Census and Statistics Department

MACRO level Impacts depend on recovery – the world has had much bigger pandemics and economies have changed but always recovered

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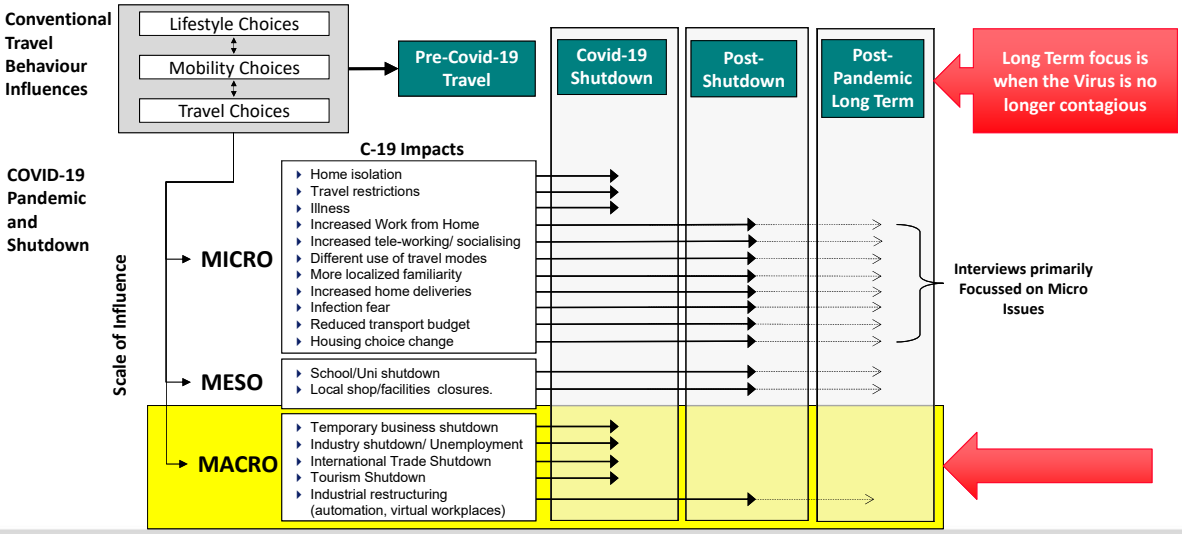
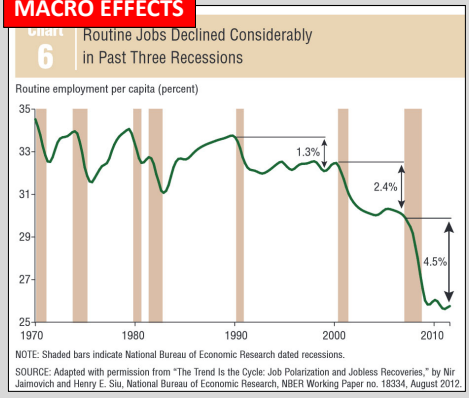


Note: This framework is developed by the research team from a review of previous research literature and also from a workshop with staff from the Victorian Department of Transport

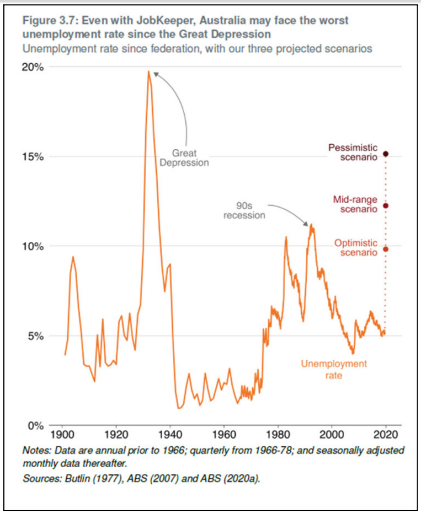
MACRO IMPACT - We know that economic shocks have lasting employment effects for some groups – but also that total unemployment recovers over time

MACRO EFFECTS

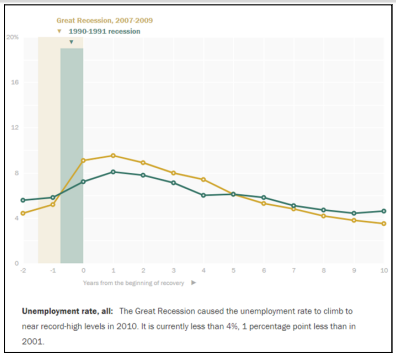


http://www.dallasfed.org/assets/documents/research/eclett/2014/el1405.pdf

Source: Prof Simon Wilke Dean, Monash Faculty of Business and Economics



Source: Coates, B., Cowgill, M., Chen, T., and Mackey, W. (2020). *Shutdown: estimating the COVID-19 employment shock*. Grattan Institute.



Source: RAKESH KOCHHAR AND JESSE BENNETT (2019) 'Two Recessions, Two Recoveries Compare the two longest episodes in U.S. history with our interactive' Pew Research Centre, Social and Demographic Trends Dec 31 2019. https://www.pewsocialtrends.org/essay/two-recessions-two-recoveries/ last accessed May 2020

MESO level Impacts – During Post-Shutdown many more behavioural changes will be imposed which will affect travel and which could have long term impacts

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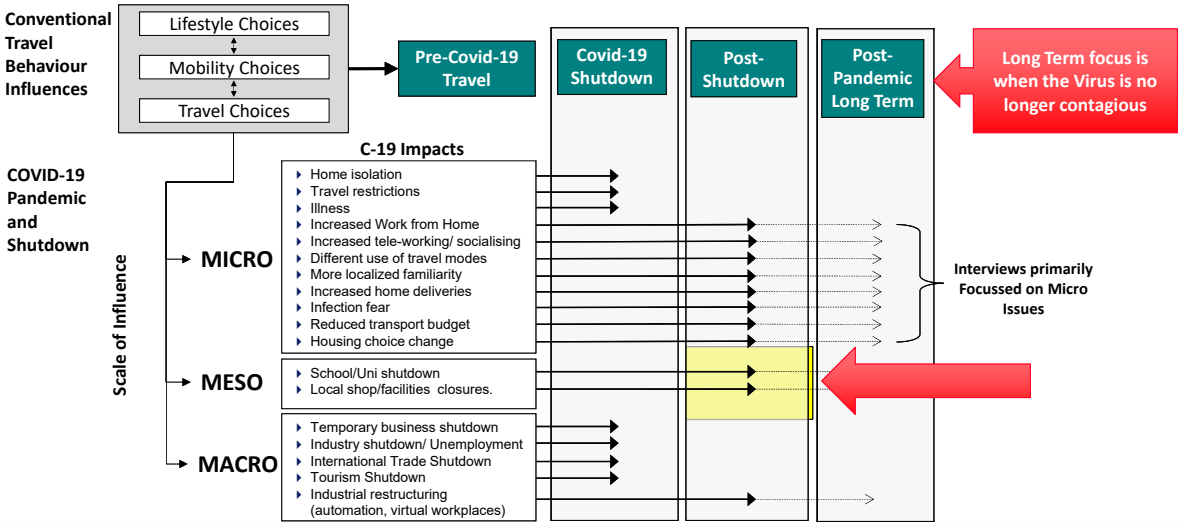
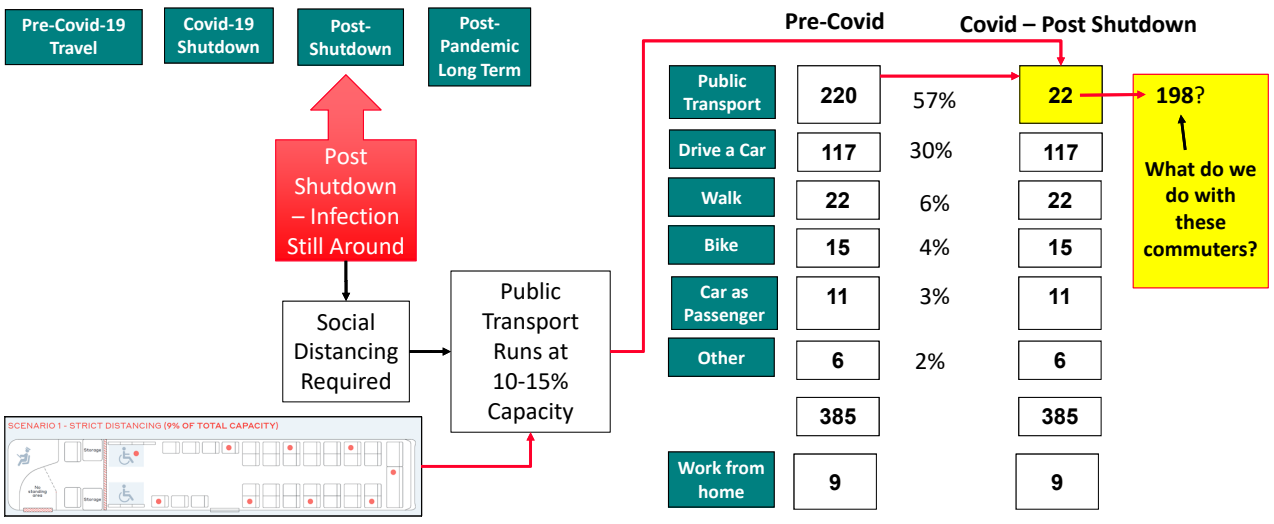


Note: This framework is developed by the research team from a review of previous research literature and also from a workshop with staff from the Victorian Department of Transport

MESO EFFECT – Post Shutdown – we need to find a new way to manage 51% of all travel to central Melbourne – how we do this and how long it lasts might affect long term travel impacts

MESO EFFECTS



Source: WSP – Public Transport and COVID-19, 2020

Commute To Work – City of Melbourne (000)

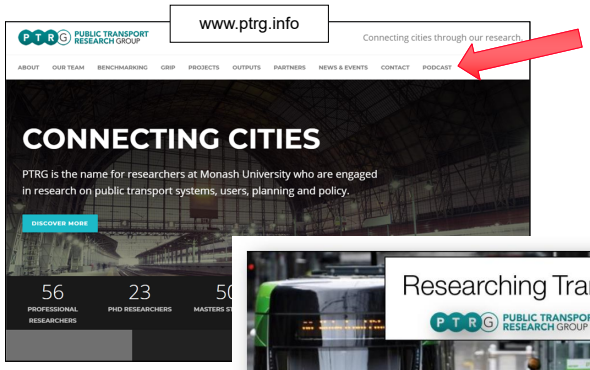
	Pre-Covid		Covid – Post Shutdown
Public Transport	220	57%	22
Drive a Car	117	30%	117
Walk	22	6%	22
Bike	15	4%	15
Car as Passenger	11	3%	11
Other	6	2%	6
	385		385
Work from home	9		9

198?

What do we do with these commuters?

Source: ABS Census Journey to Work 2016

A more detailed discussion of these findings is presented on the RESEARCHING TRANSIT podcast released Monday 25th May



Long Term Impacts of Covid-19 on Travel

Released Monday 25th May