

**THE IMPACTS OF COVID-19 ON TELE-ACTIVITIES, TRAVEL,  
AND PURCHASING BEHAVIORS WEBINAR SERIES**

**WEBINAR #2**

**Impacts of the COVID-19  
Pandemic on Person-Trips  
and Tele-Activities  
(Part 1)**

**July 15, 2020 • 11AM EST**



Cara Wang

Michael Maness

**With a brief introduction from Prof. José Holguín-Veras**

# Mechanics of the Seminar

- The webinar is being recorded, the link to it will be sent out to participants and posted, in a few days at: <https://cite.rpi.edu/index.php/training-and-outreach/>
- Audio options:
  - Use Webex to receive the audio (PRIMARY method)
  - Dial 1-415-655-0001, access code 733 020 237
  - Refer to confirmation email for local number
- Submit questions using the Q&A feature – they will be answered at the end of the webinar



# Outline

- Introduction (José Holguín-Veras)
- Preliminary Findings (Cara Wang)
- Discussion (Michael Maness)
- Questions and Answers



# Introduction and Research Framework



José Holguín-Veras

William H. Hart Professor

Director of the VREF Center of Excellence for Sustainable  
Urban Freight Systems

Rensselaer Polytechnic Institute

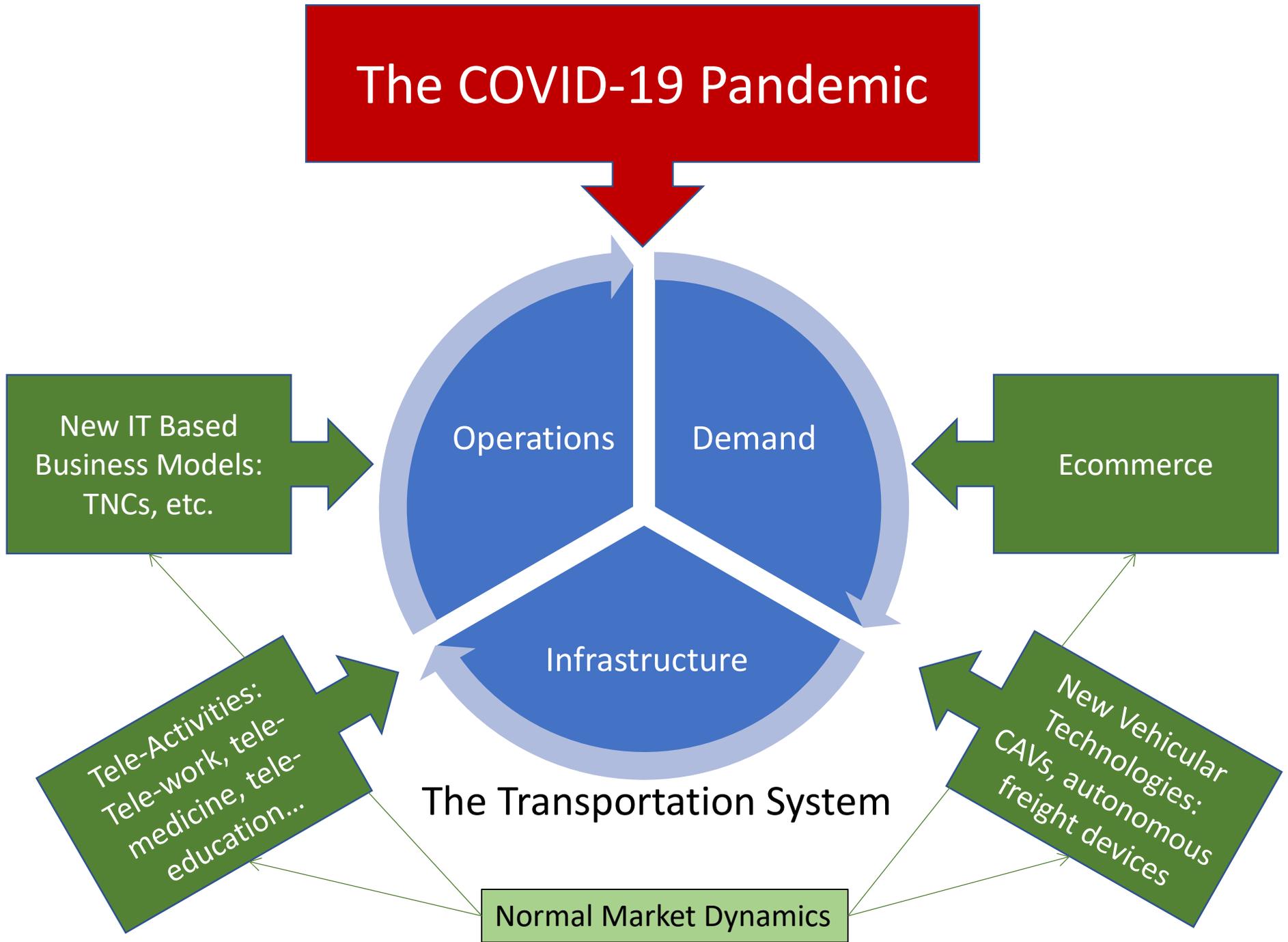
[jhv@rpi.edu](mailto:jhv@rpi.edu)

# Background

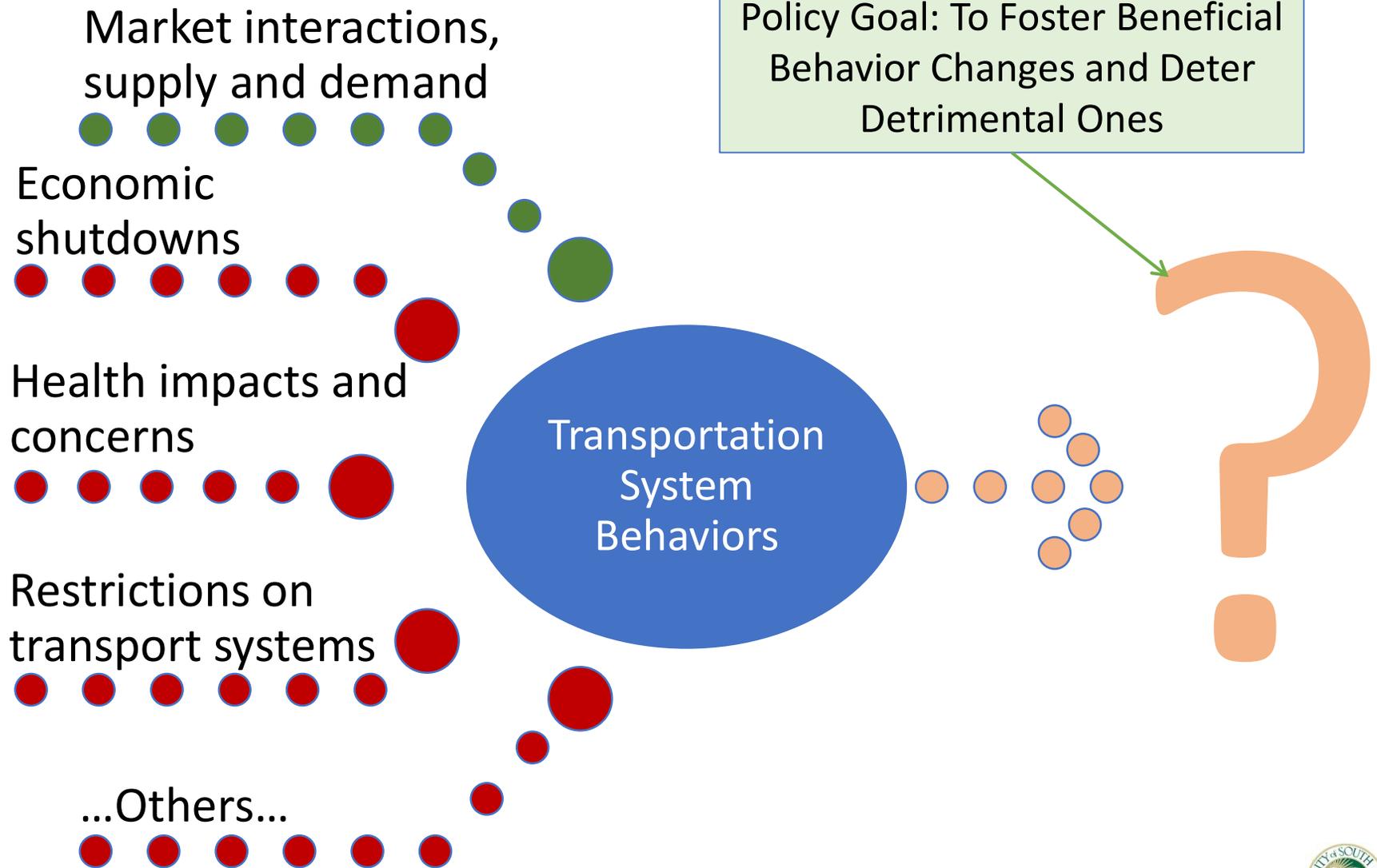
- The COVID-19 pandemic has had tremendous impacts on the entire world:
  - Large portions of local, regional, and national economies has been shutdown at times;
  - Communities and Individuals have been severely impacted
    - More than 12.8 million individuals caught the disease
    - More than 566 thousand deaths
  - Transportation activity has been curtailed to slow down the spread of the disease
  - Behaviors of transportation users dramatically changed



# The COVID-19 Pandemic



# Research Goal: To Support Policy



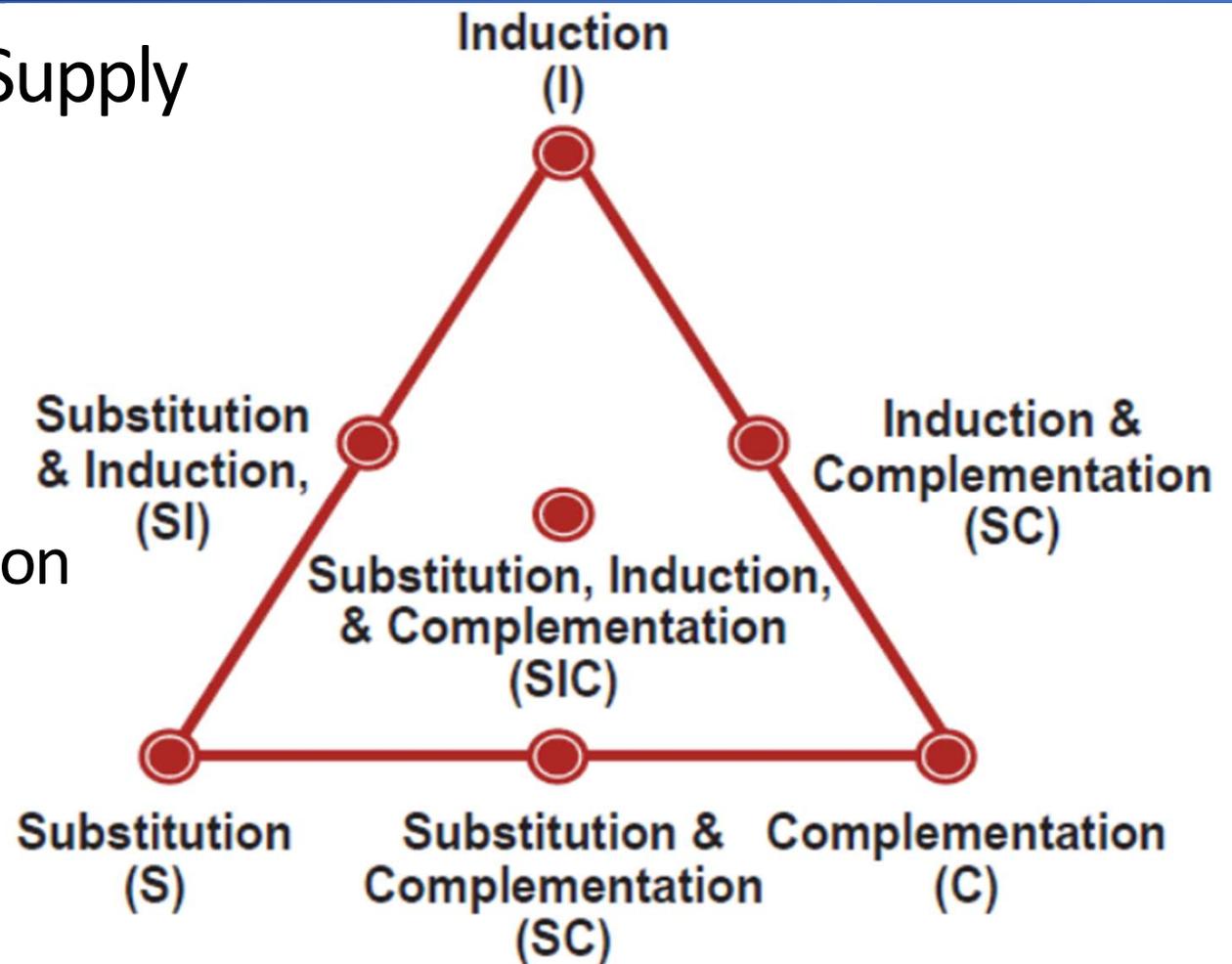
# Implication #1: The Need to Explicitly Consider Disaster Effects

- The study of changes in user behavior must consider the joint effects of:
  - The market dynamics present when the pandemic struck
  - The effects of the pandemic on user behavior
- Major challenges:
  - Lack of understanding of disaster behaviors
  - Large disasters prompt emergent behaviors, many without parallel in normal conditions, which suddenly appear (and vanish after a while):
    - Volunteerism, altruism, etc.
    - Convergence (of people, information, and materiel) to the disaster
    - Disaster Related Buying Behaviors AKA “Panic Buying”
  - COVID-19 may be different, because of its duration
    - Some behaviors may persist over time



# Implication #2: The Need to Consider Behavior Complexity

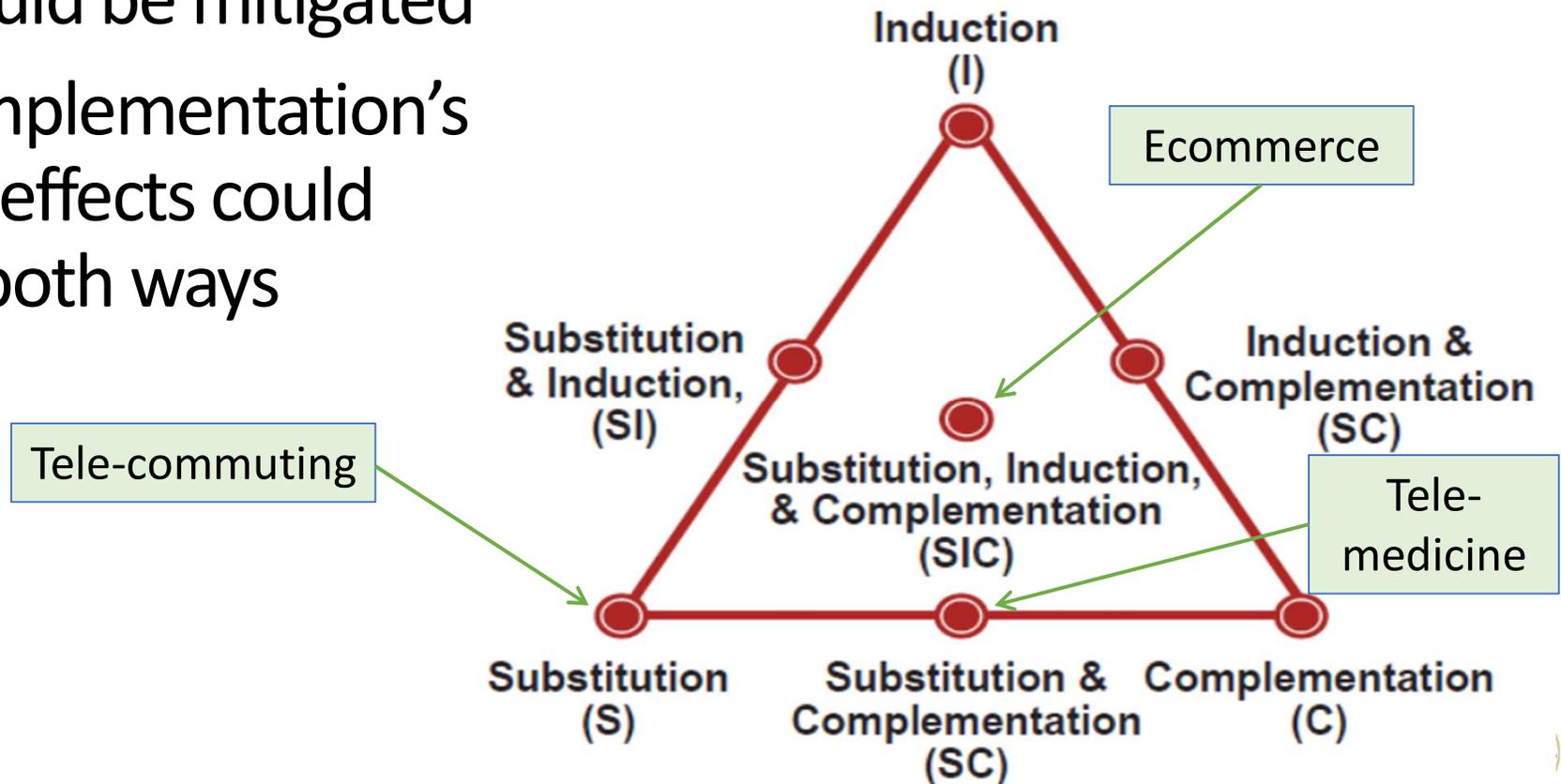
- Co-Evolution of Supply and Demand
- Demand:
  - Substitution
  - Induction
  - Complementation



After Holguín-Veras, J. et al. J. (2006). The Impacts of Time of Day Pricing on the Behavior of Freight Carriers in a Congested Urban Area: Implications to Road Pricing. *Transportation Research Part A: Policy and Practice*, 40(9), 744-766. <http://www.sciencedirect.com/science/article/pii/S0965856405001801#>

# Taxonomy of Impacts

- Substitution of transportation for tele-activities is beneficial
- Induction of transportation activity is not good and should be mitigated
- Complementation's net effects could go both ways



# Survey Design

- Travel Activity
  - Changes in travel patterns due to the pandemic and how people expect to travel after restrictions are fully lifted
- Shopping Activity
  - How people shop in stores and online and the effects of the pandemic
- Telecommuting and Online Activities
  - How working from home and online activities were affected by the pandemic
- Socio-demographic Information
  - Individual information
  - Household information
  - Zip code – to be linked to regional information



# Survey Process

- Observations collected using Amazon Mechanical Turk and SurveyMonkey
- Two rounds of data collection
- 1163 observations total → 938 after cleaning
- Additional waves of data will be collected



# Key Variable Distributions

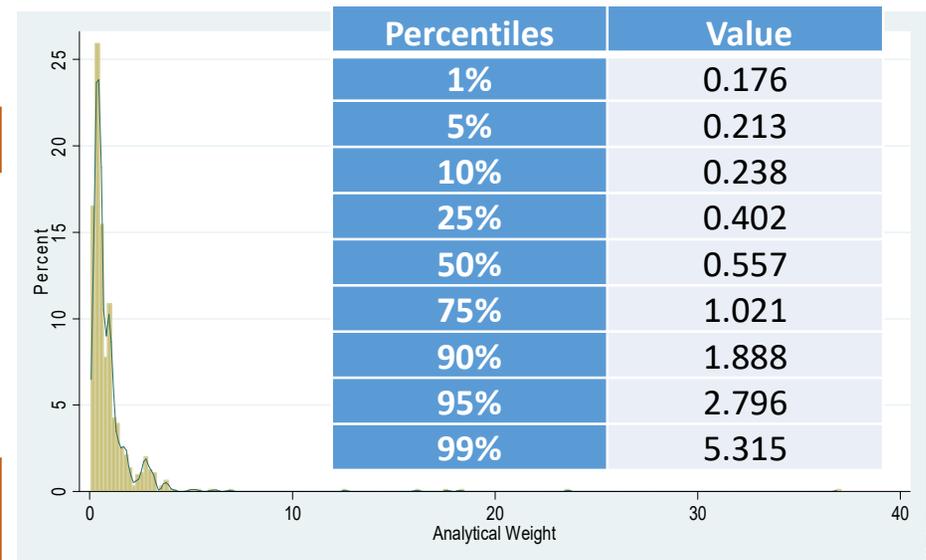
Category	Sample	Population
Less than high school	0.5%	12.0%
High School graduate	34.8%	45.0%
Associate degree	18.4%	13.0%
Bachelor's degree	34.3%	19.0%
Master's or PhD	11.9%	11.0%

Category	Sample	Population
<25	6.1%	12.1%
25~35	28.8%	17.8%
35~45	25.1%	16.4%
45~55	14.0%	16.4%
55~65	16.8%	16.6%
>=65	9.3%	20.6%

Category	Sample	Population
Female	47.2%	50.3%
Male	52.2%	49.4%

## Weighting-IPF with Population Distributions

Category	Sample	Population
Less than \$14,999	6.1%	10.6%
\$15,000 - \$24,999	9.0%	9.0%
\$25,000 - \$34,999	12.0%	8.9%
\$35,000 - \$49,999	18.7%	12.4%
\$50,000 - \$74,999	21.1%	17.4%
\$75,000 - \$99,999	13.0%	12.6%
\$100,000 - \$149,999	14.1%	15.0%
\$150,000-\$199,999	3.5%	6.6%
\$200,000 and above	2.6%	7.6%



# Preliminary Findings



Cara Wang

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# Outline

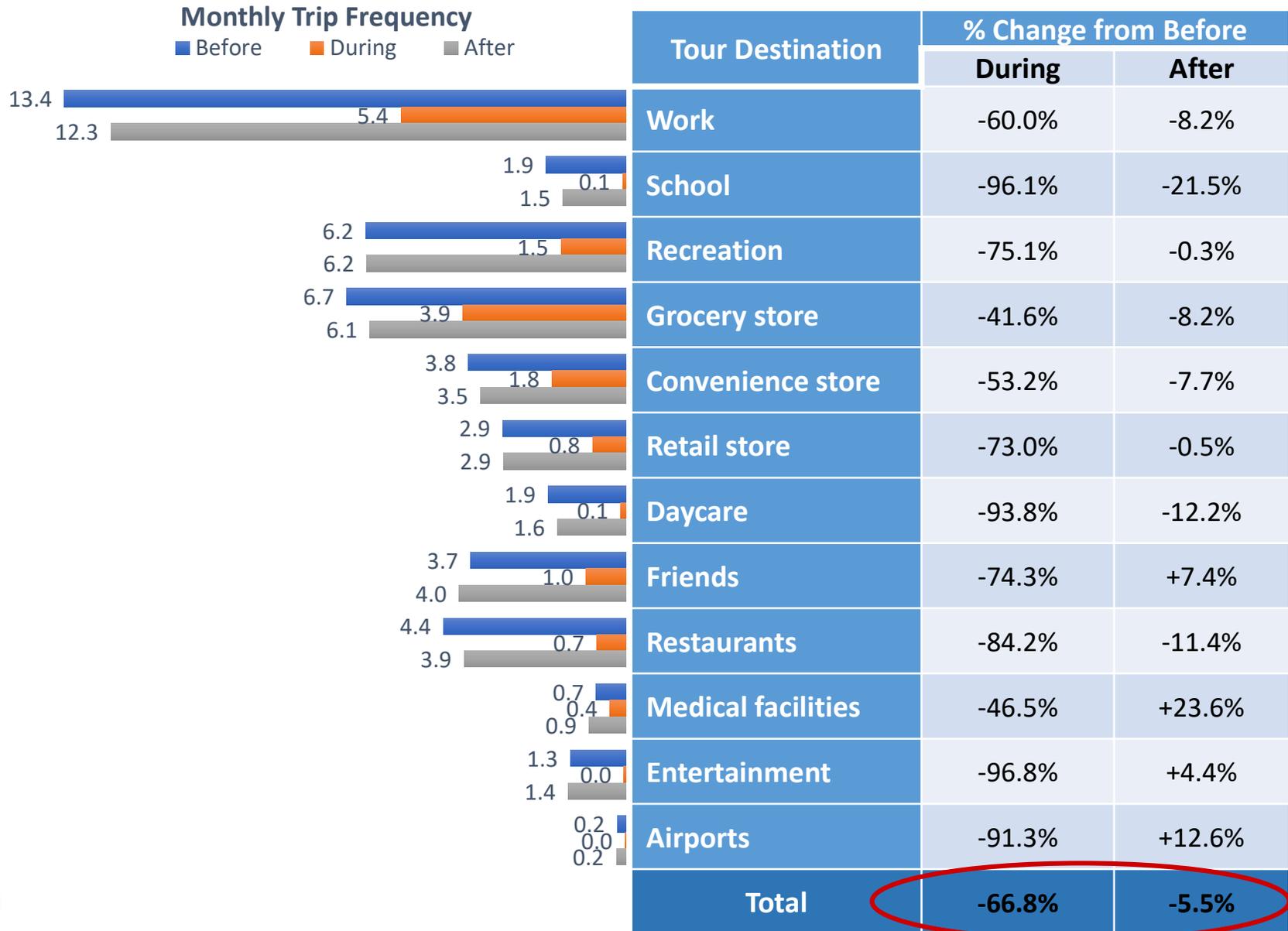
- Overview
  - Travel patterns
  - Tele-activities
- Relationship between travel and tele-activities
  - Working
  - Social activities
  - Entertainment

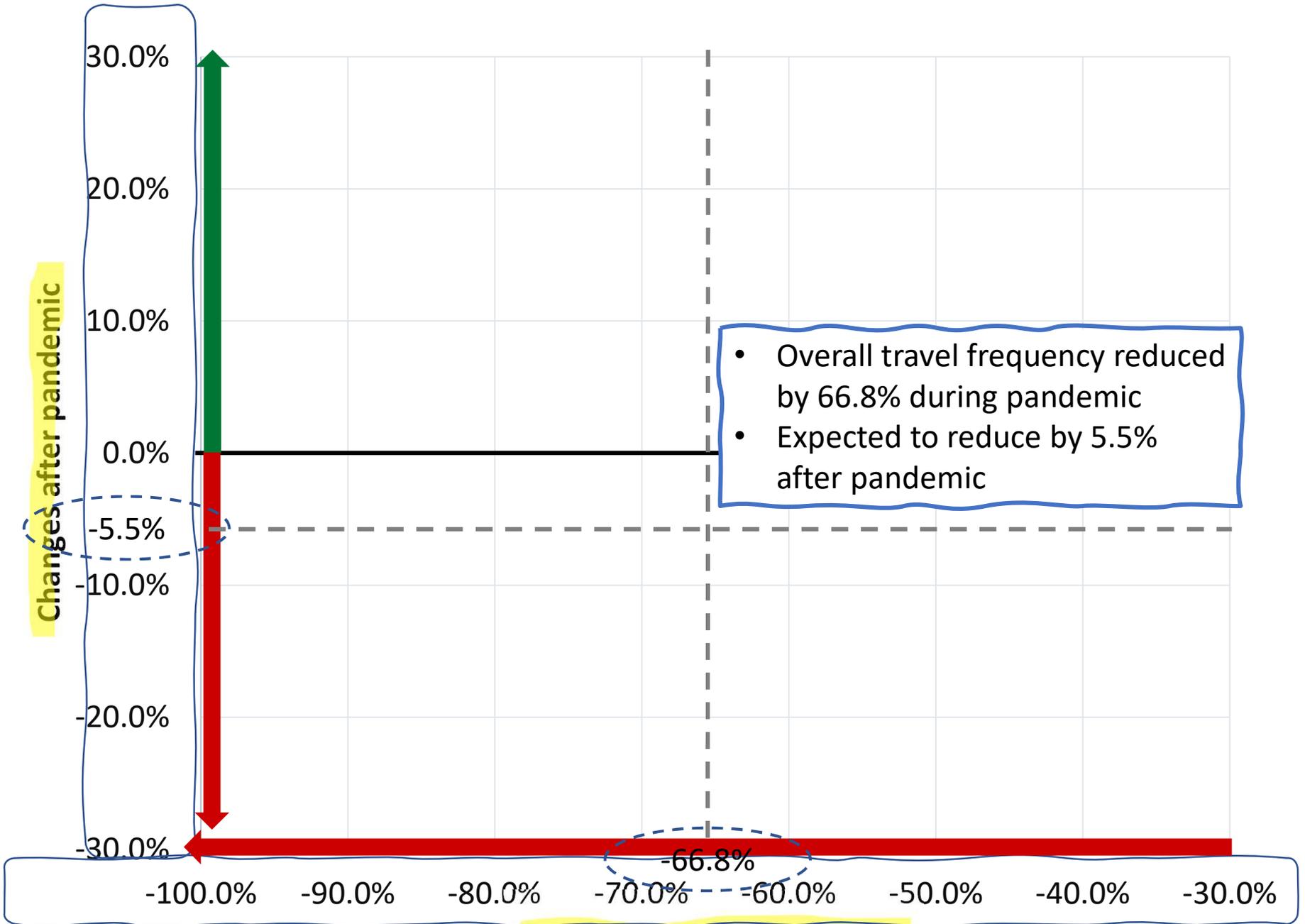


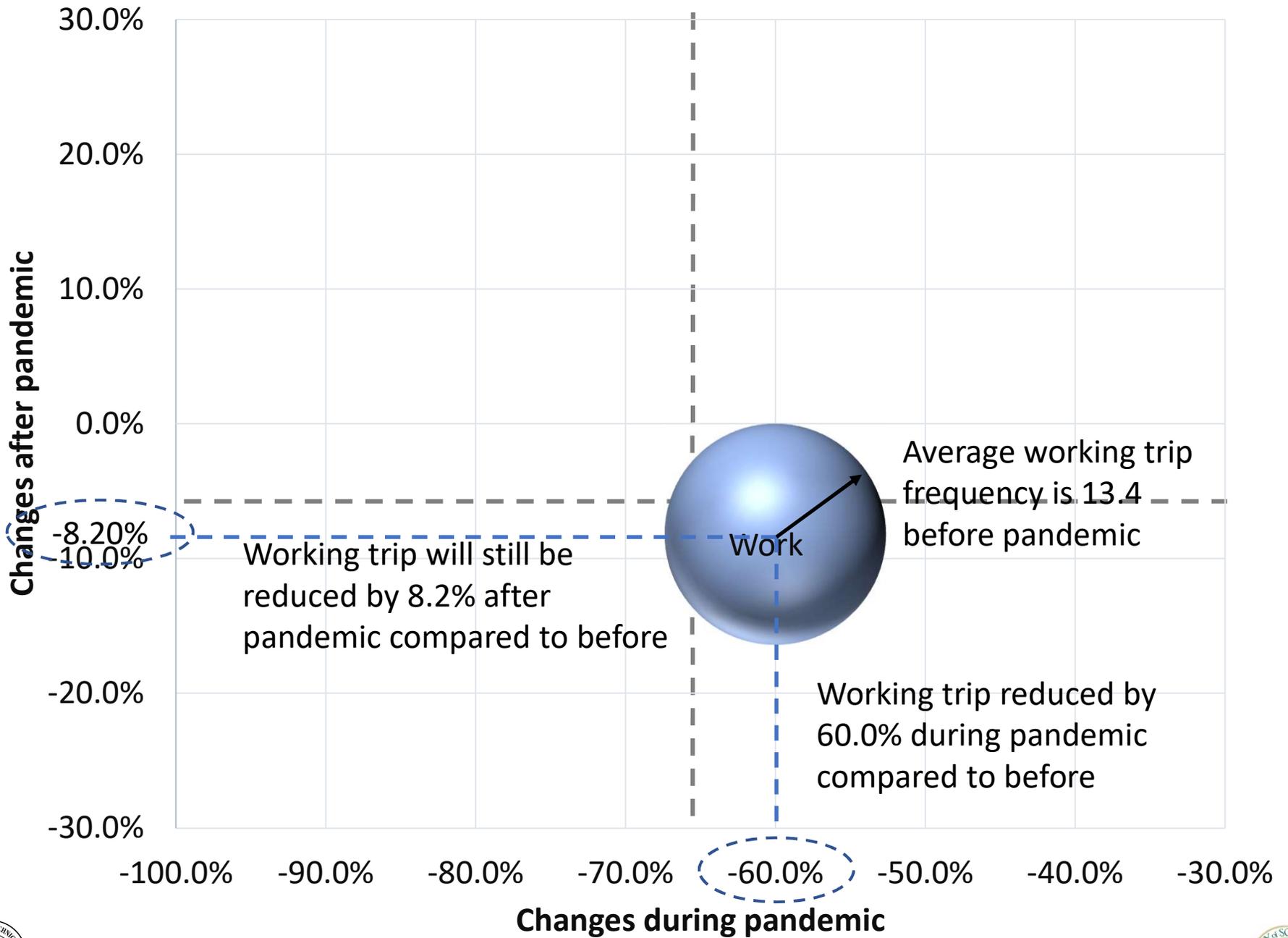
A landscape photograph showing a wide, open field in the foreground, a dense line of trees in the middle ground, and a clear blue sky above. The text 'Overview of Travel Patterns' is overlaid in white on the dark forest area.

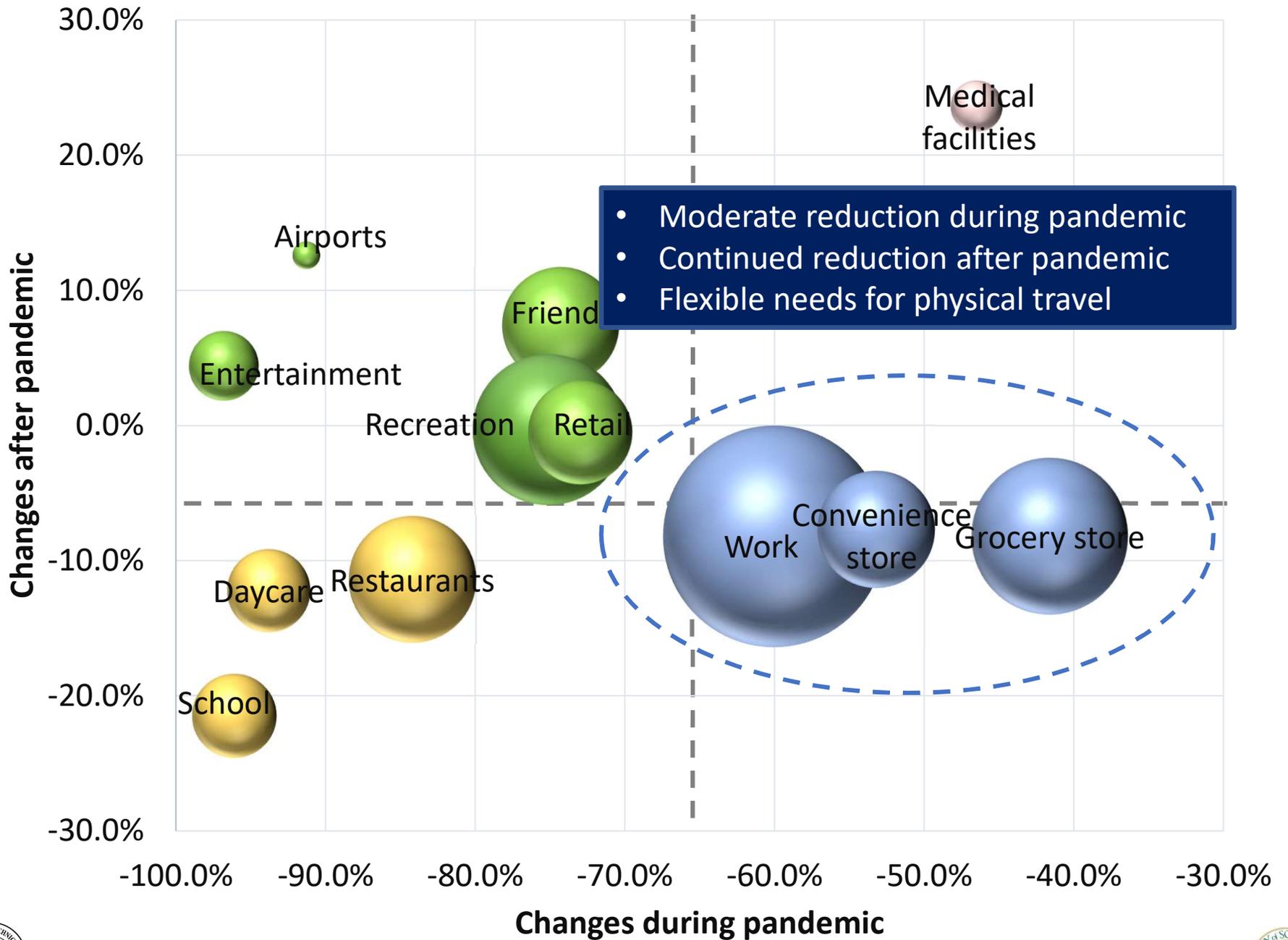
# Overview of Travel Patterns

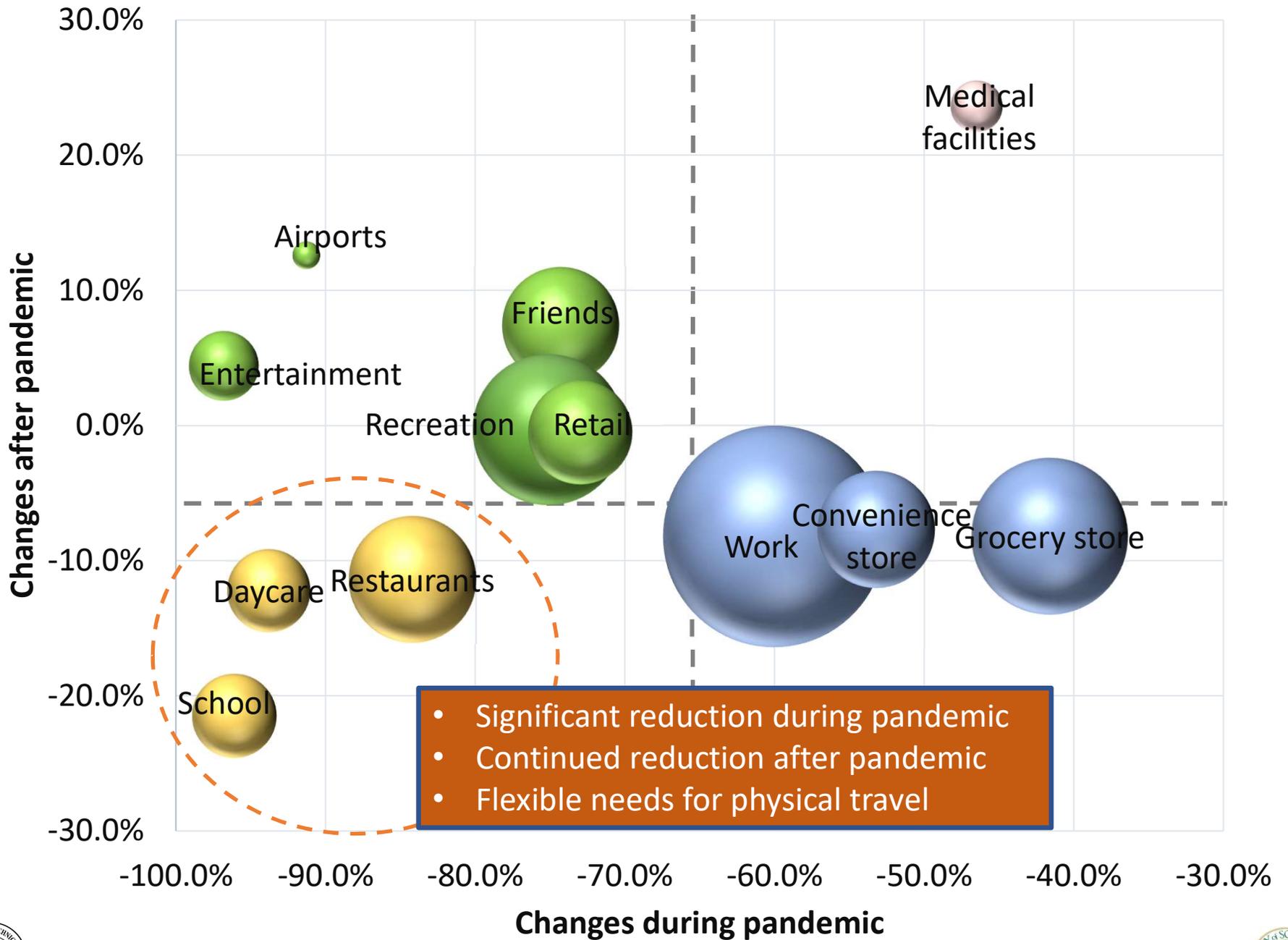
# Trip frequency per month

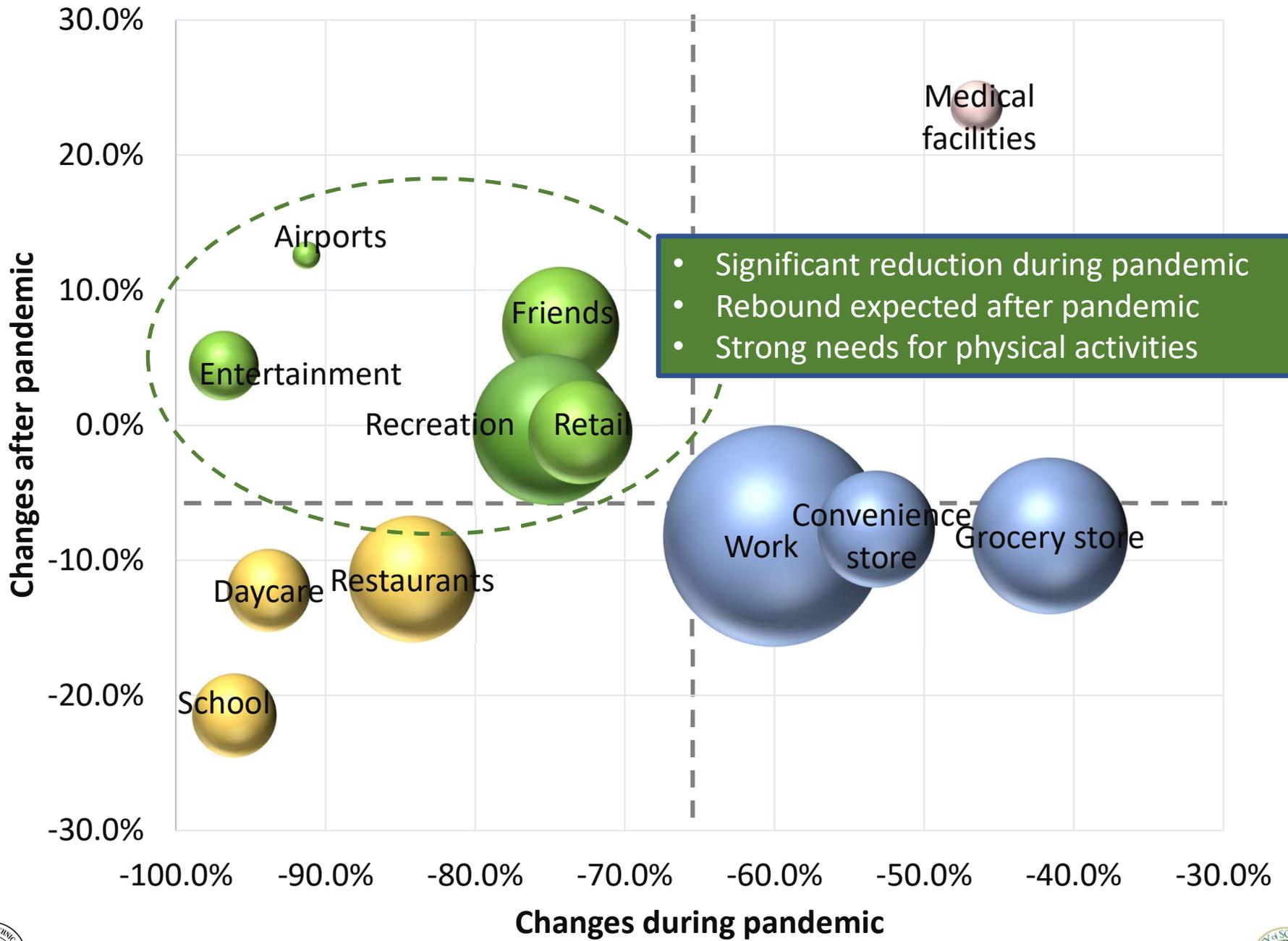


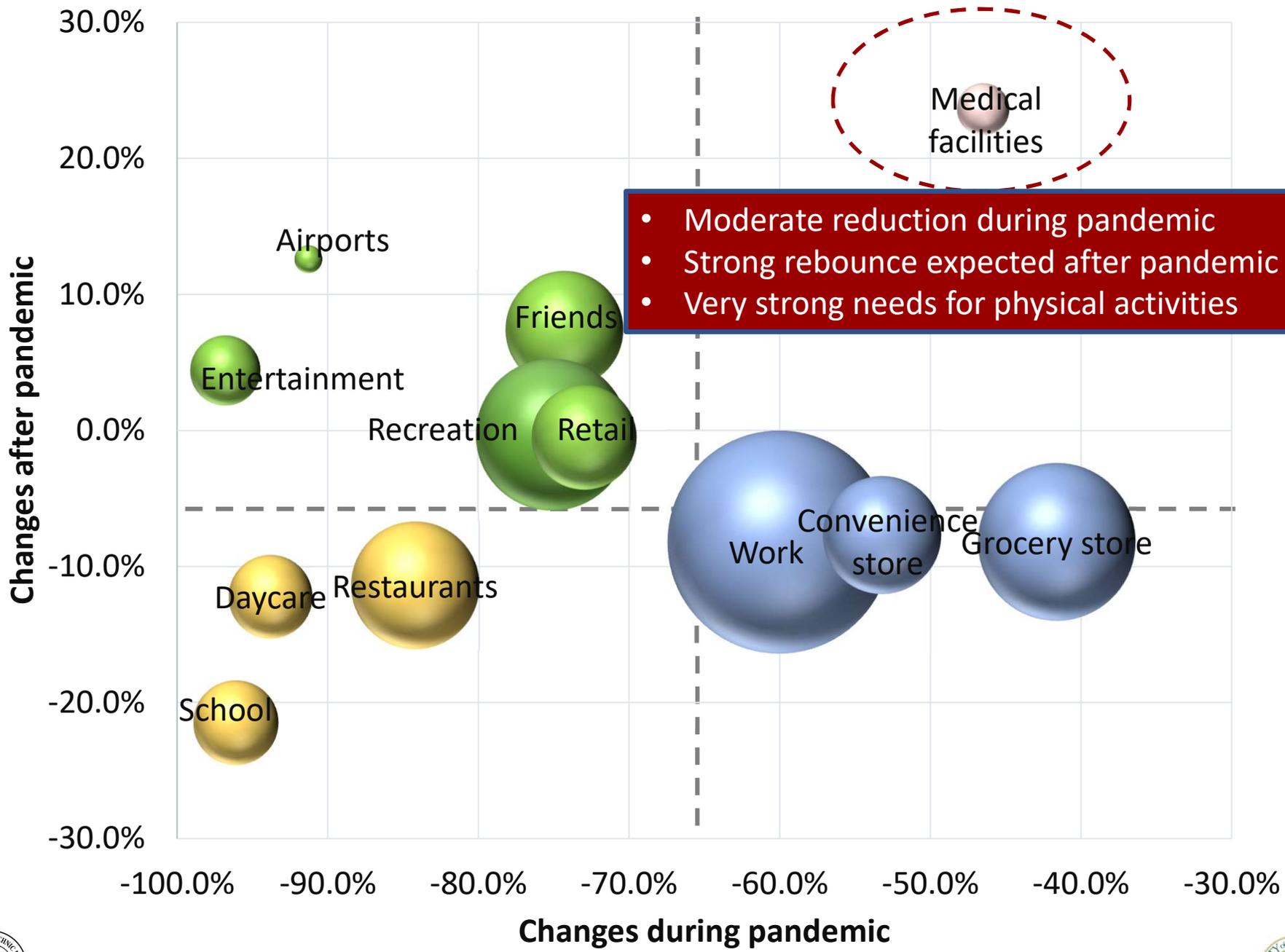












- Moderate reduction during pandemic
- Strong rebound expected after pandemic
- Very strong needs for physical activities

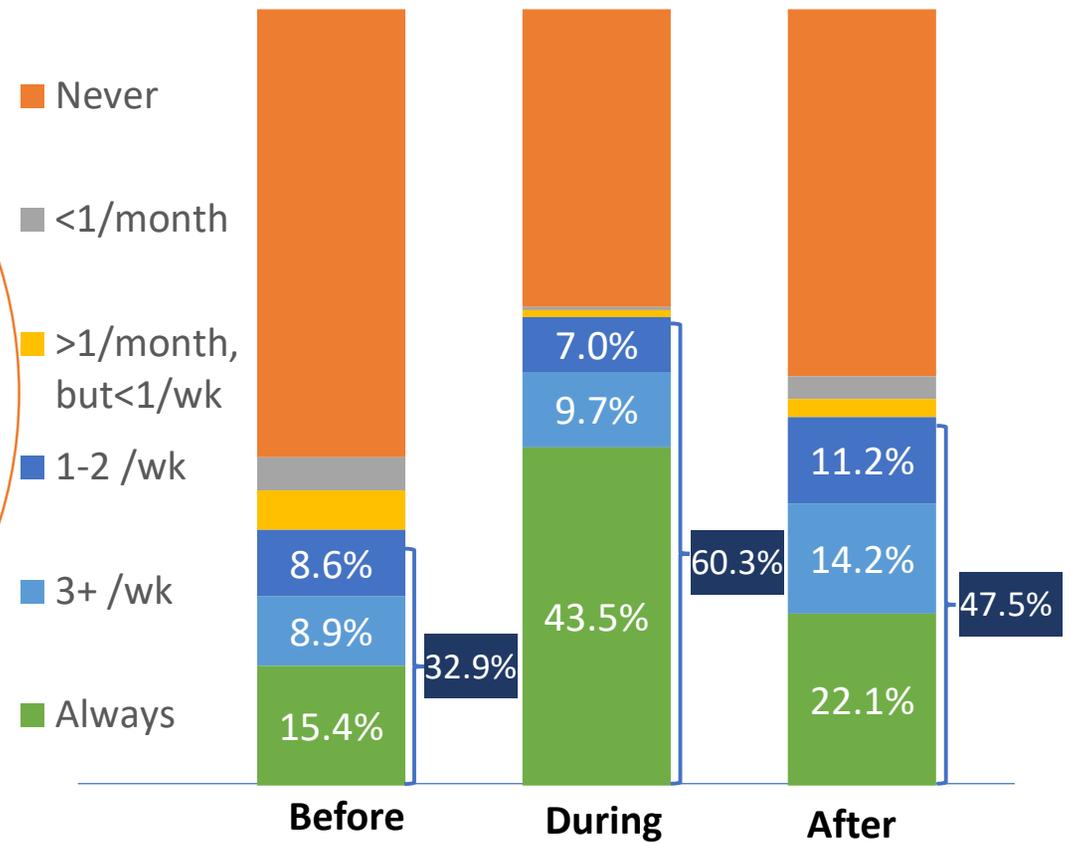
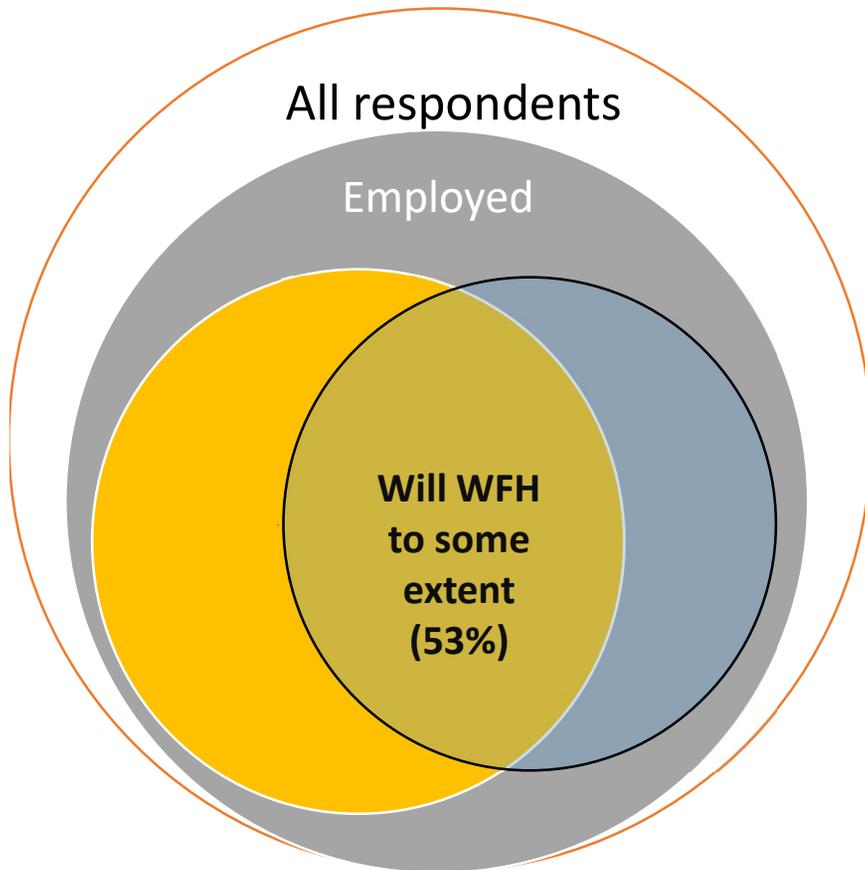


A landscape photograph showing a wide, open field in the foreground, a dense line of trees in the middle ground, and a clear blue sky above. The text "Overview of Tele-Activities" is overlaid in white on the dark forest area.

# Overview of Tele-Activities

# Remote working

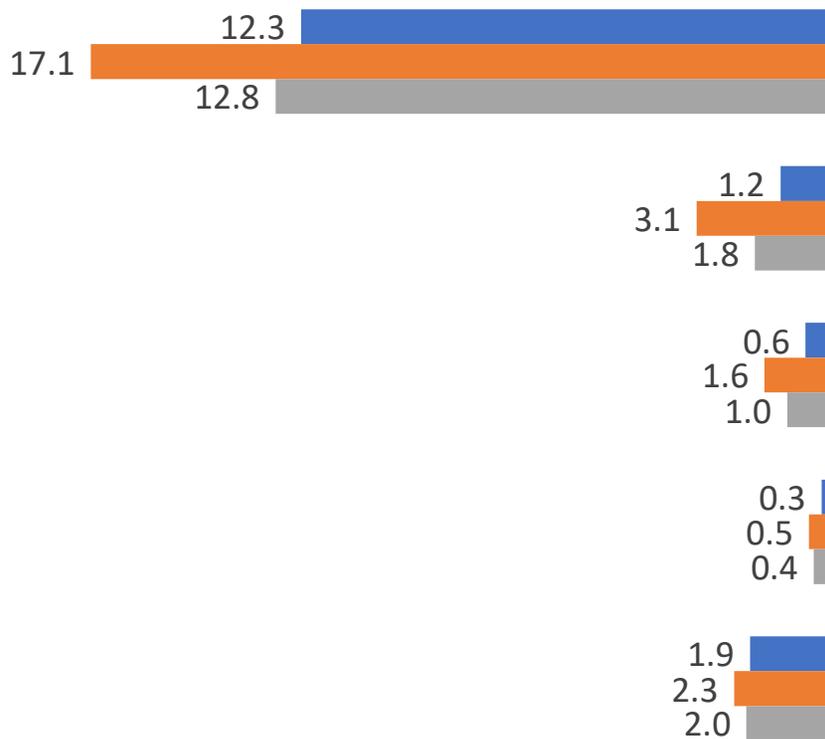
Distribution of WFH frequency for employed in different stages



# Weekly hours spent on tele-activities

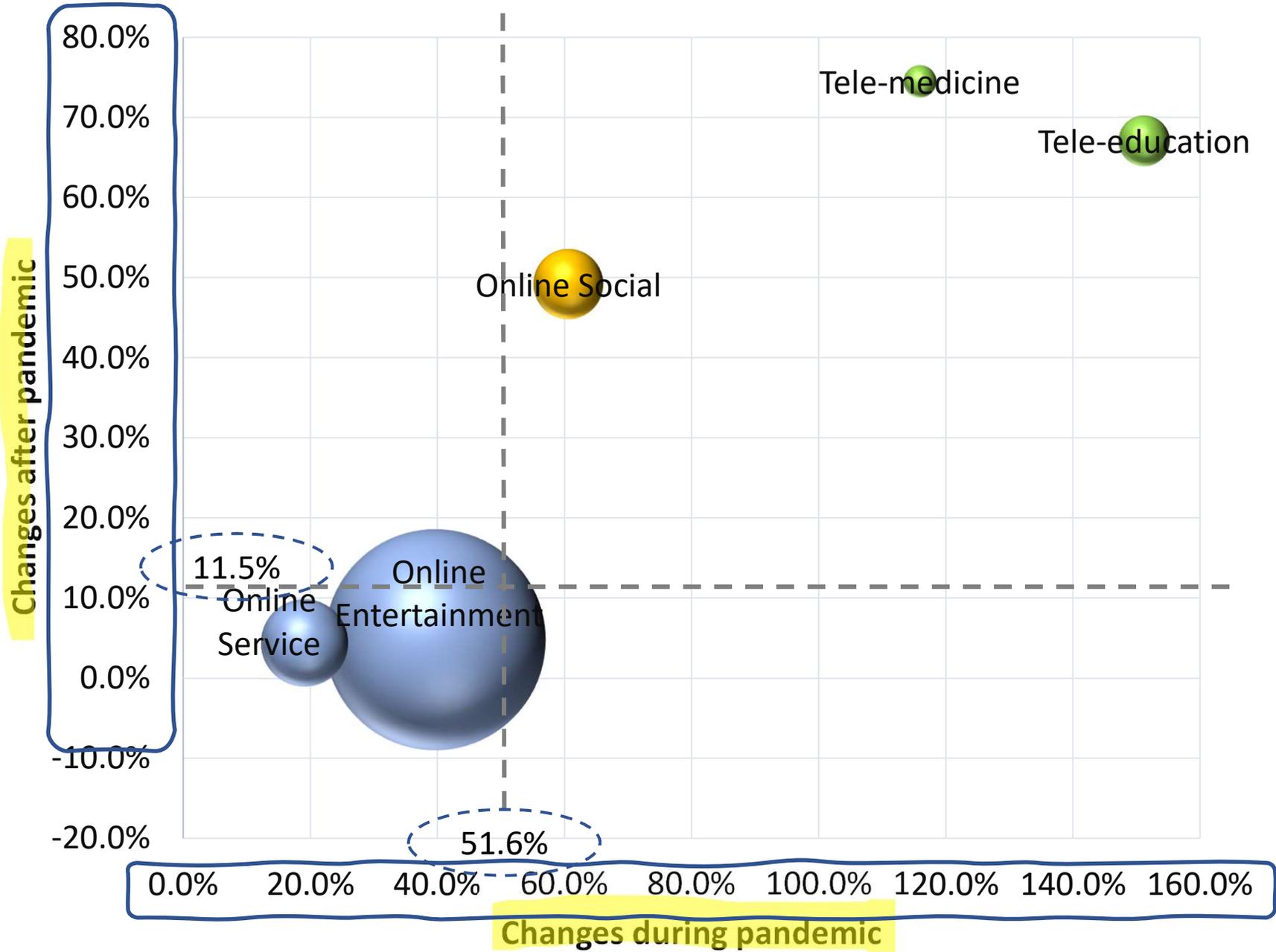
Hours spent on tele-activities (per week)

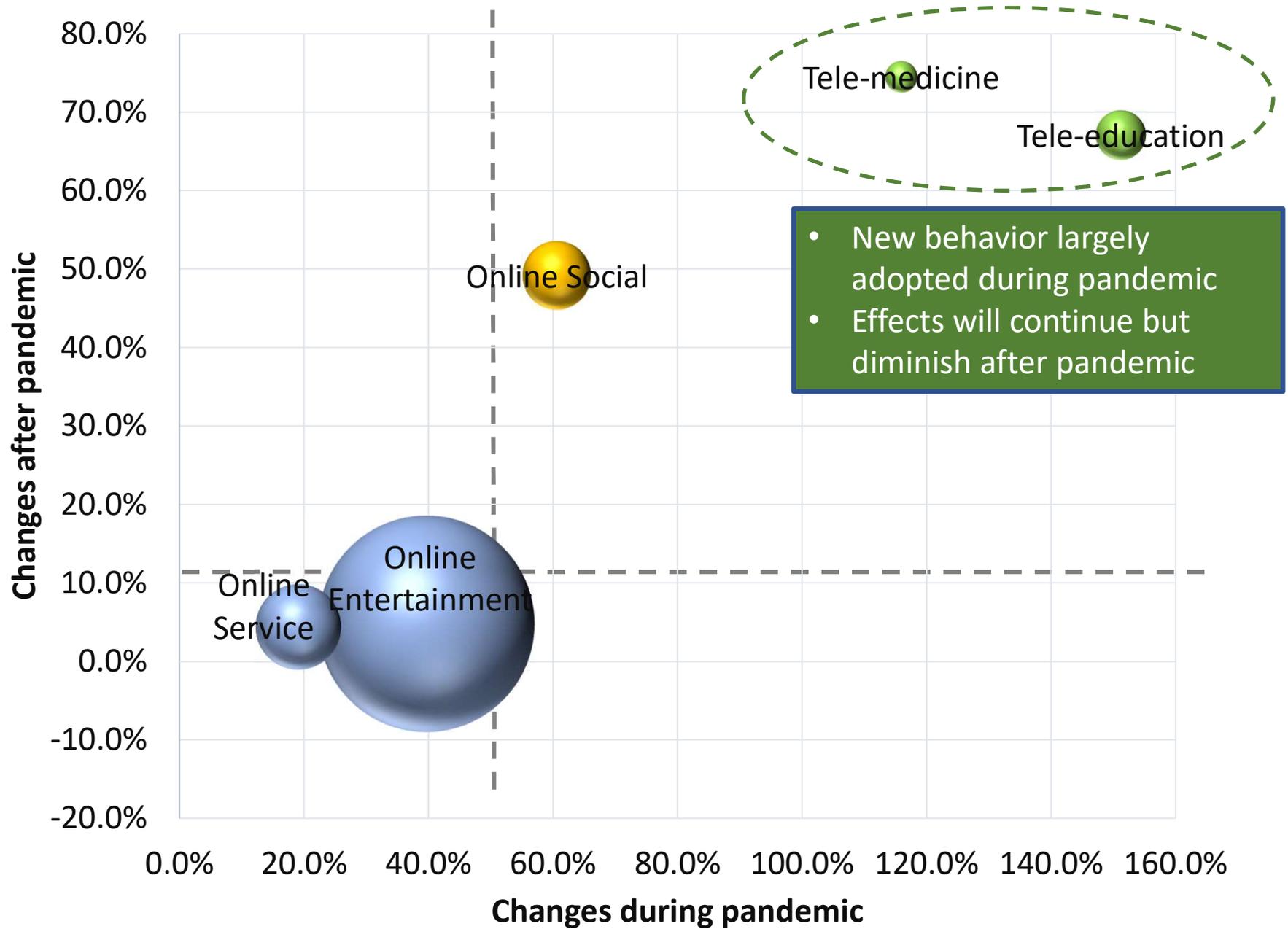
■ Before ■ During ■ After

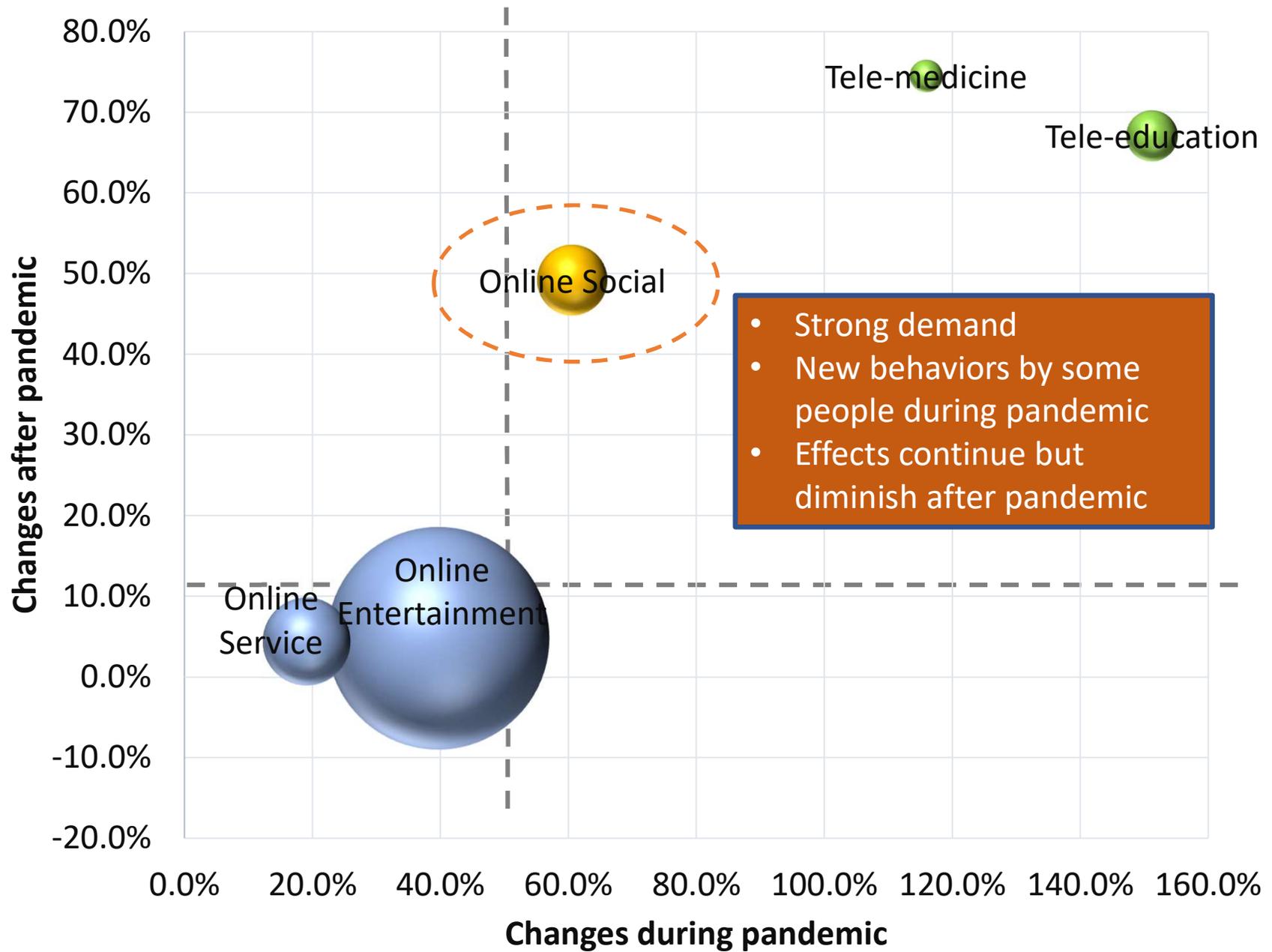


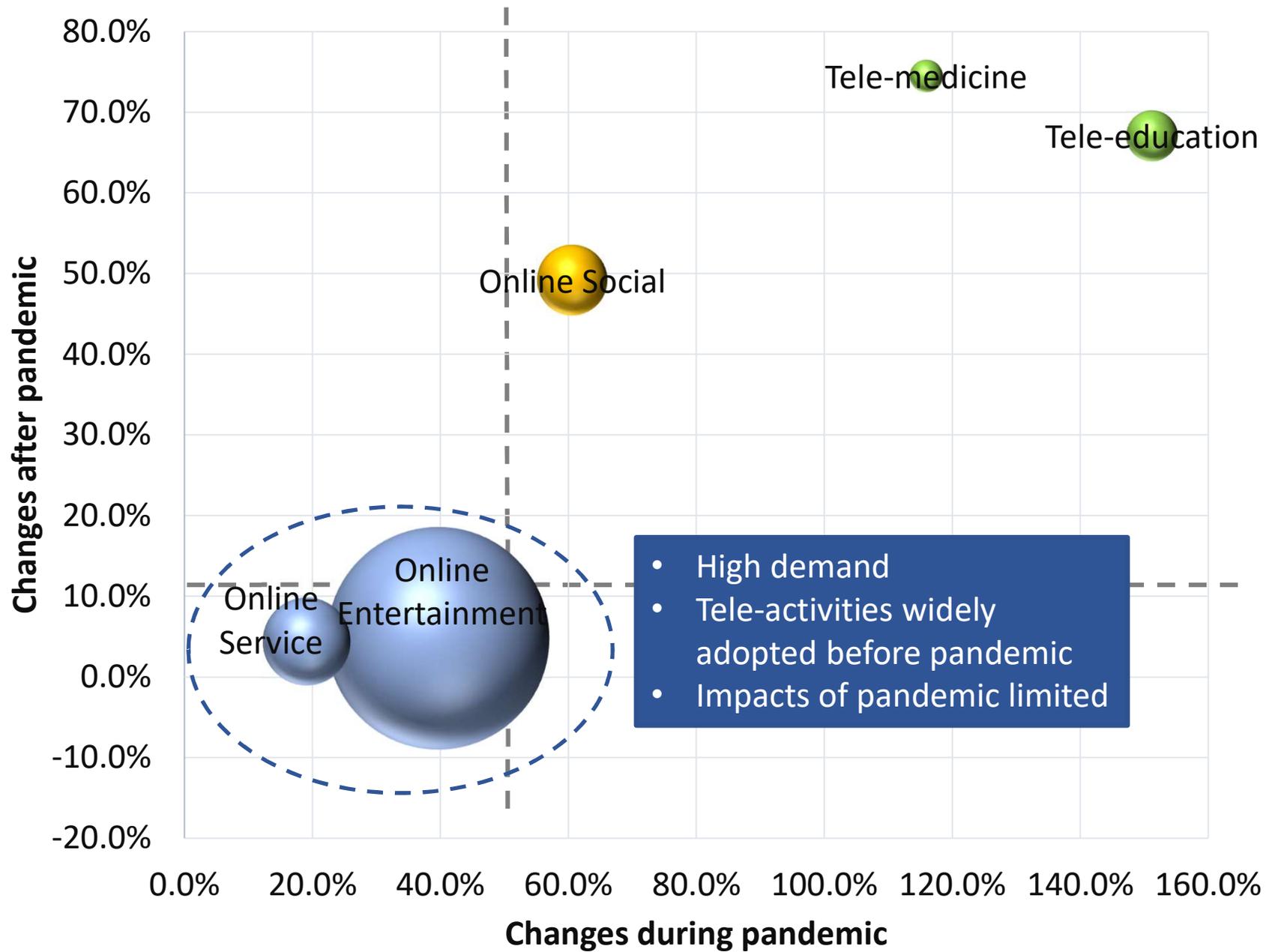
Type of activities	% Change from Before	
	During	After
Online Entertainment	+39.6%	+4.8%
Online Social	+60.6%	+49.2%
Tele-education	+151.2%	+67.1%
Tele-medicine	+115.9%	+74.5%
Online Service	+19.1%	+4.4%
<b>Total</b>	<b>+51.6%</b>	<b>+11.5%</b>





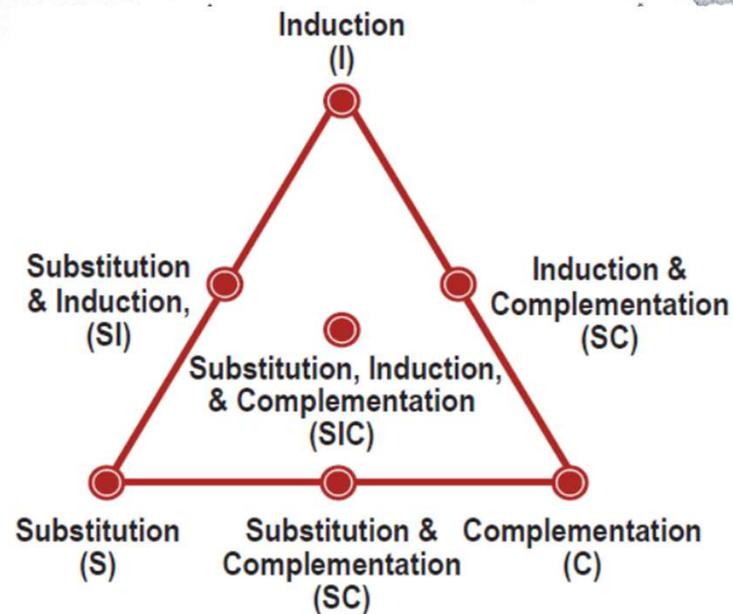








# Relationship between Travel and Tele-Activities



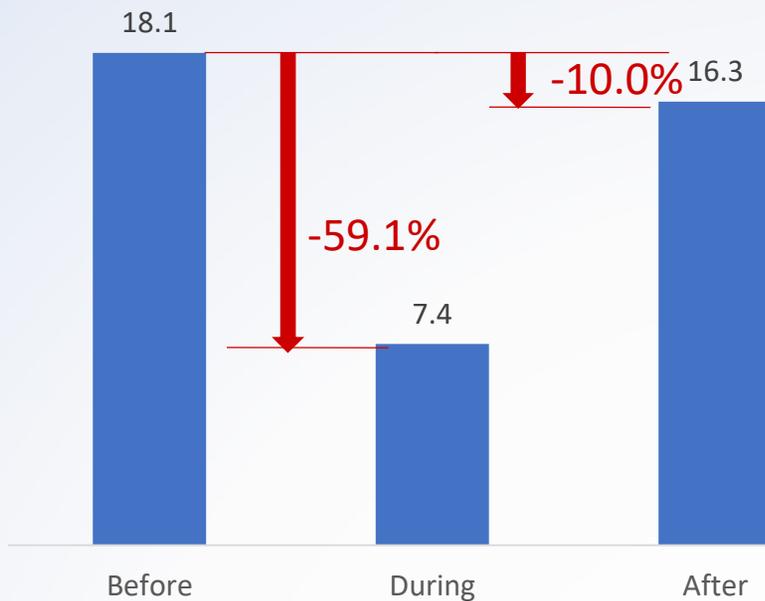


**Working**

# Working trips vs Remote working

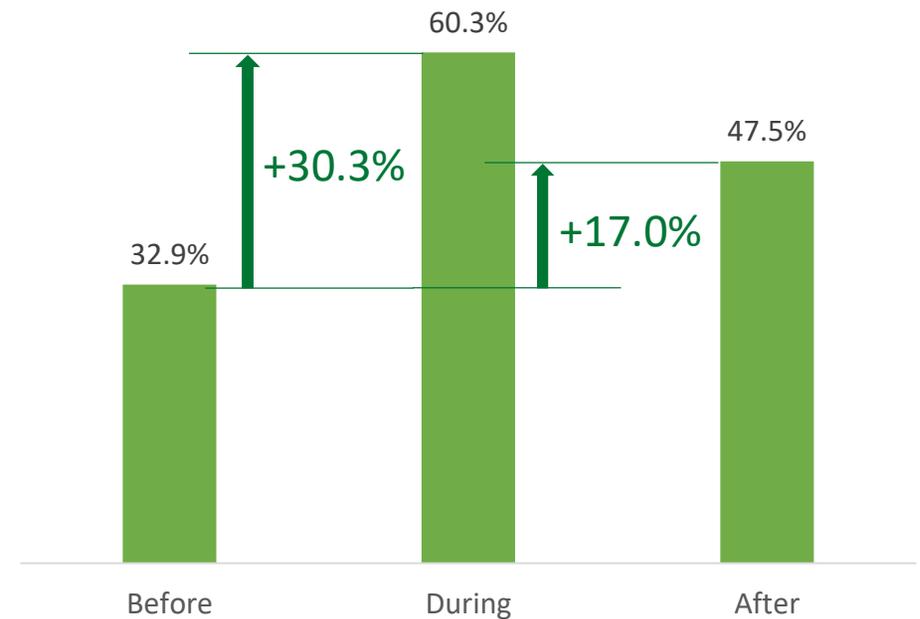
## Working trips

Monthly working trip frequency for employed



## Remote working

Percentage of Workers WFH for 1+Day/Week



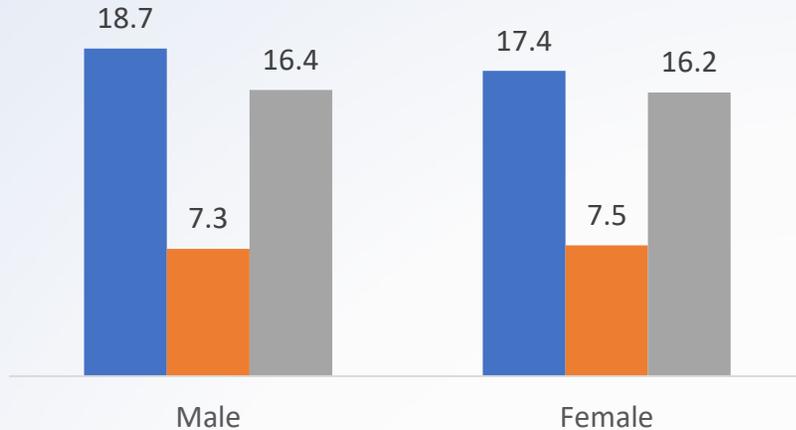
- Working trip and remote working may substitute each other
- Working trips will be less frequent after pandemic
- WFH part of the time after pandemic

# Working by Gender

## Working trips

Monthly working trip frequency

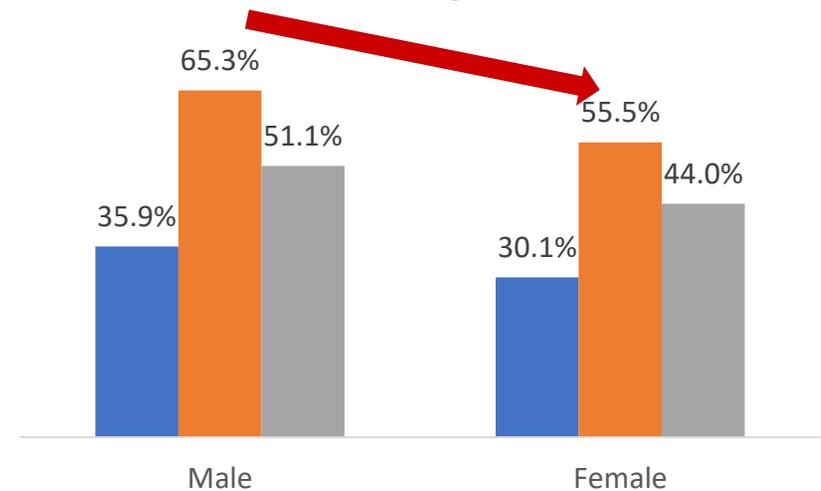
■ Before ■ During ■ After



## Remote working

Percentage of Workers WFH for 1+Day/Week

■ Before ■ During ■ After



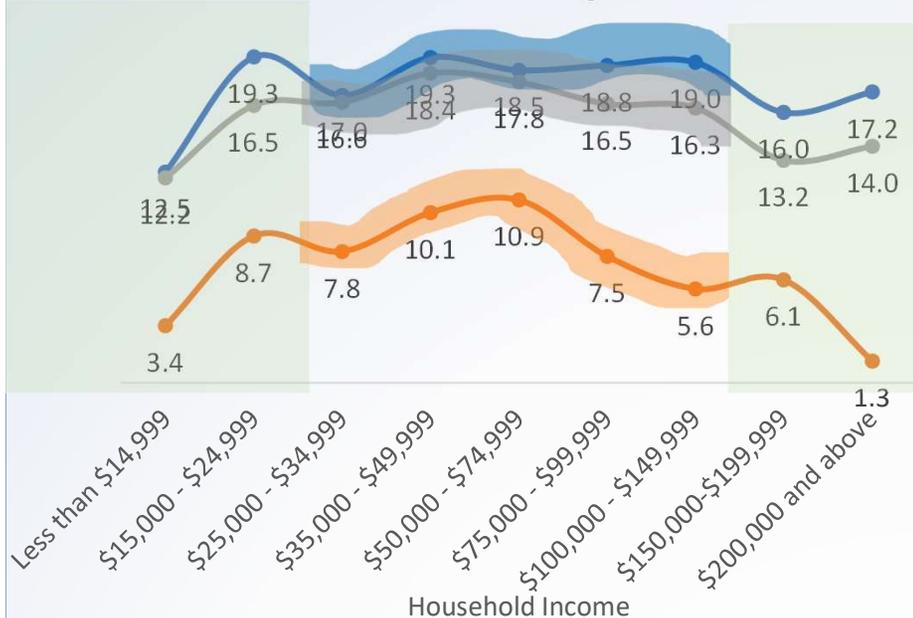
- Working trip frequencies show no significant difference
- Rate of WFH is lower for female
- Similar changing trends during and after pandemic

# Working by Income Level

## Working trips

### Monthly working trip frequency

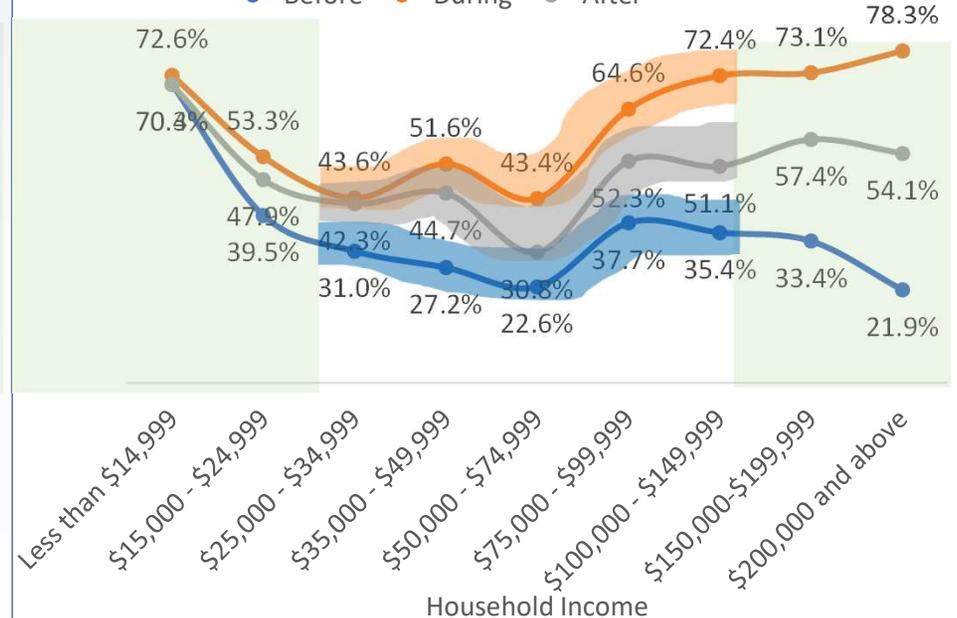
● Before ● During ● After



## Remote working

### Percentage of Workers WFH for 1+Day/Week

● Before ● During ● After



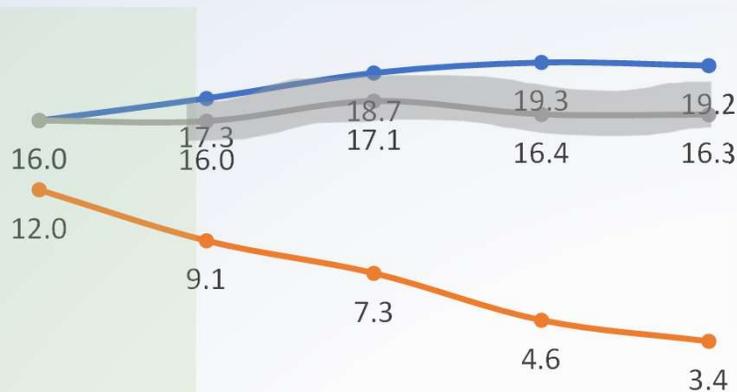
- Working trip frequency and rate of WFH did not differ much before
- Working trip frequency decreases, and rate of WFH increases with income during pandemic
- “After” is in between “before” and “during”

# Working by Education Level

## Working trips

### Monthly Working Trip Frequency

● Before ● During ● After



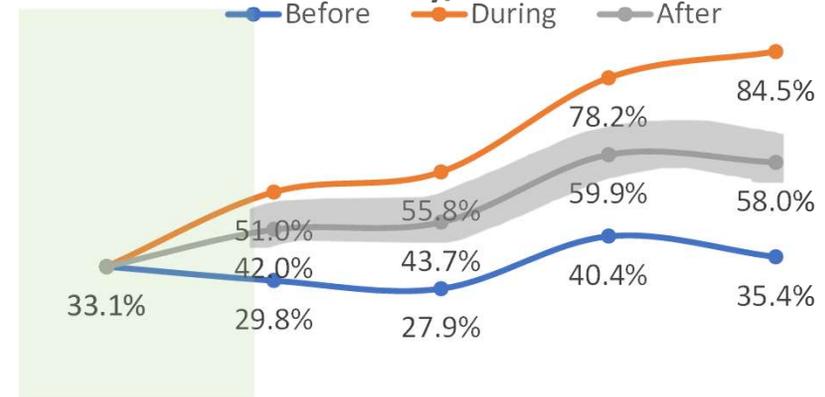
Less than high school graduate    High School graduate    Associate degree    Bachelor's degree    Master's or doctoral degree

## Remote working

### Percentage of Workers WFH for

1+Day/Week

● Before ● During ● After



Less than high school graduate    High School graduate    Associate degree    Bachelor's degree    Master's or doctoral degree

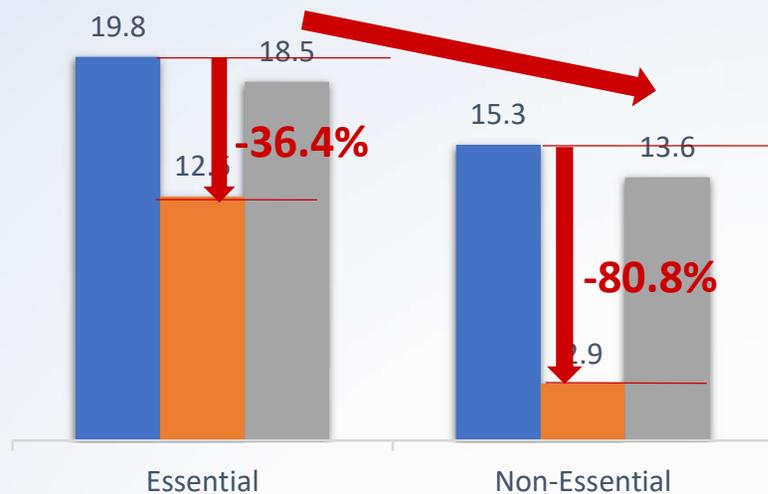
- Before pandemic, both working trip frequency and rate of WFH increases slightly with education level
- Working trip frequency decreases and rate of WFH increases significantly with education level during pandemic.
- The “after” WFH rate is in the middle of “before” and “during.”

# Working by Essential vs Non-Essential

## Working trips

Monthly Working Trip Frequency

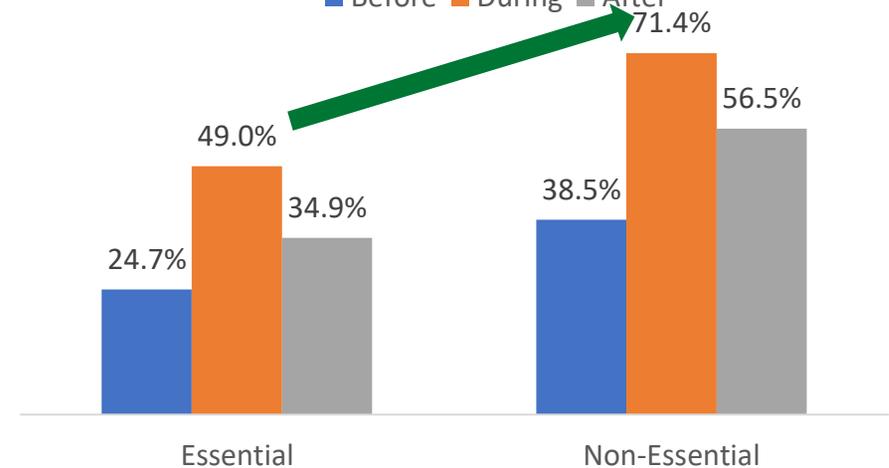
■ Before ■ During ■ After



## Remote working

Percentage of Commuters WFH for 1+Day/Week

■ Before ■ During ■ After



- “Essential” workers generally make more working trips than “non-essential,” and have less flexibility to WFH.
- During pandemic, “essential” workers cannot reduce working trip as much as “non-essential” workers.

# Working by Employment Type

Flexible, remote working highly possible in long term

## Working trips

## Remote working

### Monthly Trip Frequency

■ Before ■ During ■ After

### Employment Type

During After

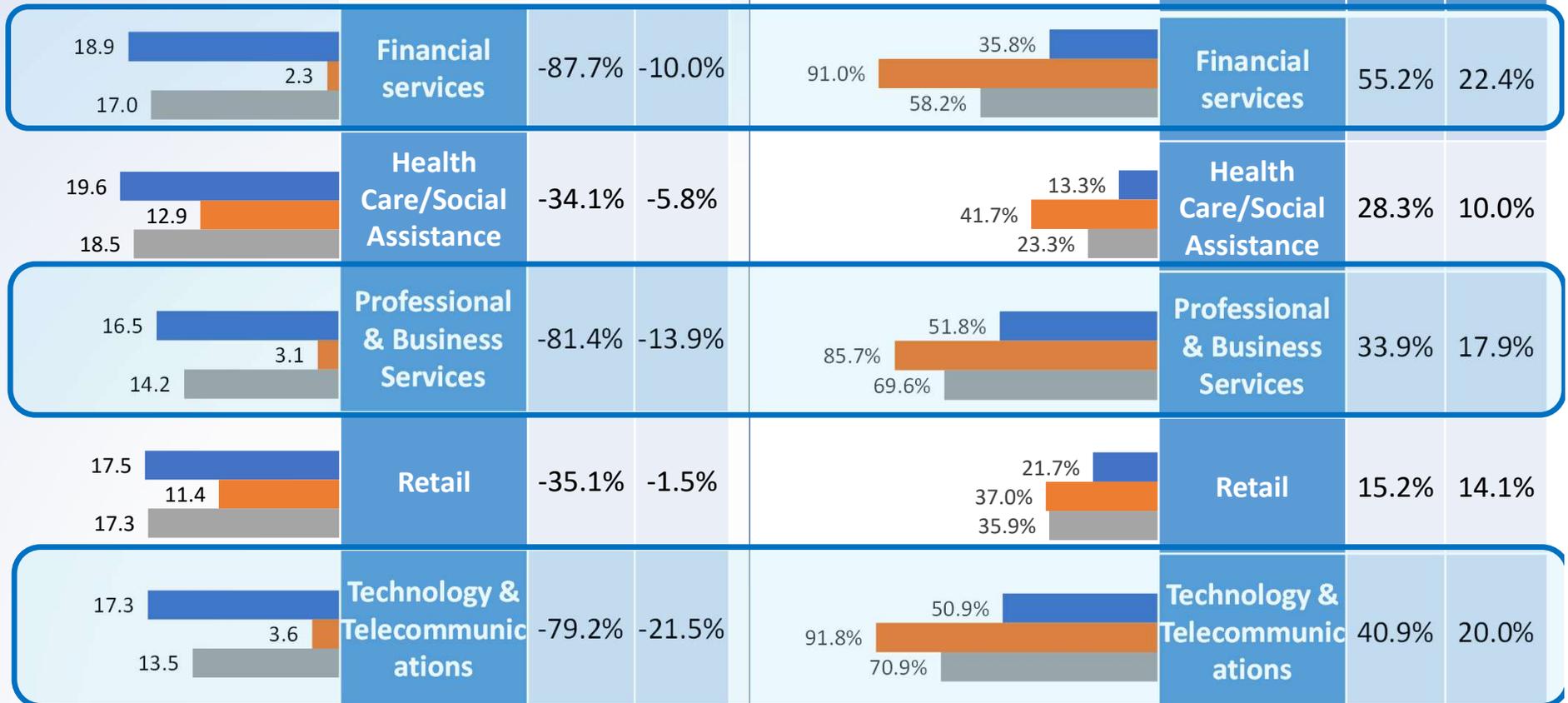
### Percentage of Workers

WFH for 1+Day/Week

■ Before ■ During ■ After

### Employment Type

During After



# Working by Employment Type

Mixture, on-site working largely needed

## Working trips

## Remote working

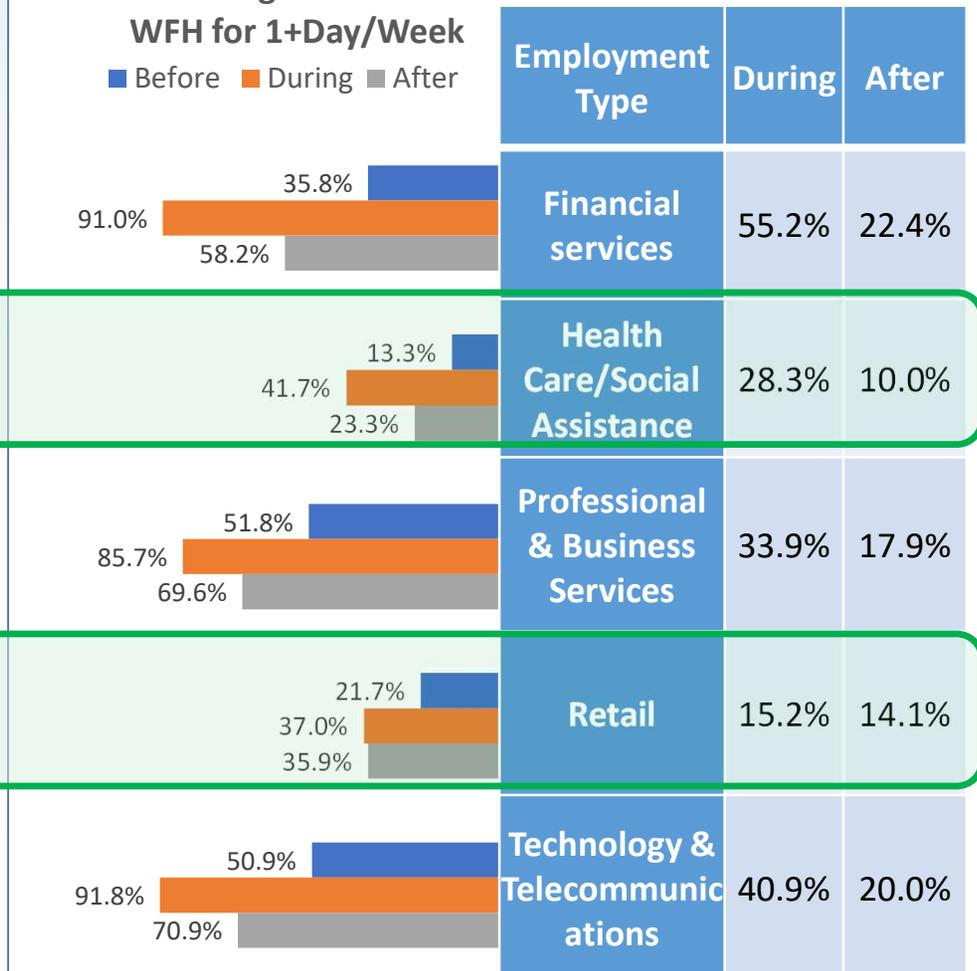
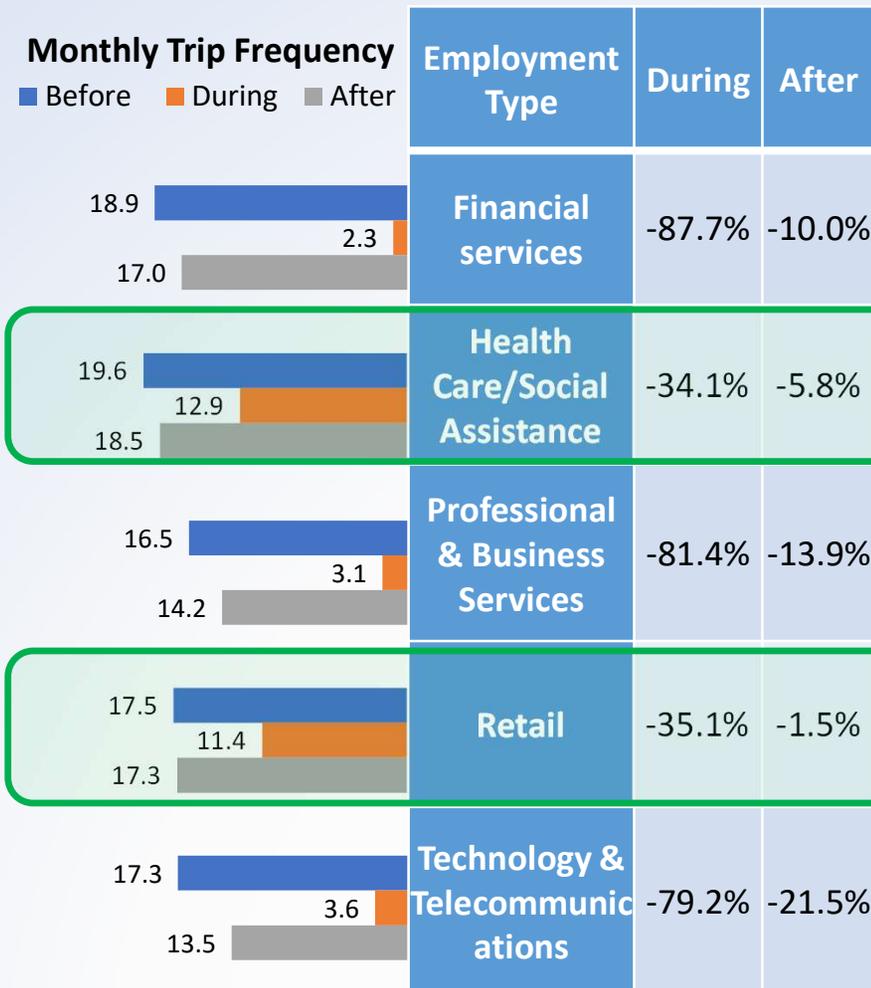
### Monthly Trip Frequency

■ Before ■ During ■ After

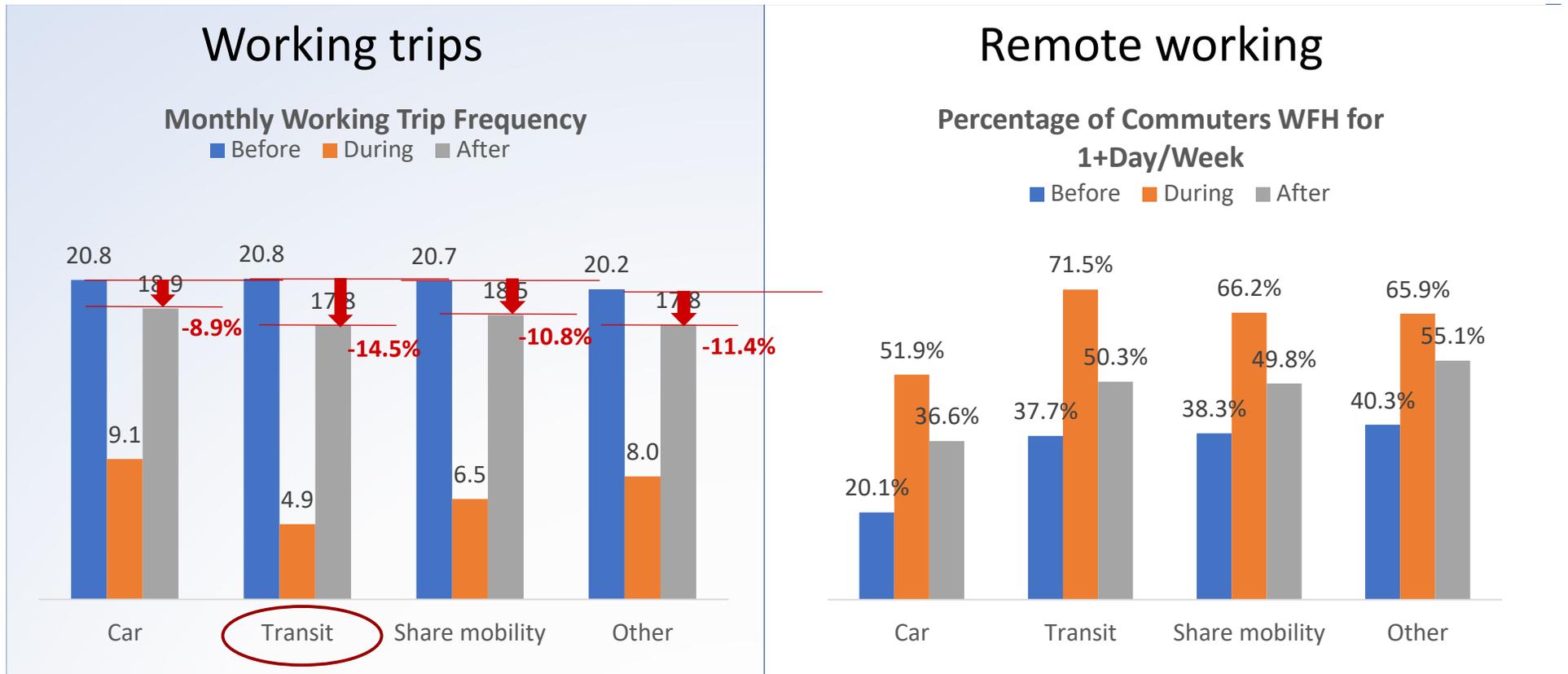
### Percentage of Workers

WFH for 1+Day/Week

■ Before ■ During ■ After



# Working by Commuting Mode



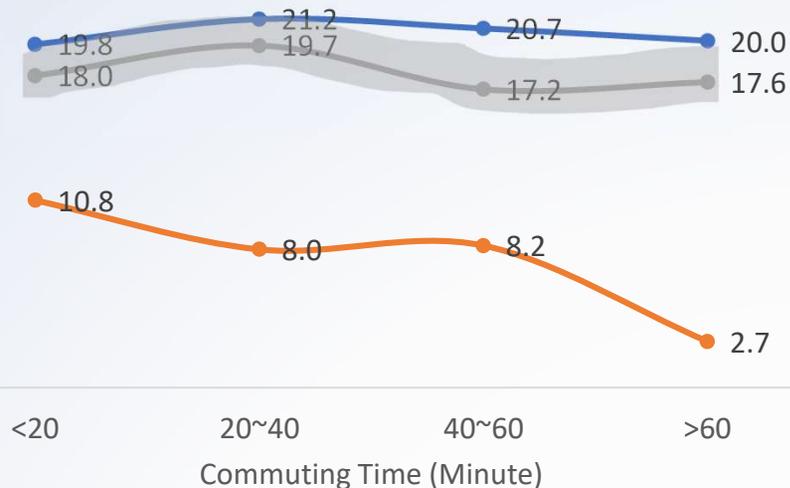
- Before pandemic, working trip frequency almost the same.
- Transit users significantly reduced working trips during pandemic.
- The difference continues to exist after pandemic.

# Working by Commuting Time

## Working trips

### Monthly Trip Frequency

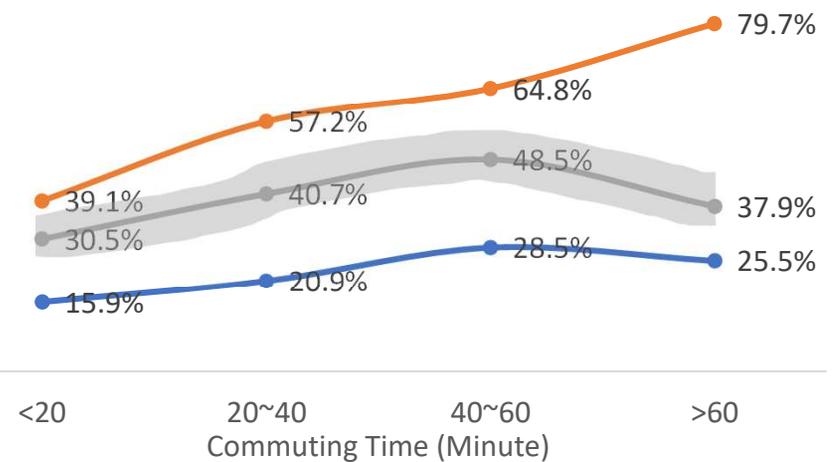
● Before ● During ● After



## Remote working

### Percentage of Commuters WFH for 1+Day/Week

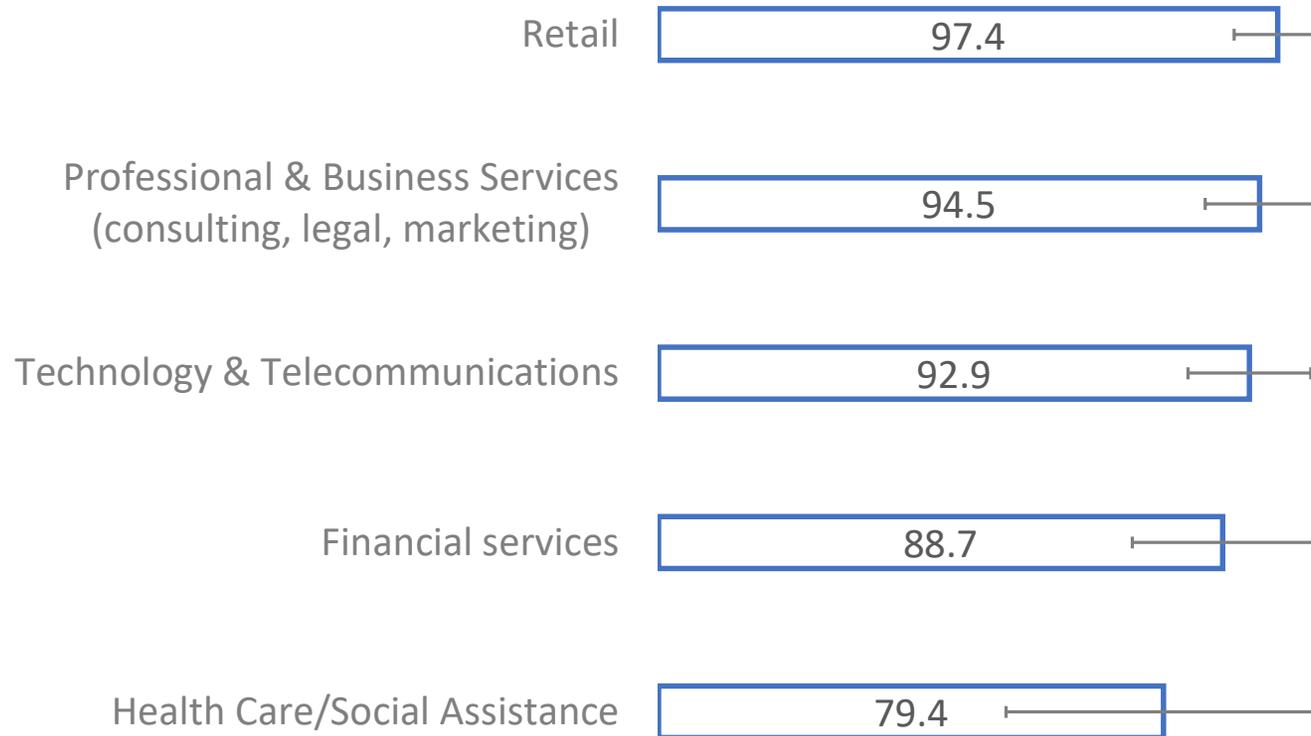
● Before ● During ● After



- Before pandemic, working trip frequency almost the same.
- During pandemic, people travel longer reduced more trips and are more likely to WFH.
- The “after” condition is similar to the “before” condition with universal reduction in travel and increase in WFH.

# WFH Working Efficiency by Job Type

How efficiently are you working from home compared to working at your normal work location?



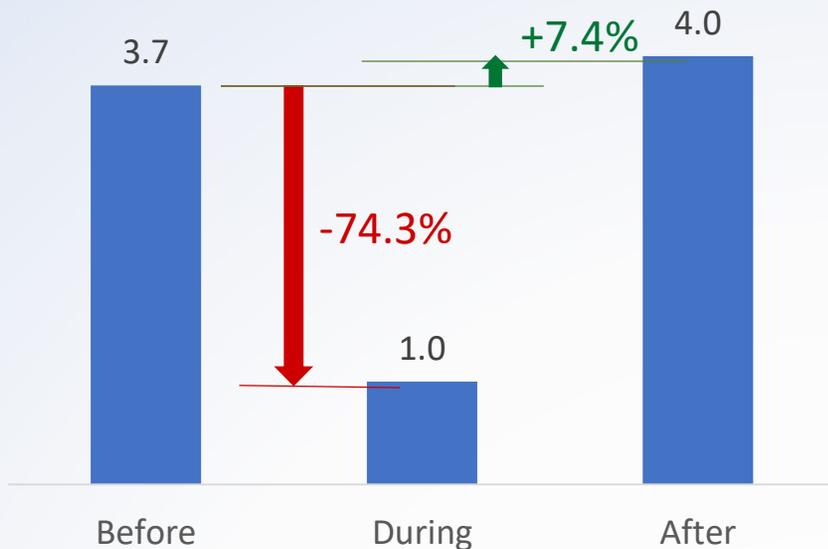


# Social Activities

# Social Activities

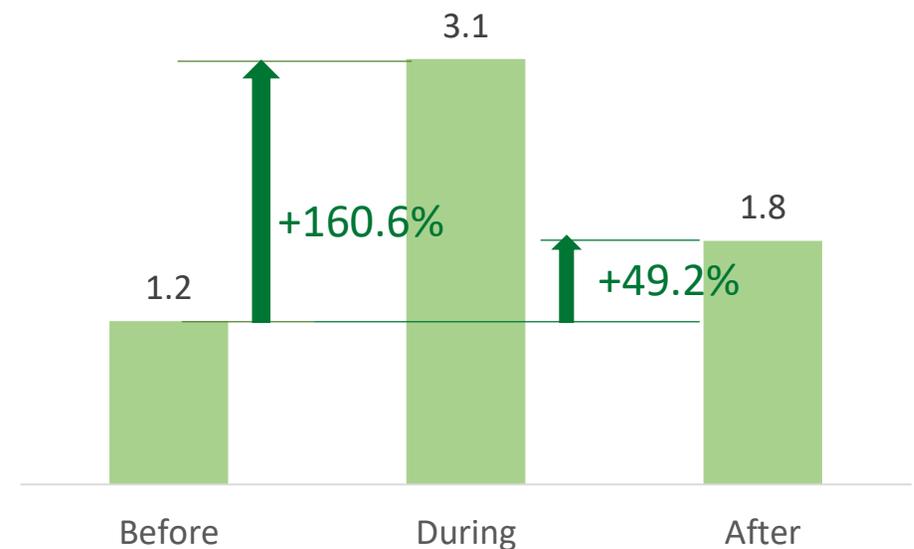
## Person trips

Social trip frequency per month



## Tele-activities

Online social hours per week



- Reduction in social trips somewhat compensated by online social activities
- People's social needs may be increased: after pandemic, people will increase **both** physical and online social activities

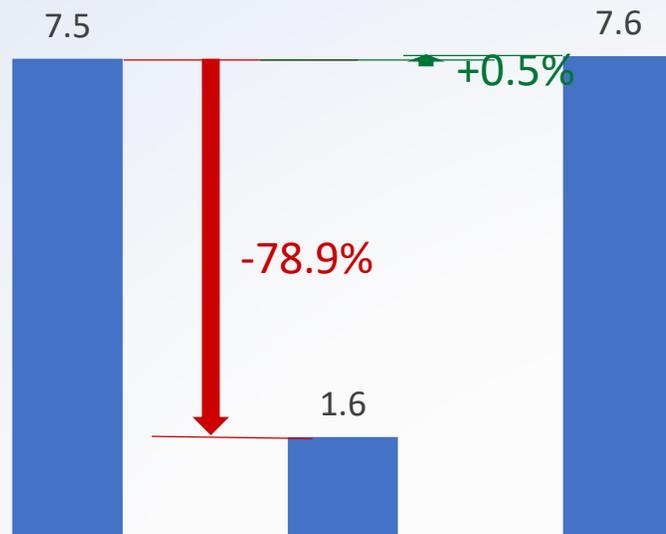
# Entertainment



# Entertainment activities

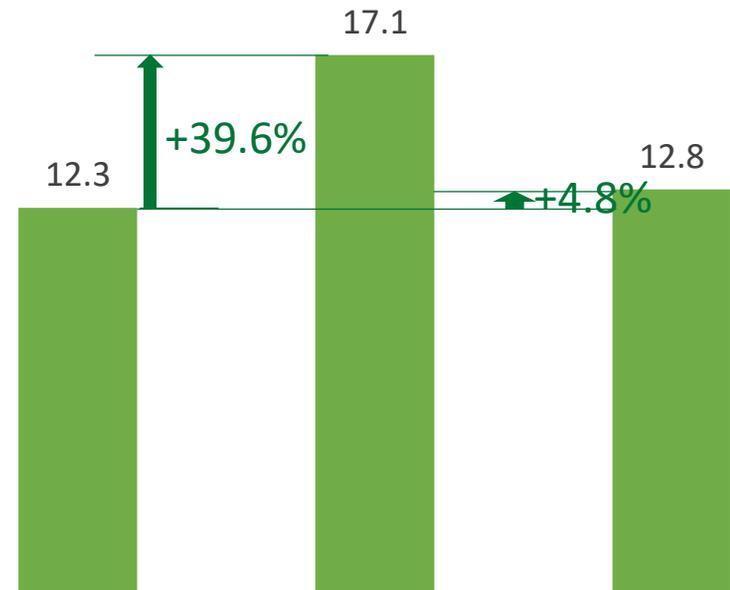
## Person trips

Entertainment and recreational trip frequency per month



## Tele-activities

Online entertainment hours per week



- Increase of online entertainment hours less than the decrease of entertainment trips
- People's entertainment needs are stable

# Discussion



Michael Maness

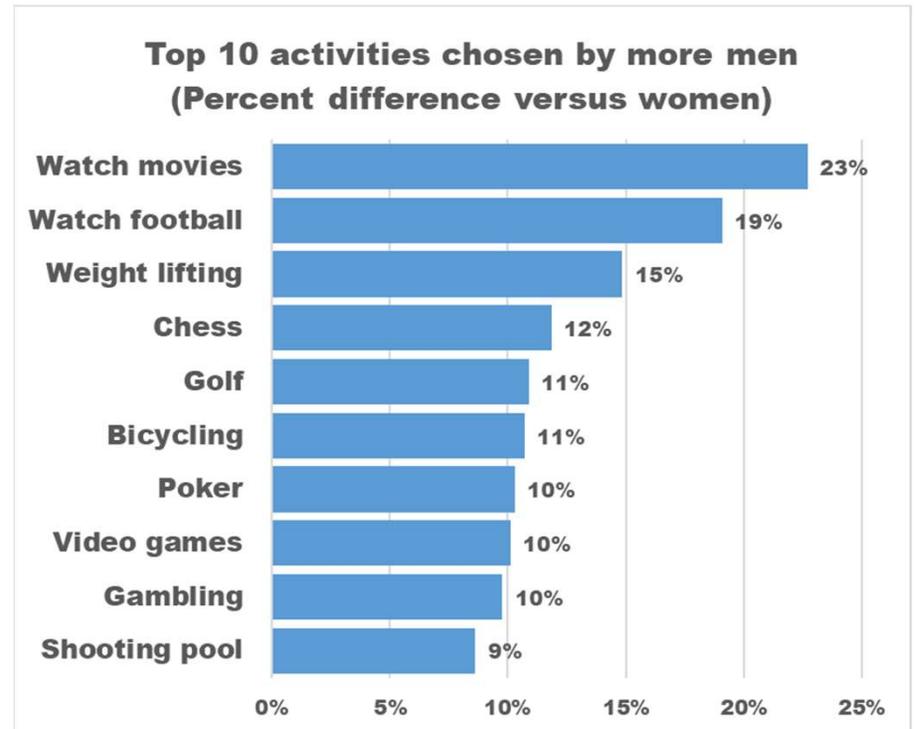
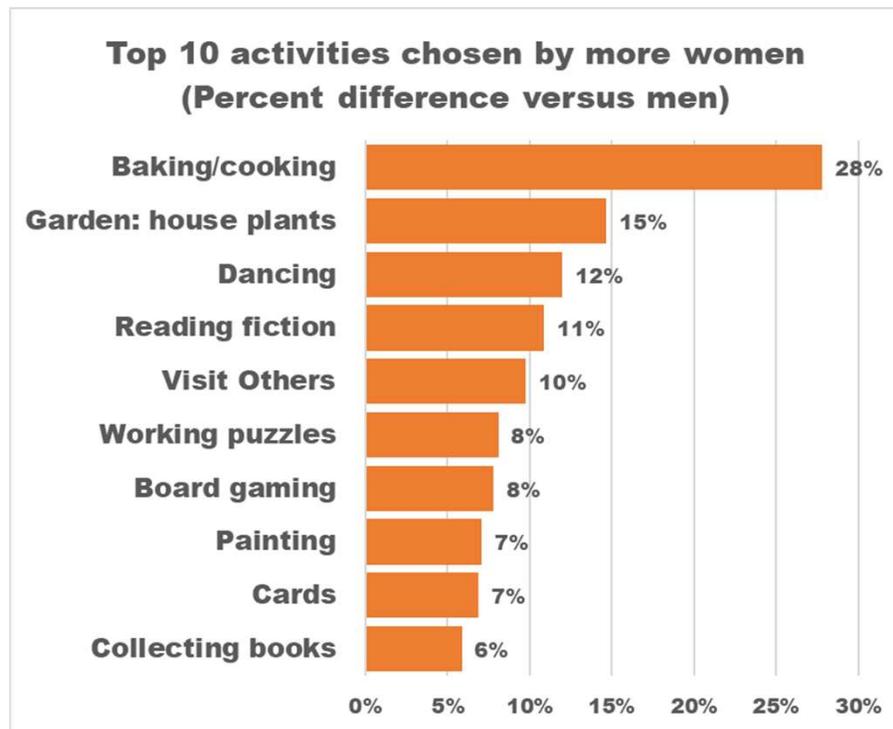
Assistant Professor

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University of South Florida

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# Gender Differences in Activity Participation (Pre-COVID)



Survey Source: Social Capital and Leisure Activity Survey

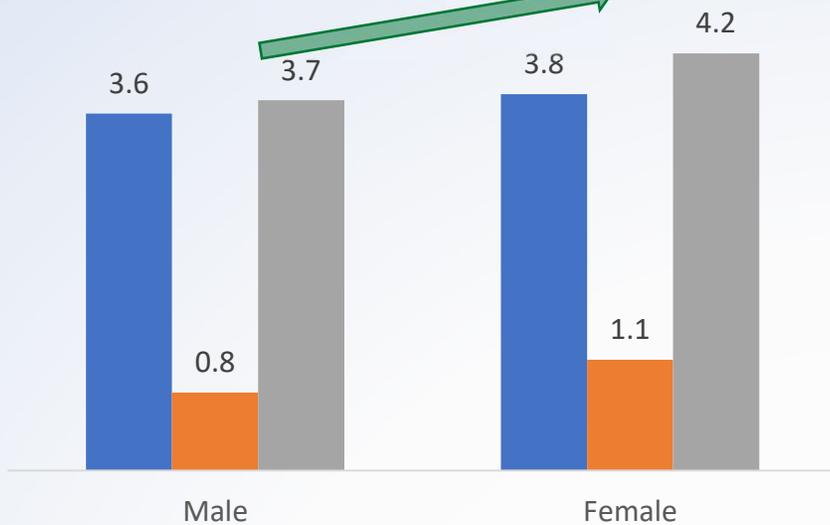


# Social Activities by Gender

## Person trips

Social trip frequency per month

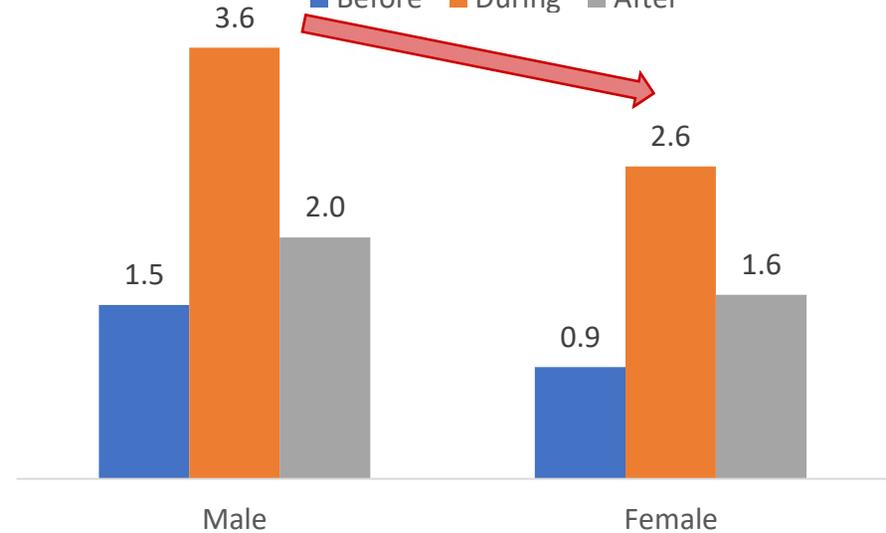
■ Before ■ During ■ After



## Tele-activities

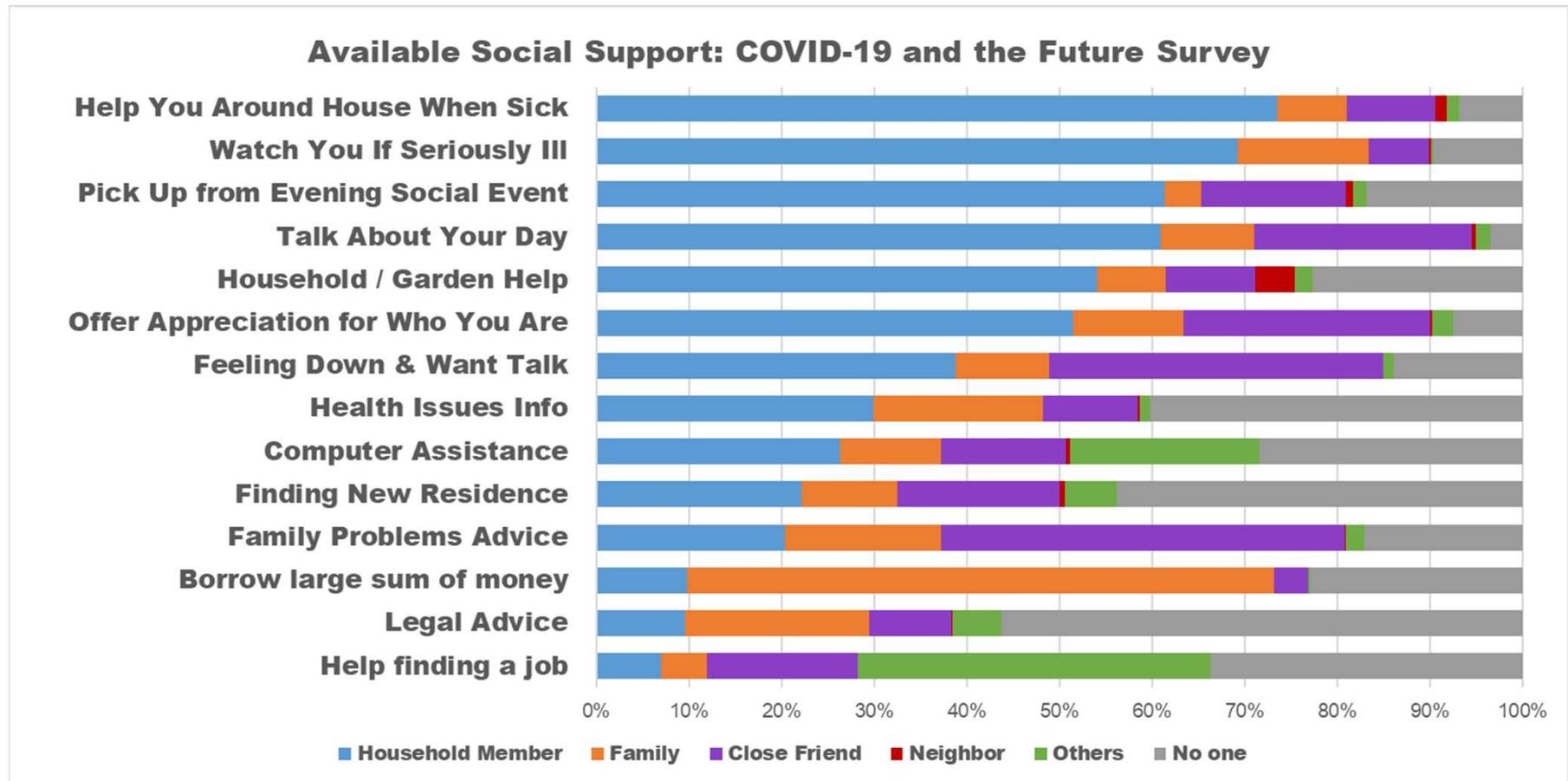
Online social hours per week

■ Before ■ During ■ After



- Female exhibit preference of physical social activities over online social activities
- Changing trends are similar for both genders during and after pandemic

# Social Support During the Pandemic



Survey Source: <https://covidfuture.org/>



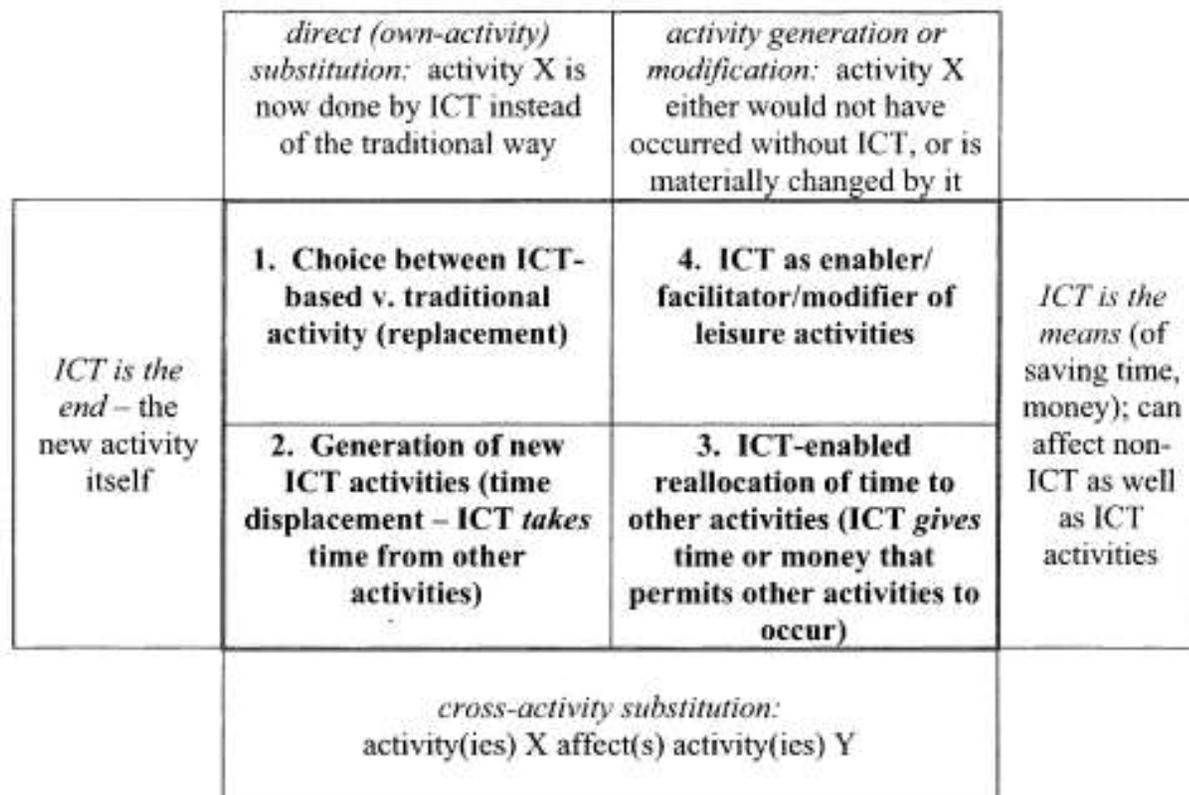
# A Tale of Two Activities

- Work and Discretionary Activities exhibit quite different properties
- Work Activities
  - Working from home is doable, adjusted our home to enable it
  - Employers now have experience with it
  - Teleworking likely will increase
- Social and Discretionary Activities
  - Not easily substituted
  - Not figured out how to modify our homes and communications to deal with lessening physical sociality
  - But this still goes back to even the telephone, it never made us see each other less



# Feedback Effect from Telework?

- Will this transformation in telework lead to more experiences?



- Moktharian et al. (2006) mentions this as ICT-enabled reallocation
- Fancourt et al. (2020) found depression & anxiety lessening but still persisting after some easing of restrictions

Sources: <https://doi.org/10.1007/s11116-005-2305-6>  
<https://doi.org/10.1101/2020.06.03.20120923>

Figure 2. Relationships among types of ICT impacts.



# Experience Economy

- Transitioning to businesses emphasizing the customer experience
  - Malls become not just shopping destinations but entertainment hubs
  - Choosing tourism over obtaining larger homes
- There is some evidence here to suggest that
  - ICT-enabled substitution is not occurring for leisure
  - Some induction (creating new trips) of leisure travel shown in this study but needs to be monitored
    - Social trip rebound + increase, entertainment trip rebound
    - Lack of chance to increase socialization during current crisis



# Some Policy Implications

- Less centralized trip patterns and widening evening peak
  - Move towards flexible schedule, flexible route transit systems
- Activity Planning
  - Leisure activity spreading
  - Incentivization of activity times and locations, equity concerns
  - Encourage employers to provide flexible telework schedules (e.g. Noon-8pm, long midday breaks)



A landscape photograph showing a wide, open field in the foreground, a dense forest in the middle ground, and a clear blue sky with a few wispy clouds in the background. The word "Conclusions" is centered in the middle of the image in a white, sans-serif font.

# Conclusions

# Conclusions

- Changes in physical and tele-activities depend on many sociodemographic features, policy measures need to consider these.
- Needs for physical vs tele-activities differ by nature of activities:
  - Travel needs for discretionary activities are stable even with wider adoption of tele-activities.
  - Opportunity to foster staggered working days with increasing WFH rate.



# Acknowledgement



Center for Infrastructure,  
Transportation and Environment



Volvo Research and Education  
Foundation



VREF Center of Excellence for  
Sustainable Urban Freight Systems

Joshua Schmid (RPI)

COVID-19 and the Future Survey led by Salon (ASU) and  
Mohammadian (UIC)

**THE IMPACTS OF COVID-19 ON TELE-ACTIVITIES, TRAVEL,  
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**WEBINAR #3**

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Pandemic on Person-Trips  
and Tele-Activities  
(Part 2)

**July 22, 2020 • 11AM EST**



**José Holguín-Veras**



**Cara Wang**

**Registration Link**

<https://cite.rpi.edu/index.php/training-and-outreach/>