

**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

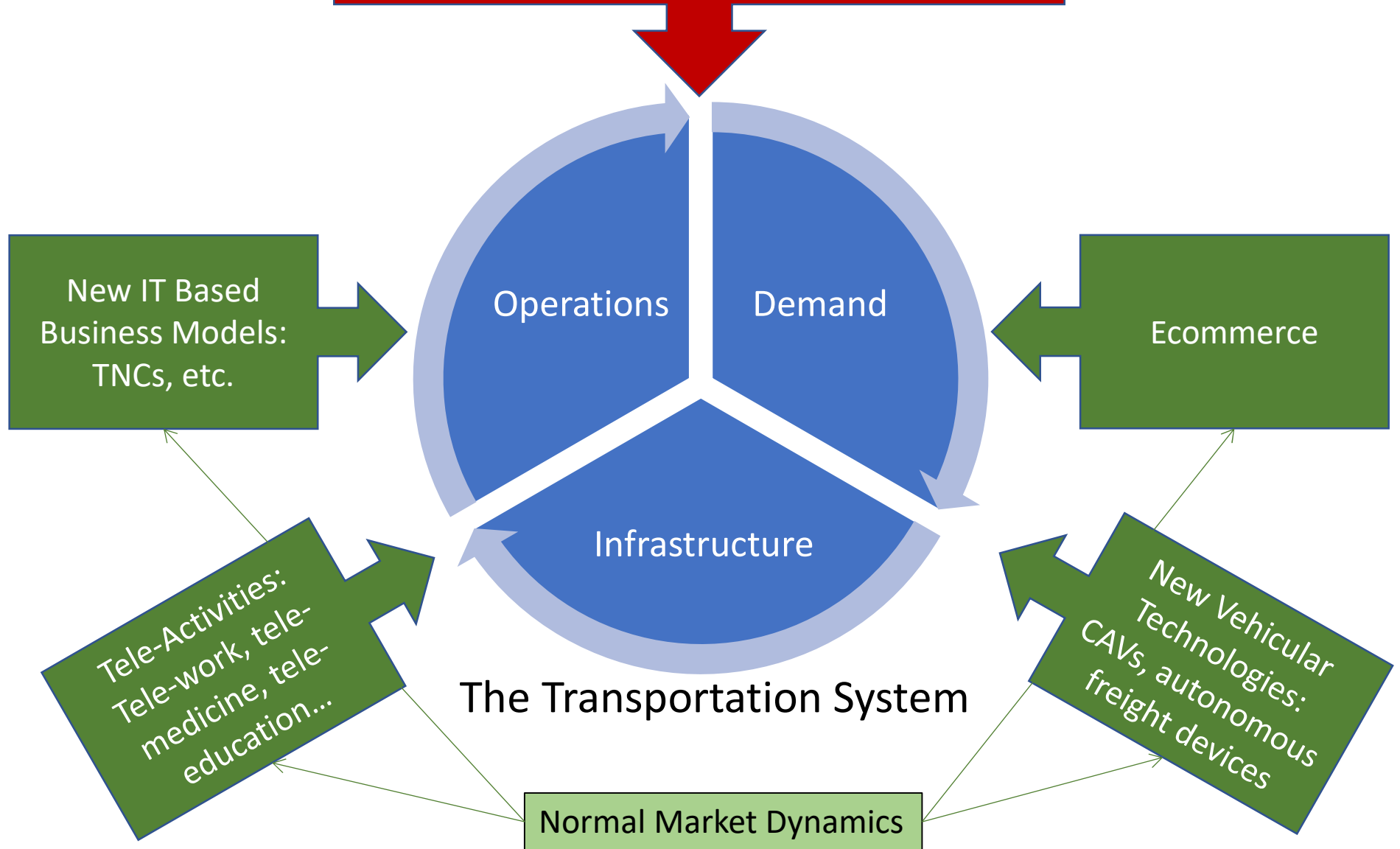
jhv@rpi.edu

Background

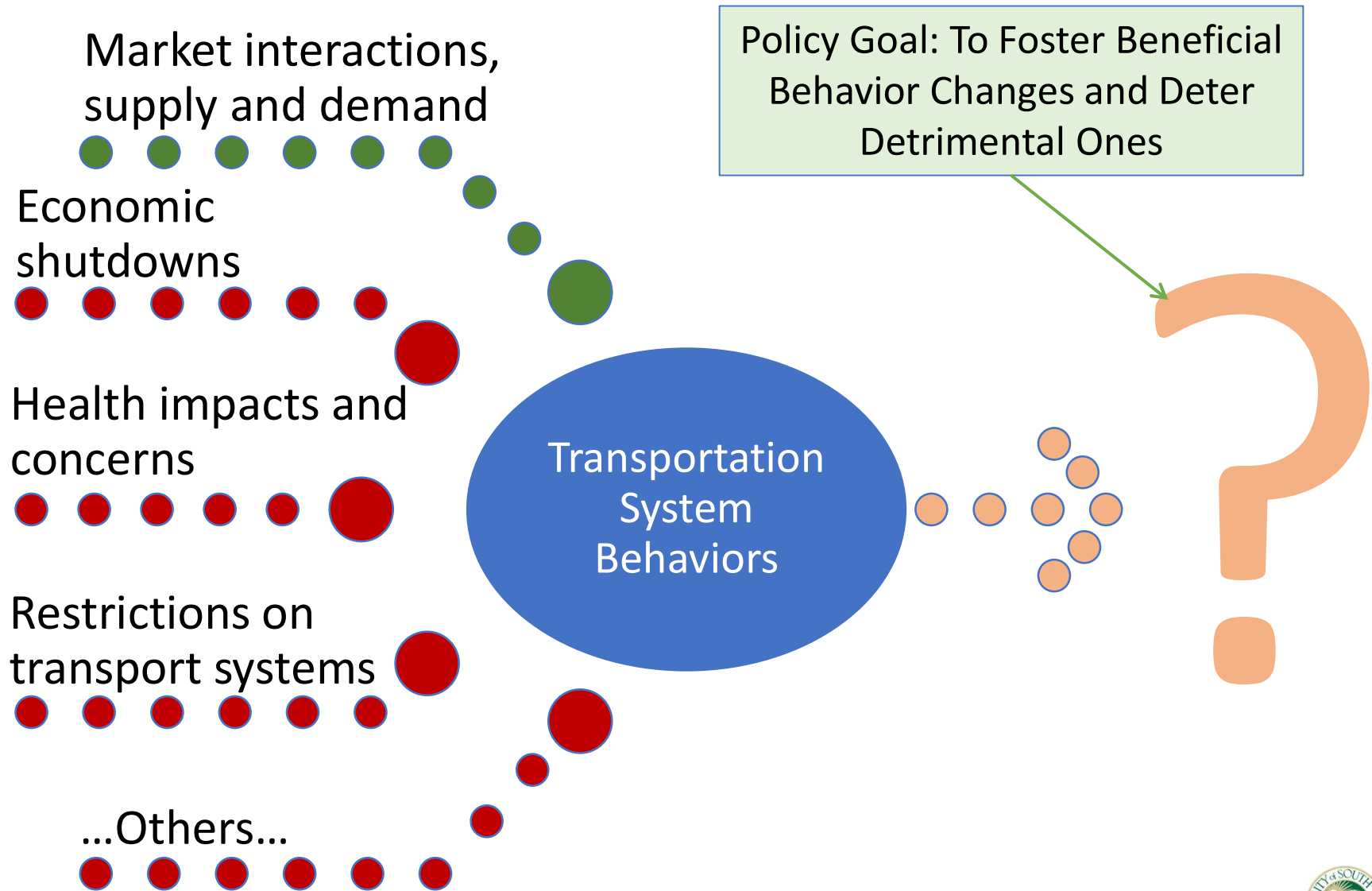
- The COVID-19 pandemic has had tremendous impacts on the entire world:
 - Large portions of local, regional, and national economies has been shutdown at times;
 - Communities and Individuals have been severely impacted
 - More than 12.8 million individuals caught the disease
 - More than 566 thousand 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



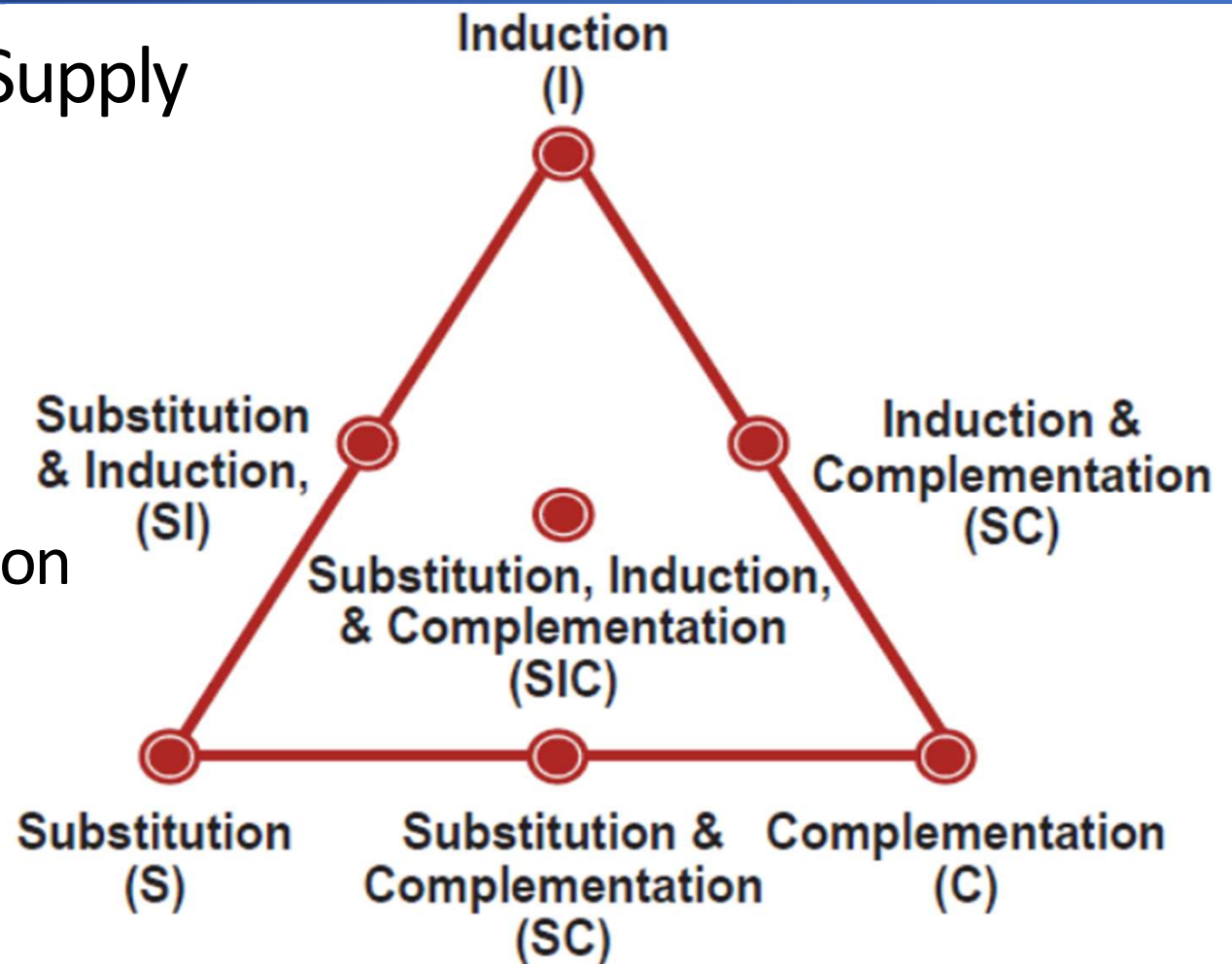
Implication #1: The Need to Explicitly Consider Disaster Effects

- 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

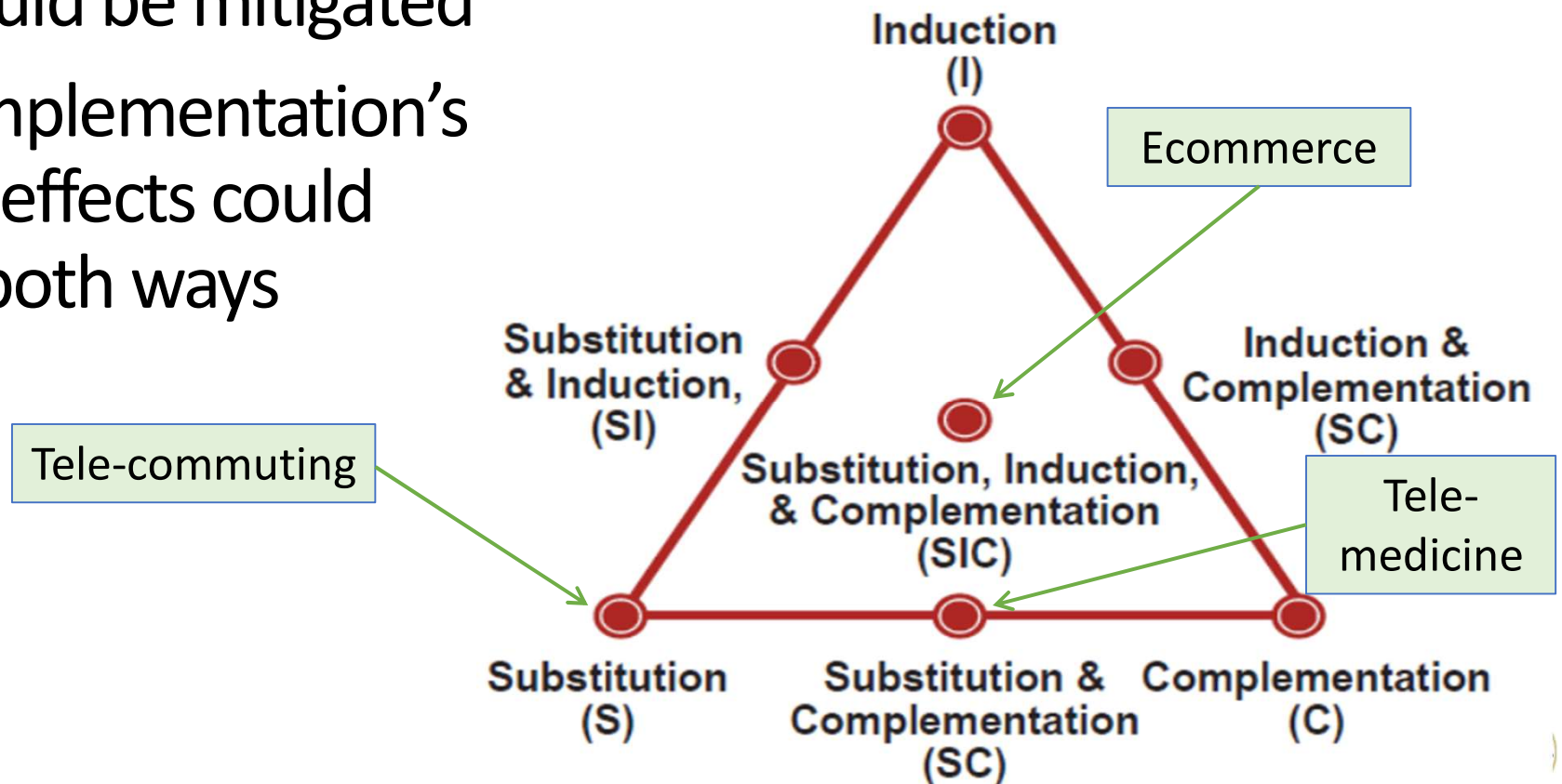
- Co-Evolution of Supply and Demand
- Demand:
 - Substitution
 - Induction
 - Complementation



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

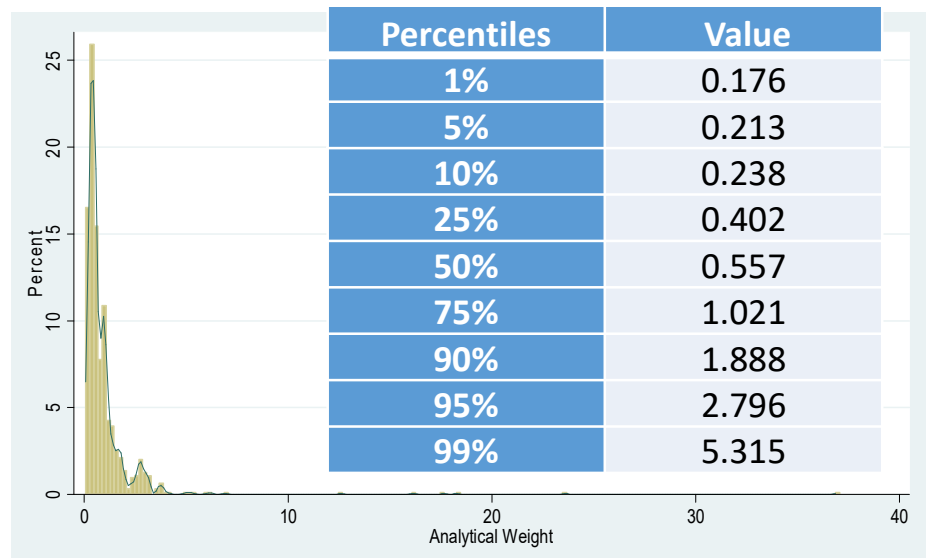
| Category | Sample | Population |
|-----------------------|--------|------------|
| Less than high school | 0.5% | 12.0% |
| High School graduate | 34.8% | 45.0% |
| Associate degree | 18.4% | 13.0% |
| Bachelor's degree | 34.3% | 19.0% |
| Master's or PhD | 11.9% | 11.0% |

| 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



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Outline

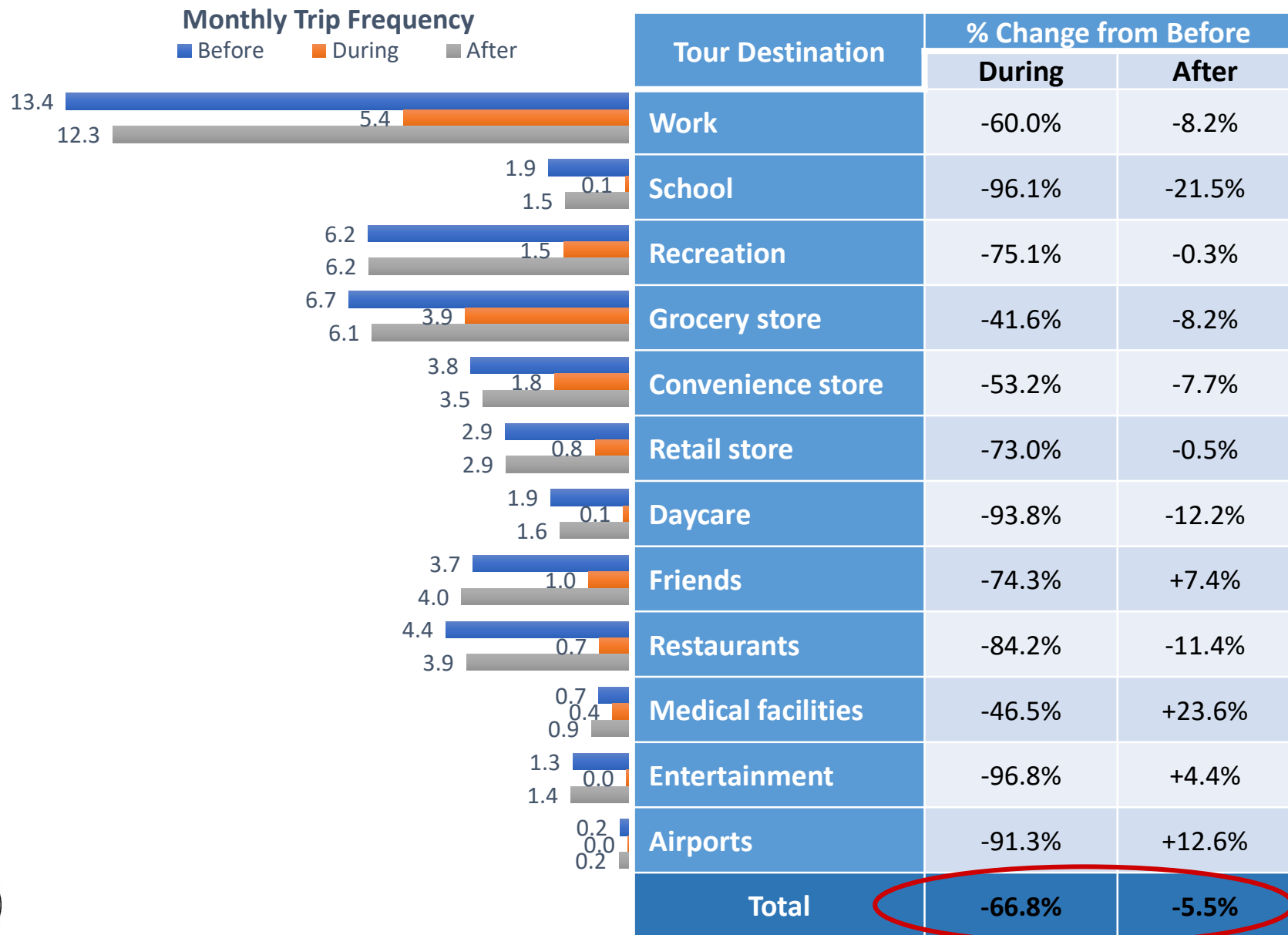
- Overview
 - Travel patterns
 - Tele-activities
- Relationship between travel and tele-activities
 - Working
 - Social activities
 - Entertainment

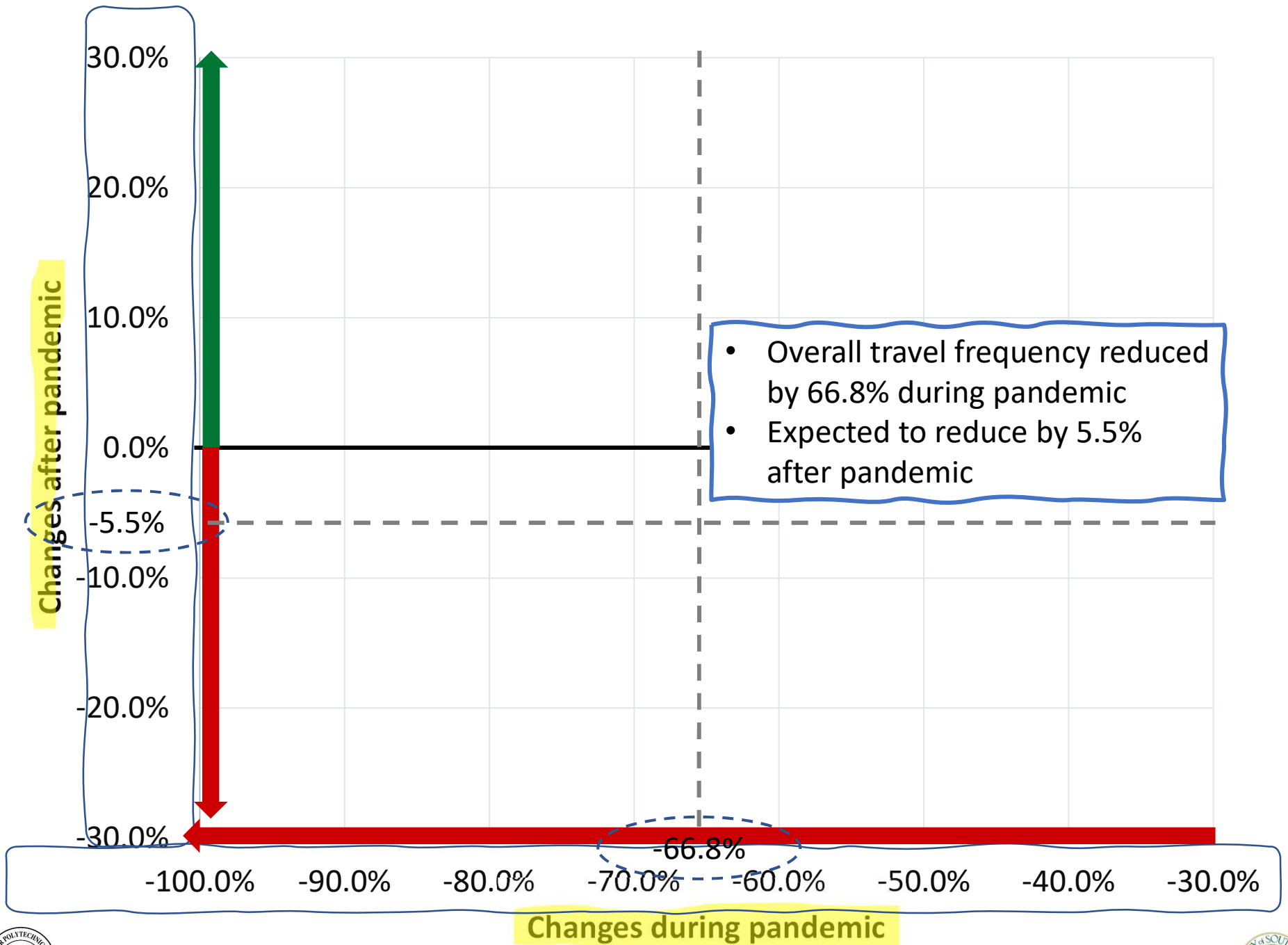


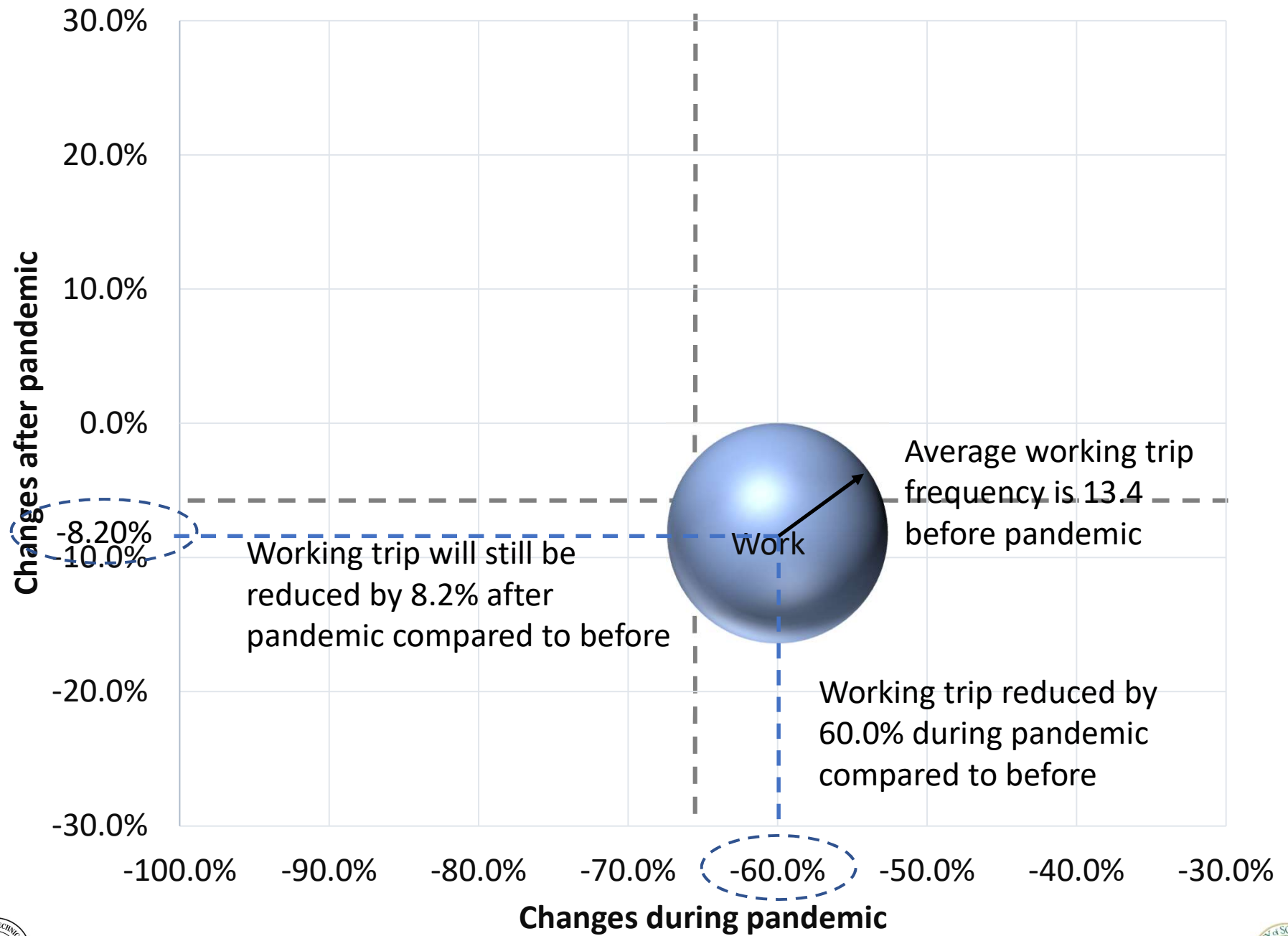


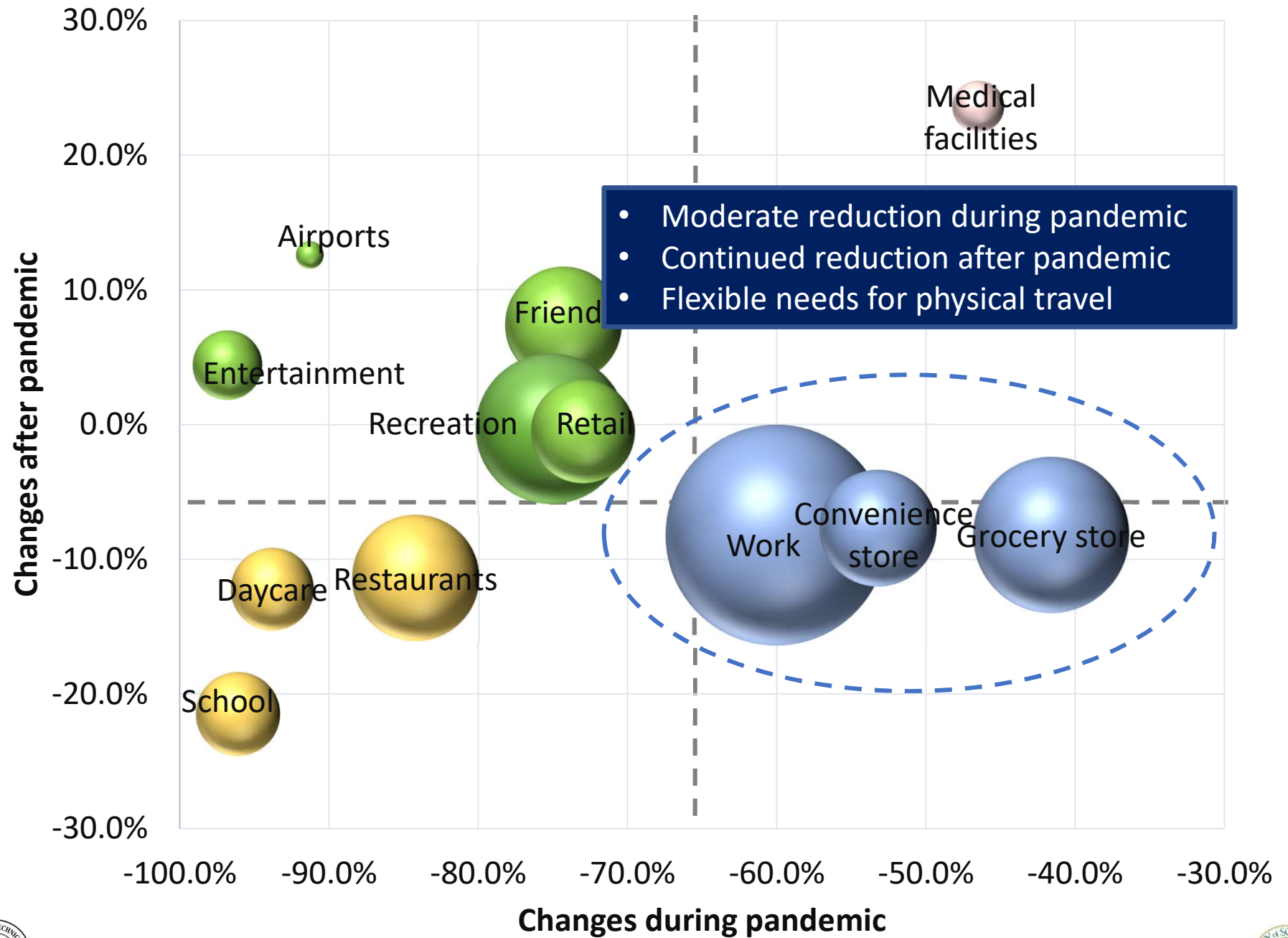
Overview of Travel Patterns

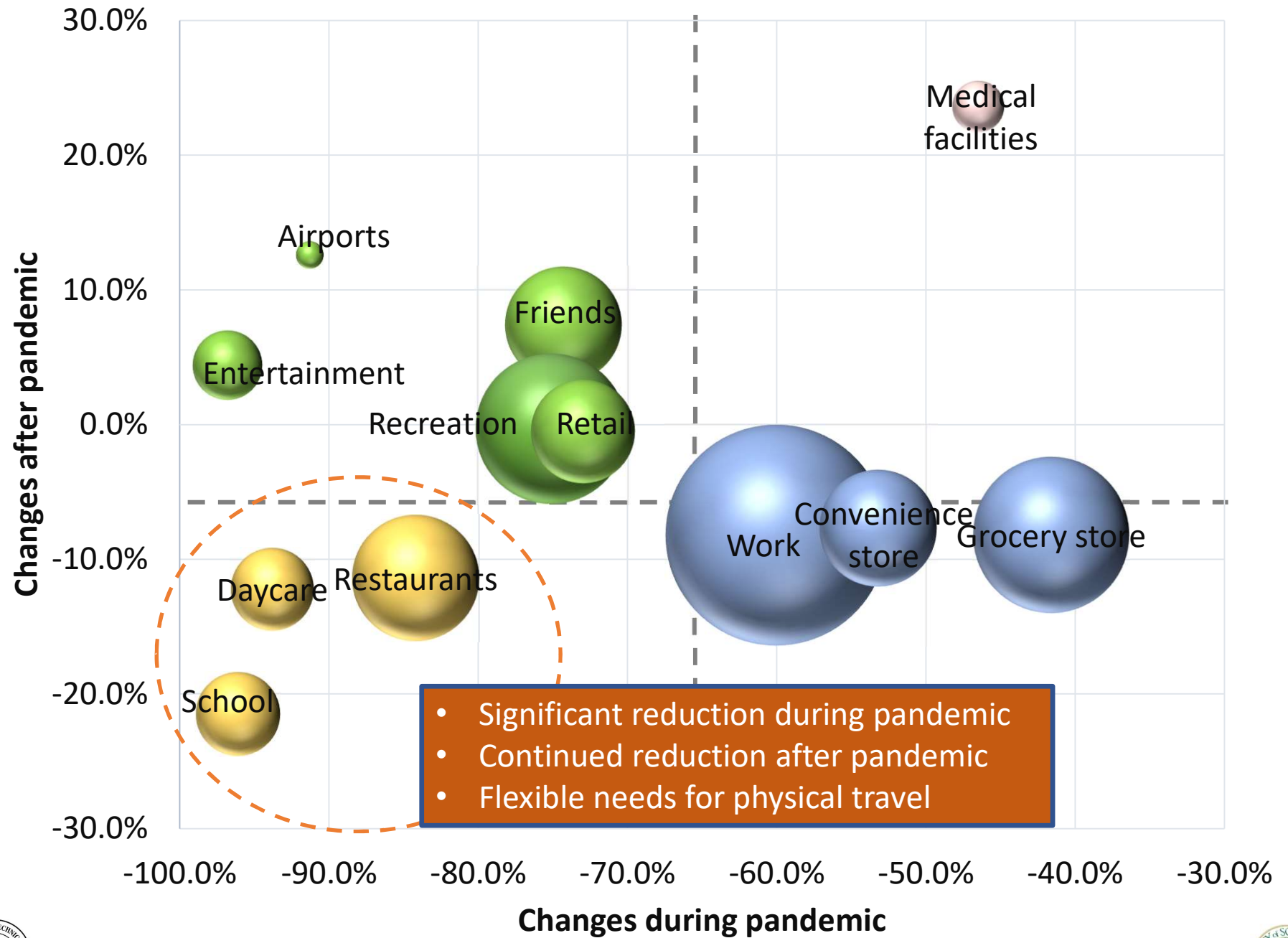
Trip frequency per month

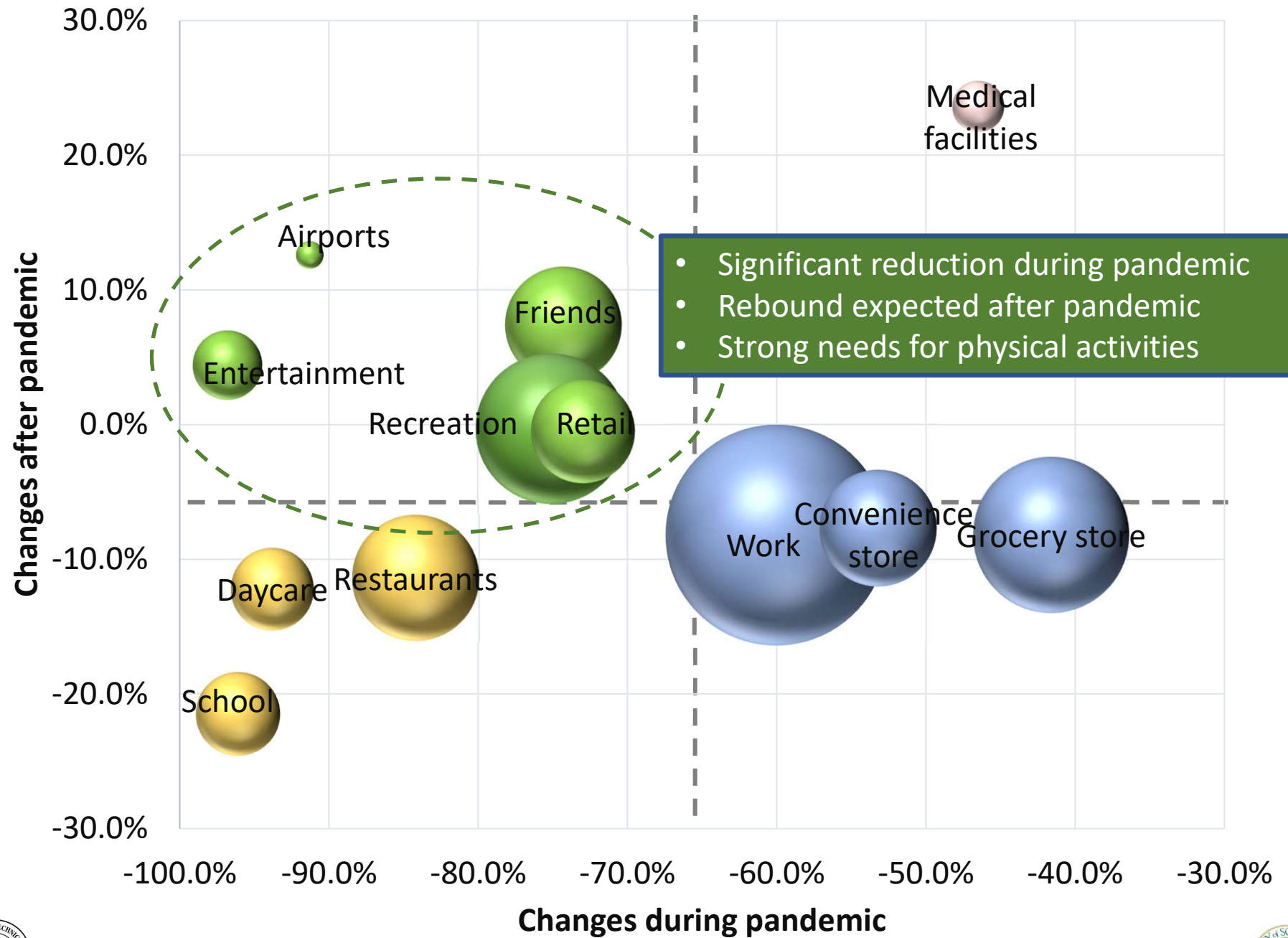


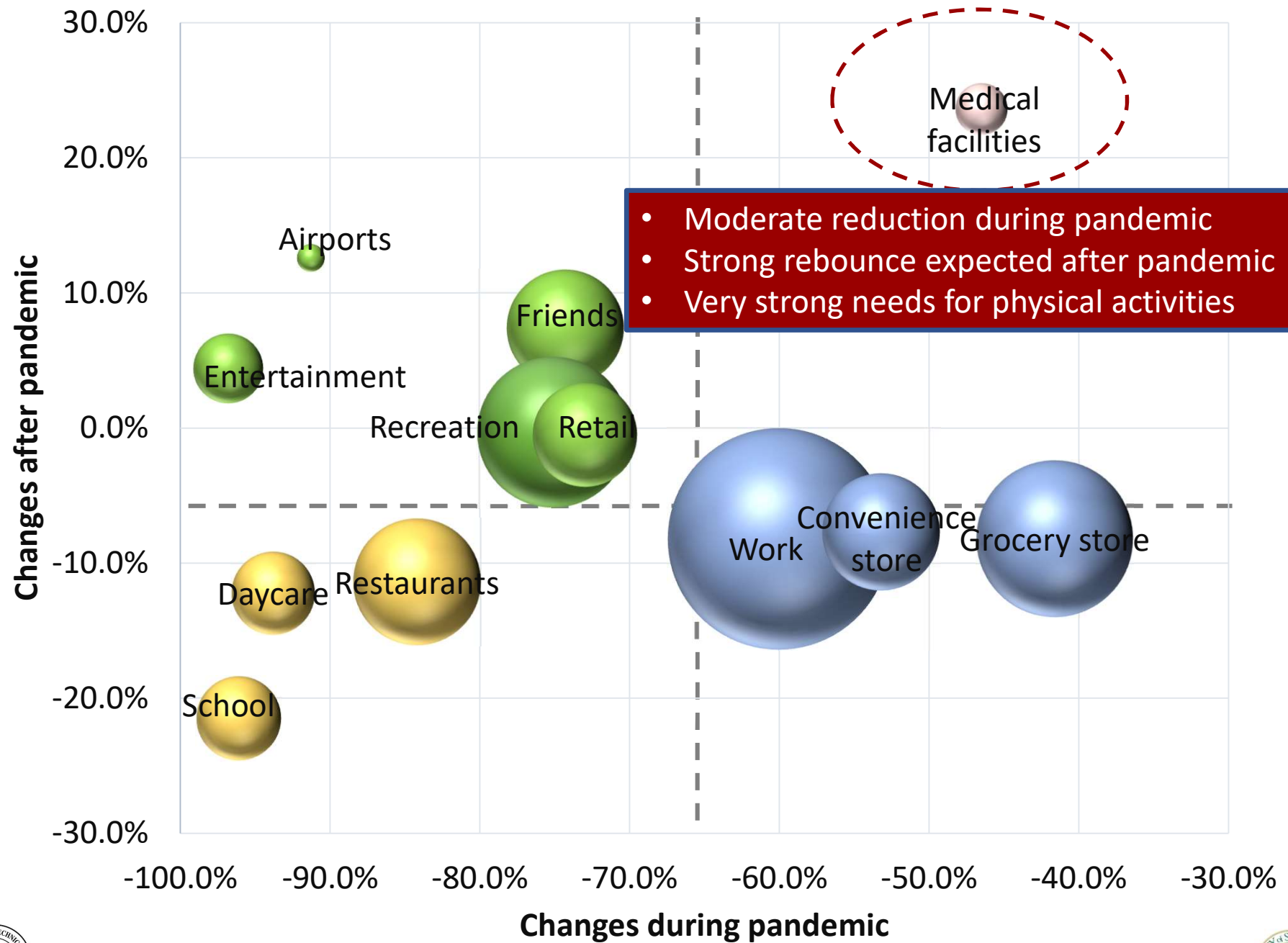








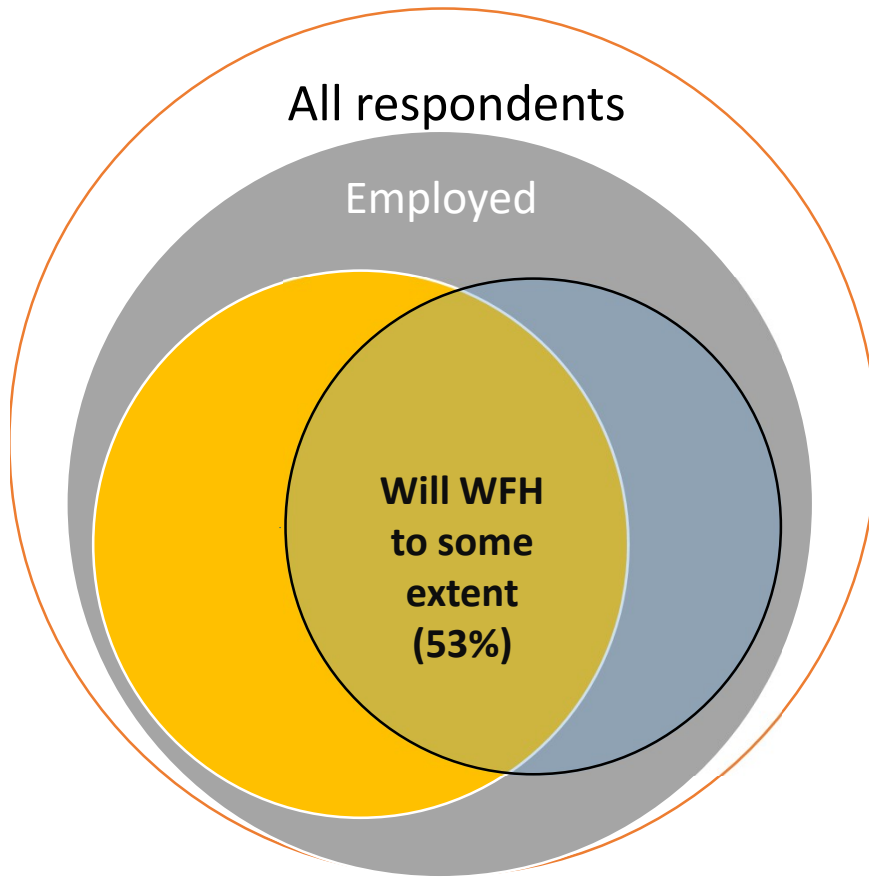




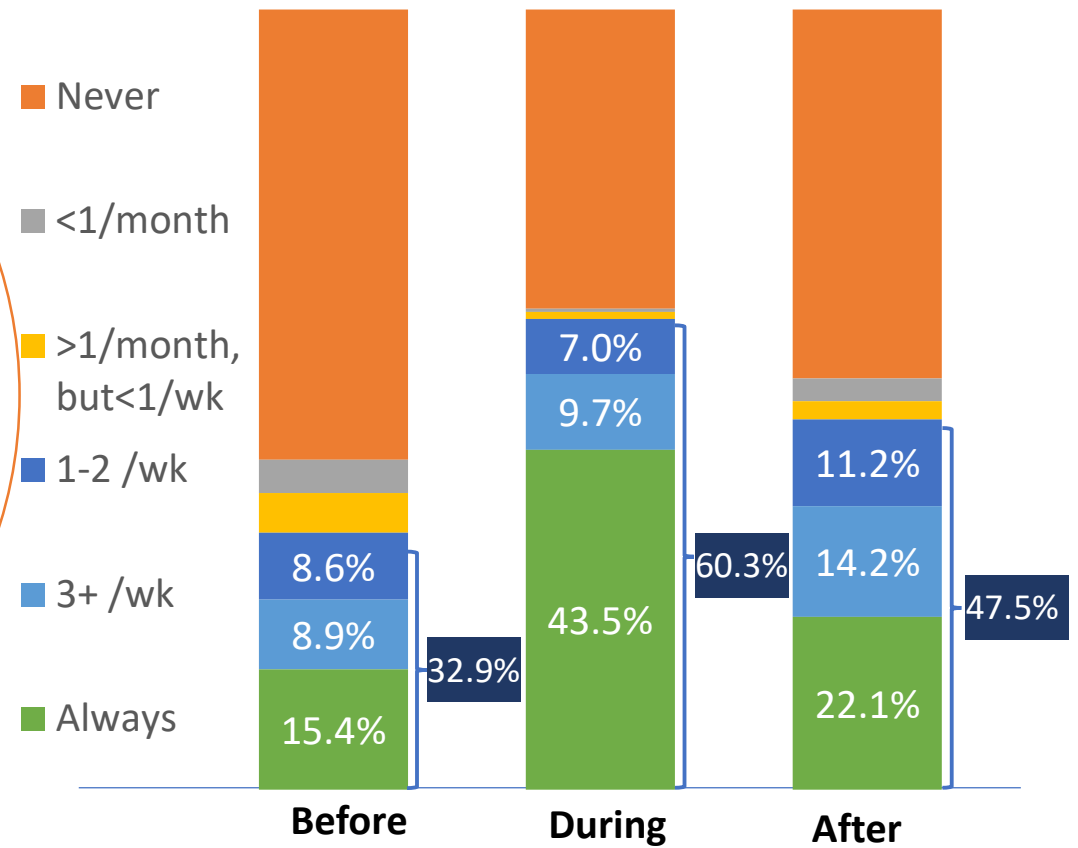


Overview of Tele-Activities

Remote working



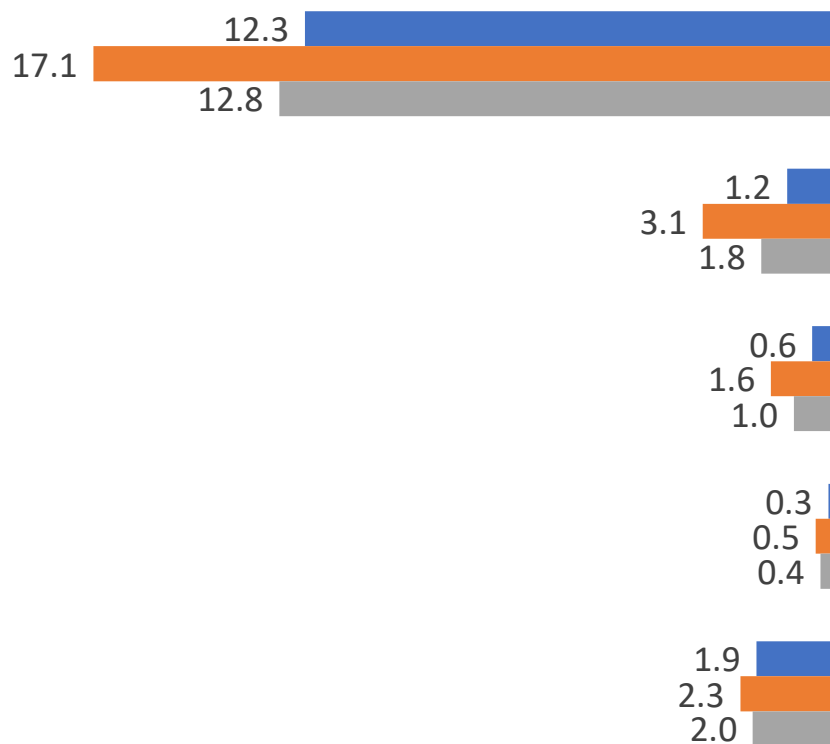
Distribution of WFH frequency for employed in different stages



Weekly hours spent on tele-activities

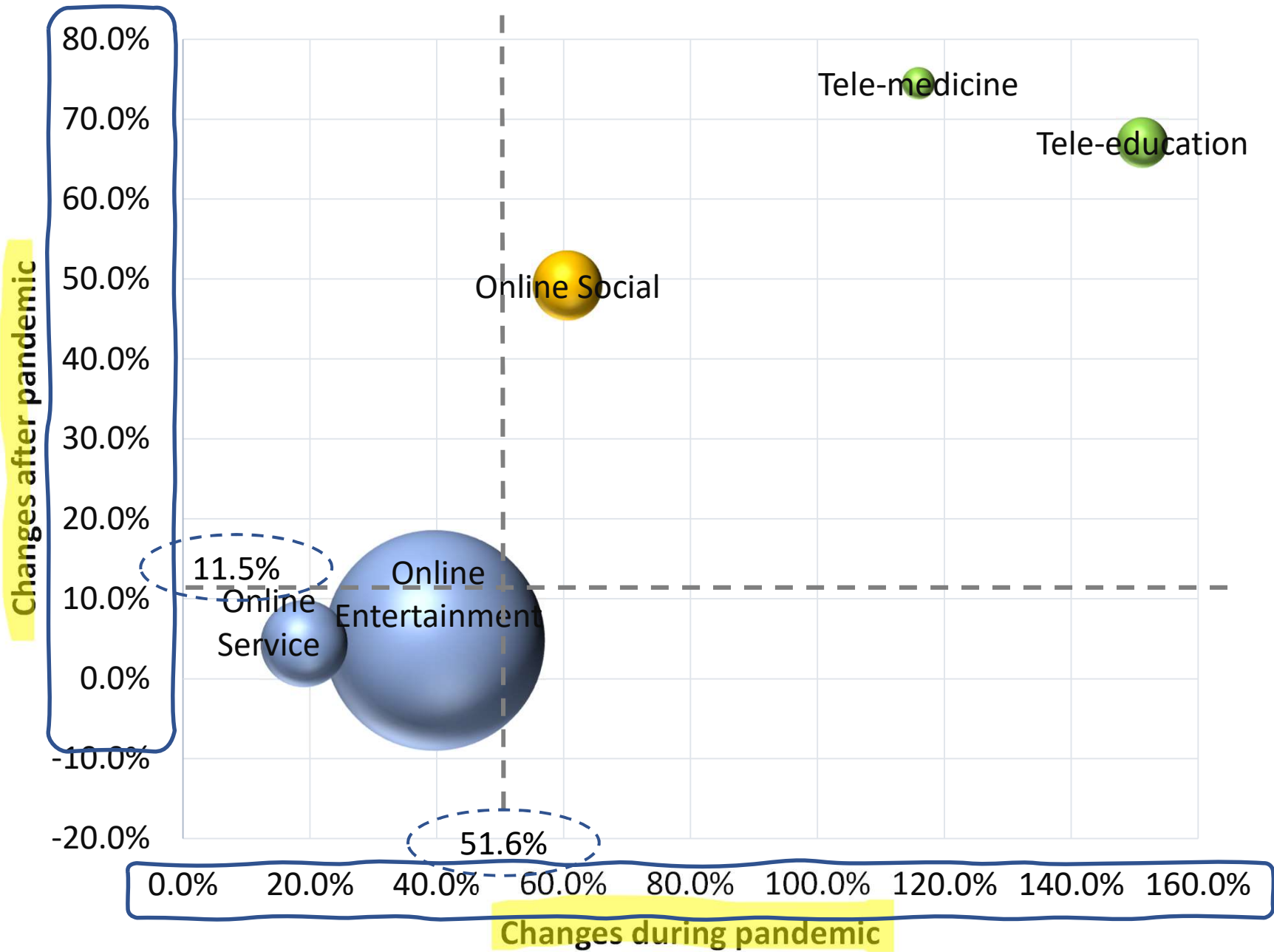
Hours spent on tele-activities (per week)

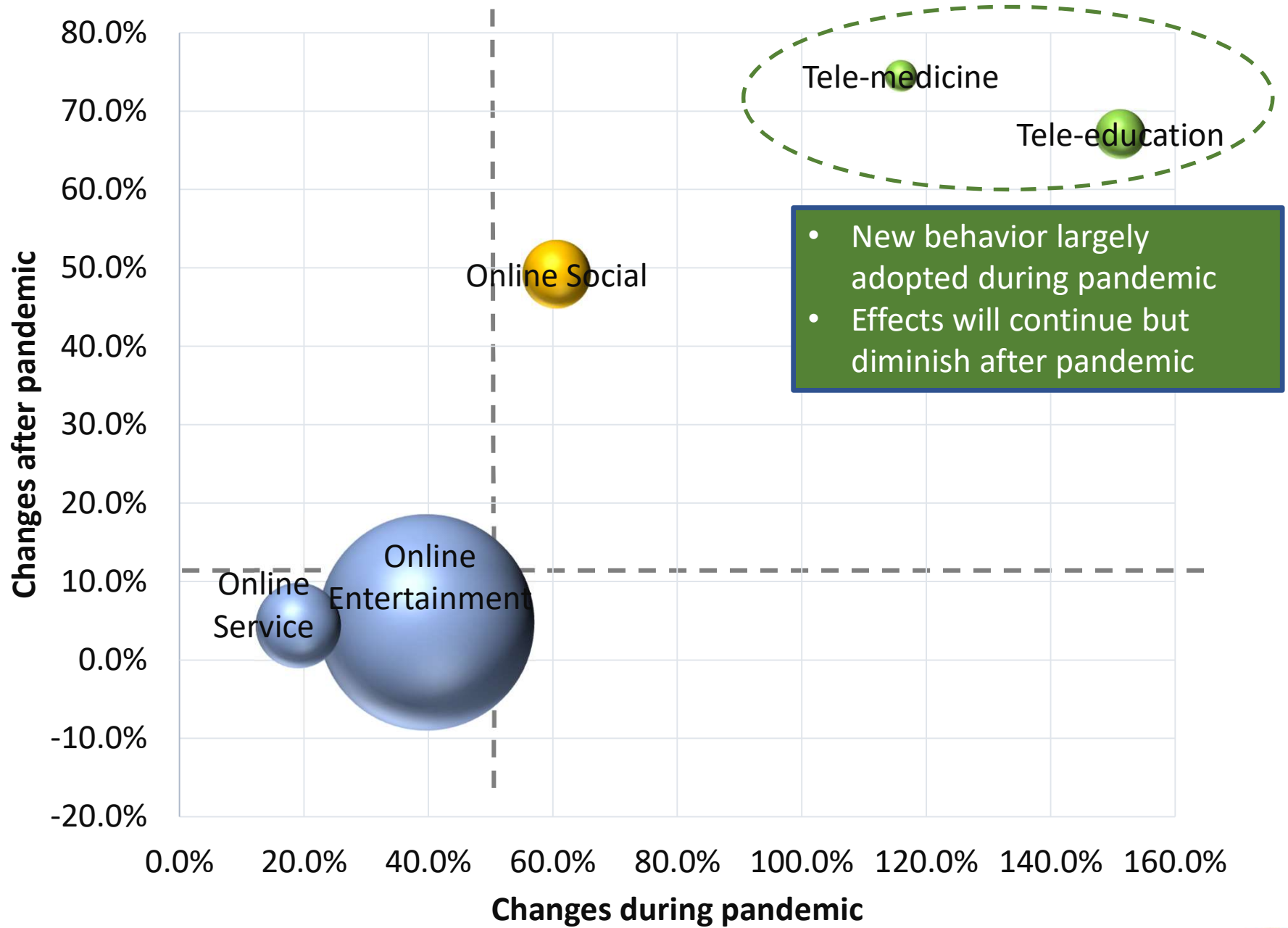
■ Before ■ During ■ After

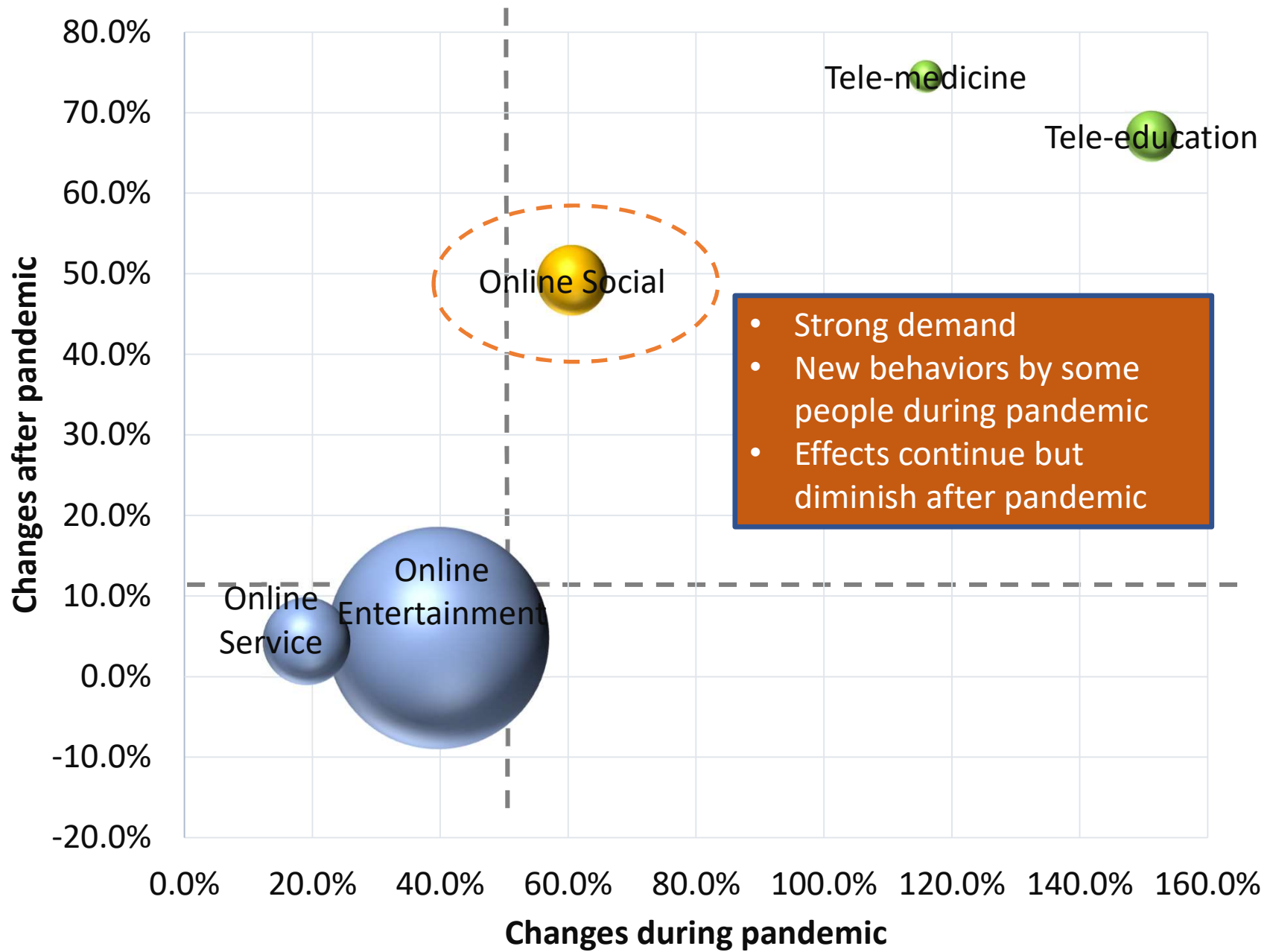


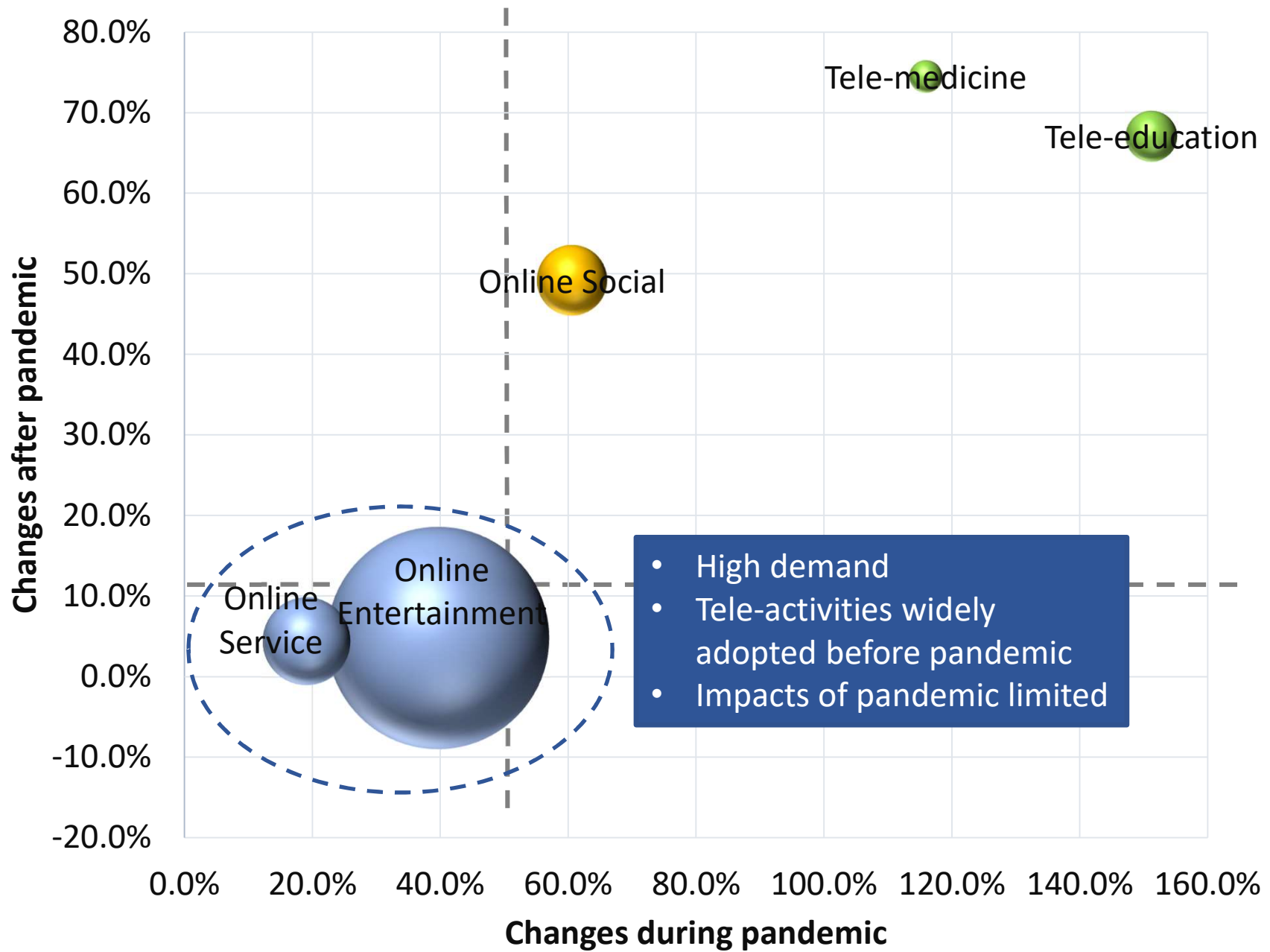
| Type of activities | % Change from Before | |
|----------------------|----------------------|---------------|
| | During | After |
| Online Entertainment | +39.6% | +4.8% |
| Online Social | +60.6% | +49.2% |
| Tele-education | +151.2% | +67.1% |
| Tele-medicine | +115.9% | +74.5% |
| Online Service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



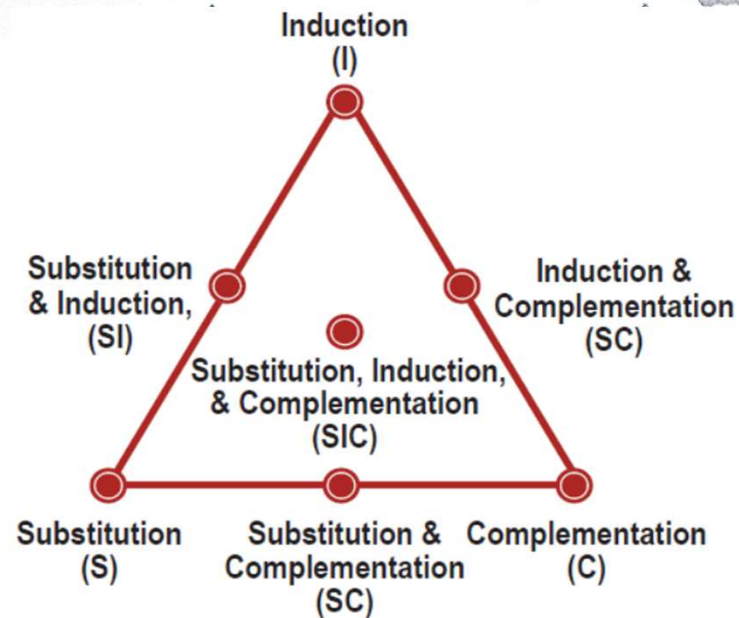








Relationship between Travel and Tele-Activities



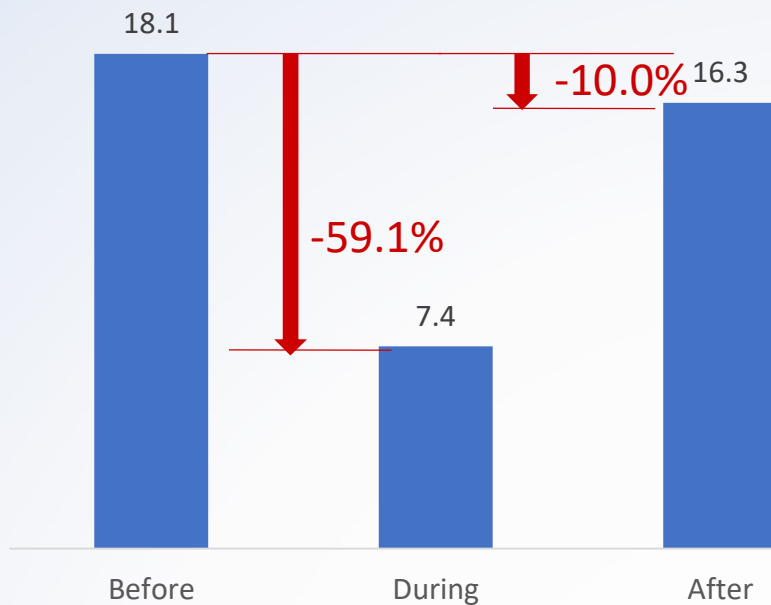


Working

Working trips vs Remote working

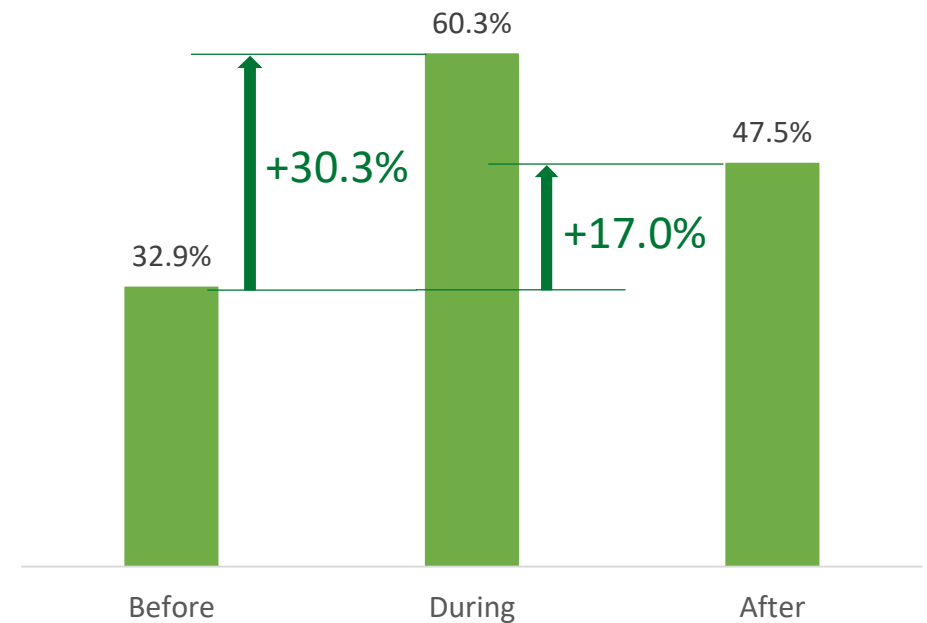
Working trips

Monthly working trip frequency for employed



Remote working

Percentage of Workers WFH for 1+Day/Week



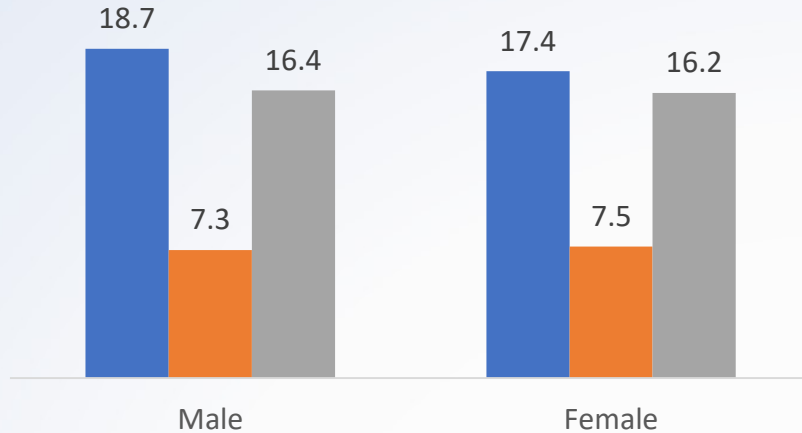
- Working trip and remote working may substitute each other
- Working trips will be less frequent after pandemic
- WFH part of the time after pandemic

Working by Gender

Working trips

Monthly working trip frequency

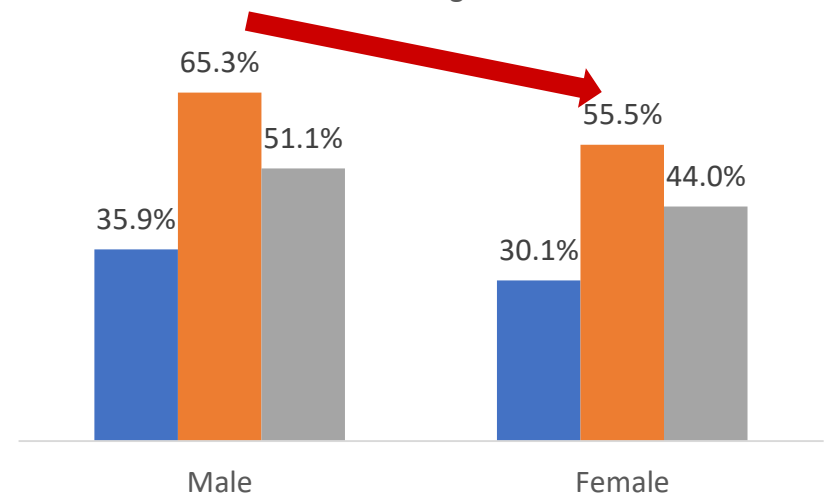
■ Before ■ During ■ After



Remote working

Percentage of Workers WFH for 1+Day/Week

■ Before ■ During ■ After

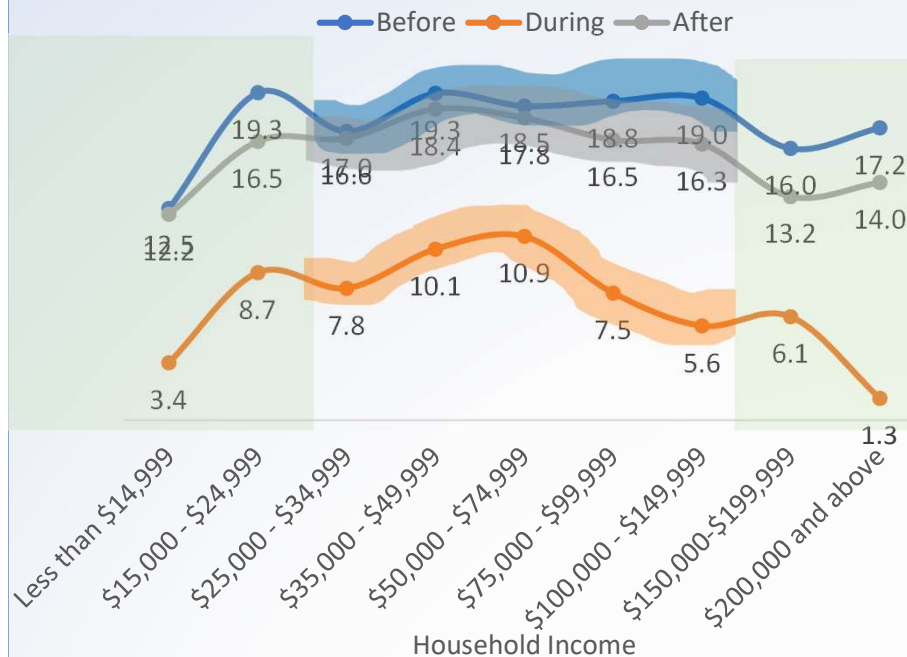


- Working trip frequencies show no significant difference
- Rate of WFH is lower for female
- Similar changing trends during and after pandemic

Working by Income Level

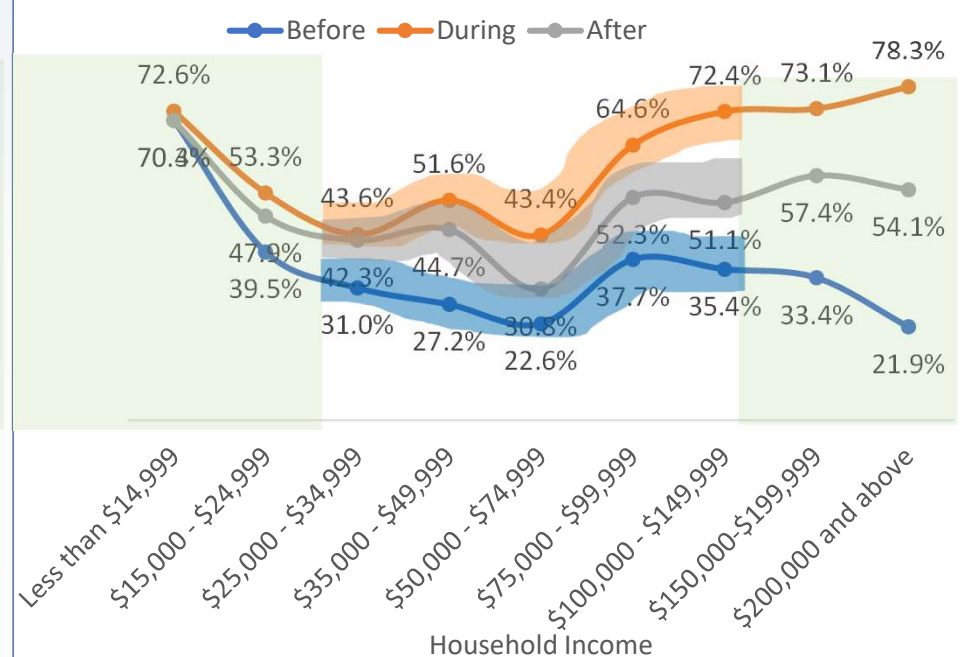
Working trips

Monthly working trip frequency



Remote working

Percentage of Workers WFH for 1+Day/Week



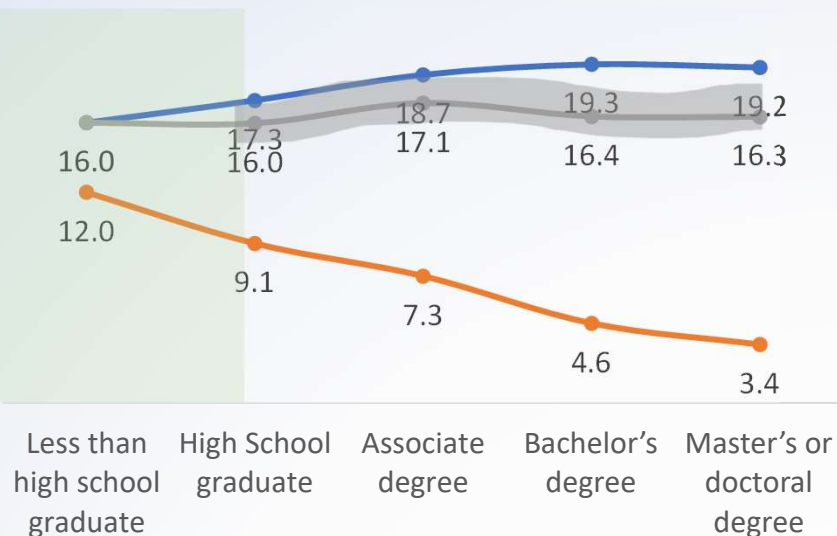
- Working trip frequency and rate of WFH did not differ much before
- Working trip frequency decreases, and rate of WFH increases with income during pandemic
- “After” is in between “before” and “during”

Working by Education Level

Working trips

Monthly Working Trip Frequency

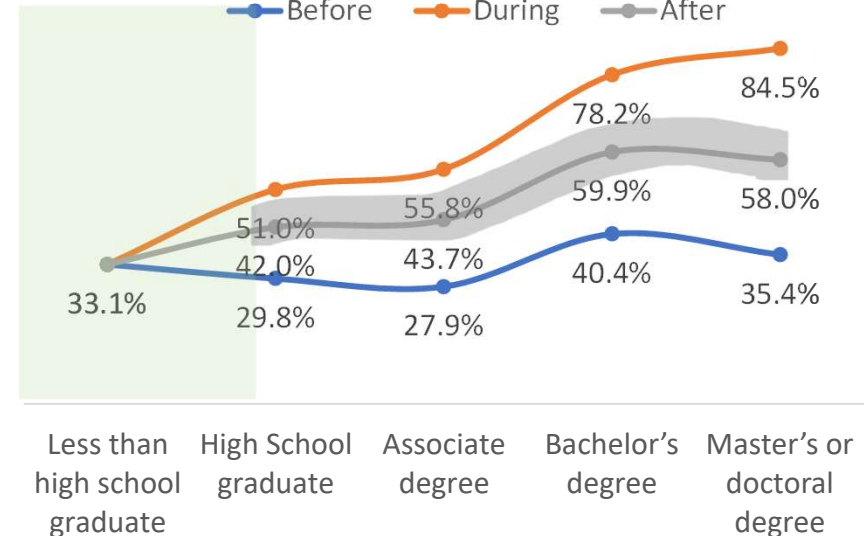
— Before — During — After



Remote working

Percentage of Workers WFH for 1+Day/Week

— Before — During — After



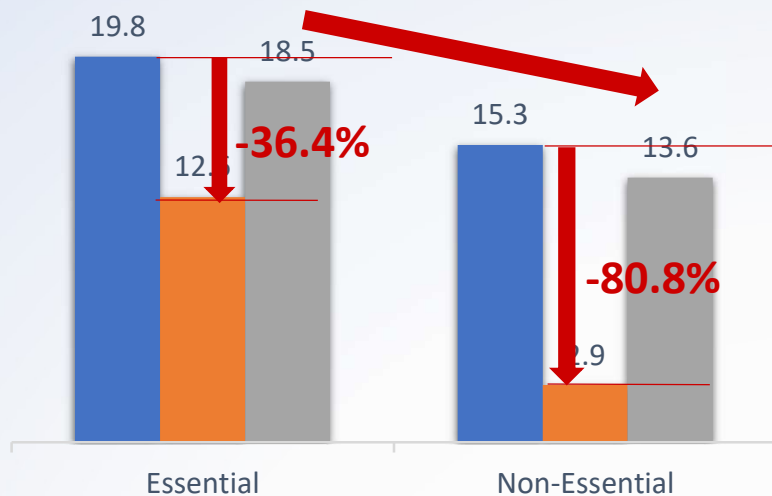
- Before pandemic, both working trip frequency and rate of WFH increases slightly with education level
- Working trip frequency decreases and rate of WFH increases significantly with education level during pandemic.
- The “after” WFH rate is in the middle of “before” and “during.”

Working by Essential vs Non-Essential

Working trips

Monthly Working Trip Frequency

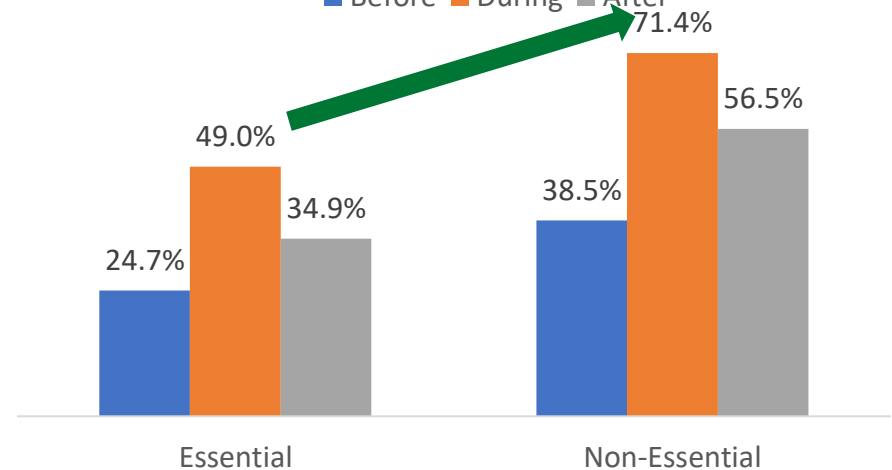
■ Before ■ During ■ After



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

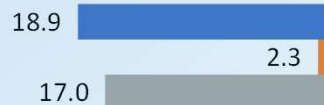
Percentage of Workers WFH for 1+Day/Week

■ Before ■ During ■ After

Employment Type

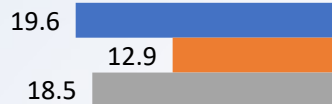
During

After



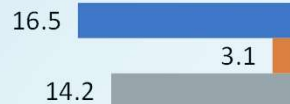
Financial services

-87.7% -10.0%



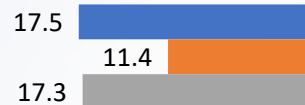
Health Care/Social Assistance

-34.1% -5.8%



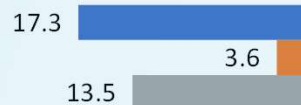
Professional & Business Services

-81.4% -13.9%



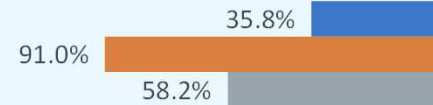
Retail

-35.1% -1.5%



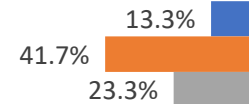
Technology & Telecommunications

-79.2% -21.5%



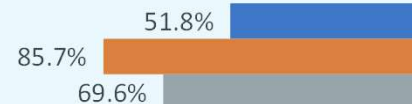
Financial services

55.2% 22.4%



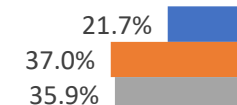
Health Care/Social Assistance

28.3% 10.0%



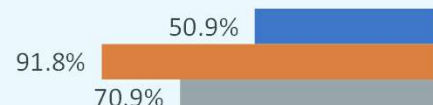
Professional & Business Services

33.9% 17.9%



Retail

15.2% 14.1%



Technology & Telecommunications

40.9% 20.0%

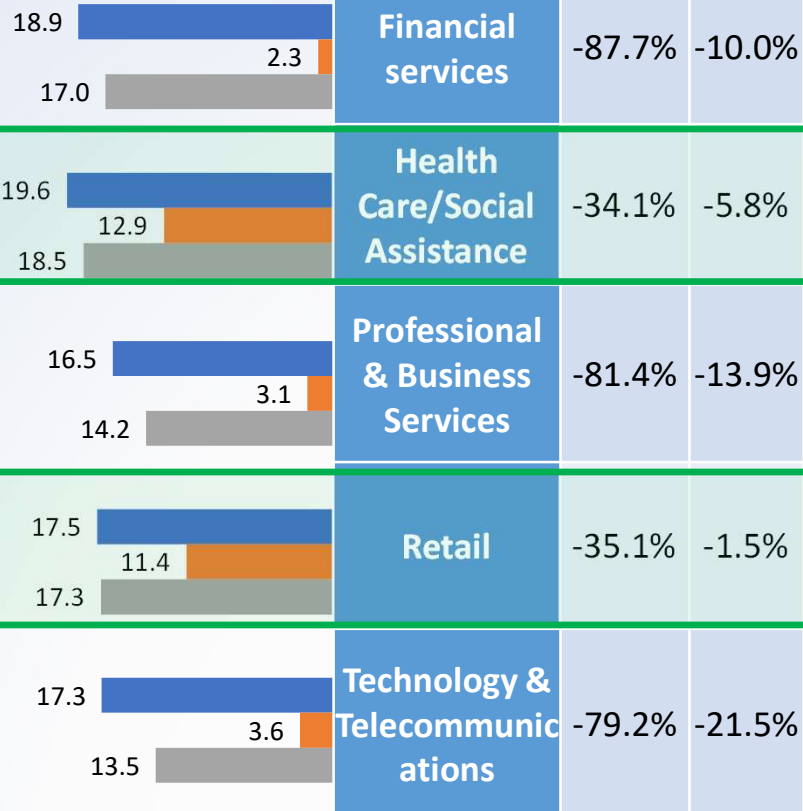
Working by Employment Type

Mixture, on-site working largely needed

Working trips

Monthly Trip Frequency

■ Before ■ During ■ After

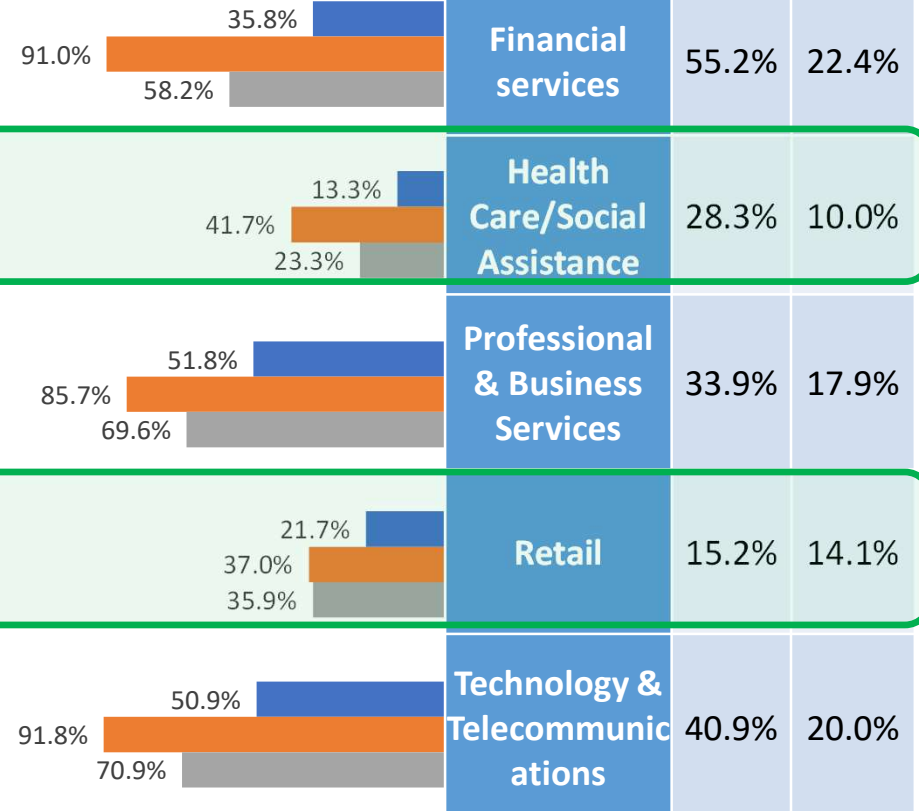


Remote working

Percentage of Workers

WFH for 1+Day/Week

■ Before ■ During ■ After

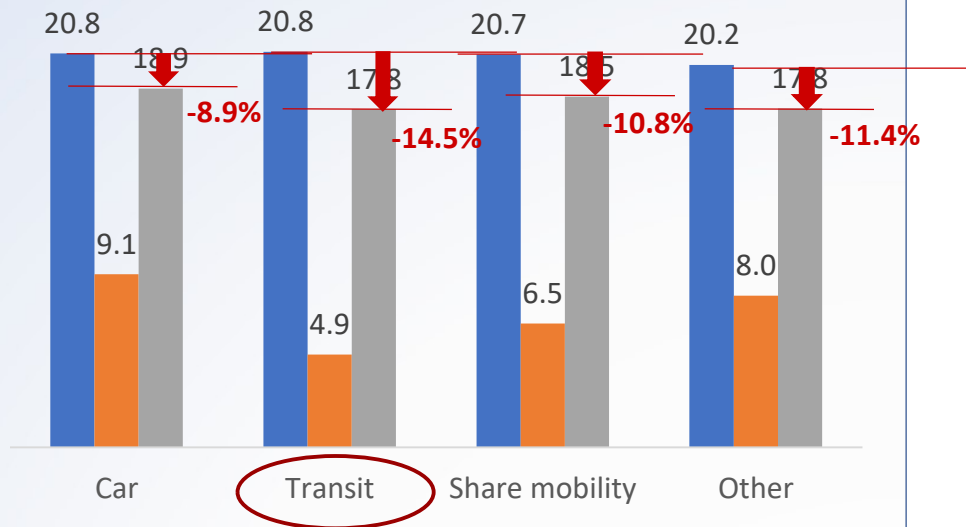


Working by Commuting Mode

Working trips

Monthly Working Trip Frequency

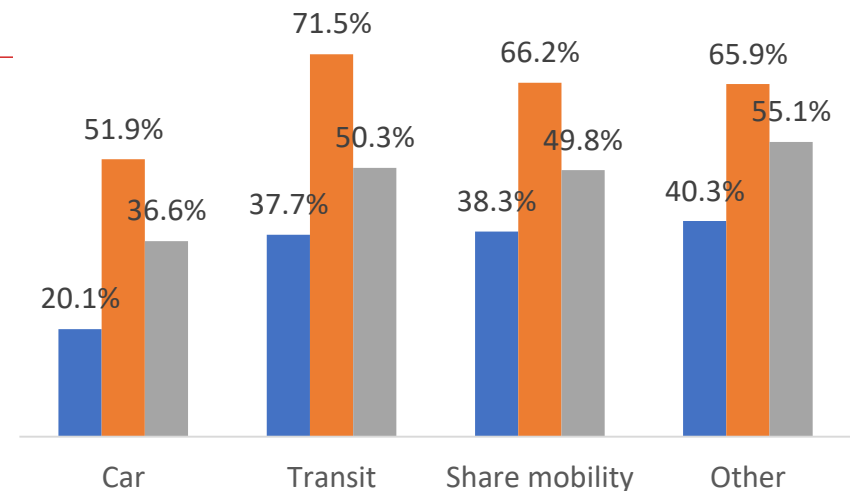
■ Before ■ During ■ After



Remote working

Percentage of Commuters WFH for 1+Day/Week

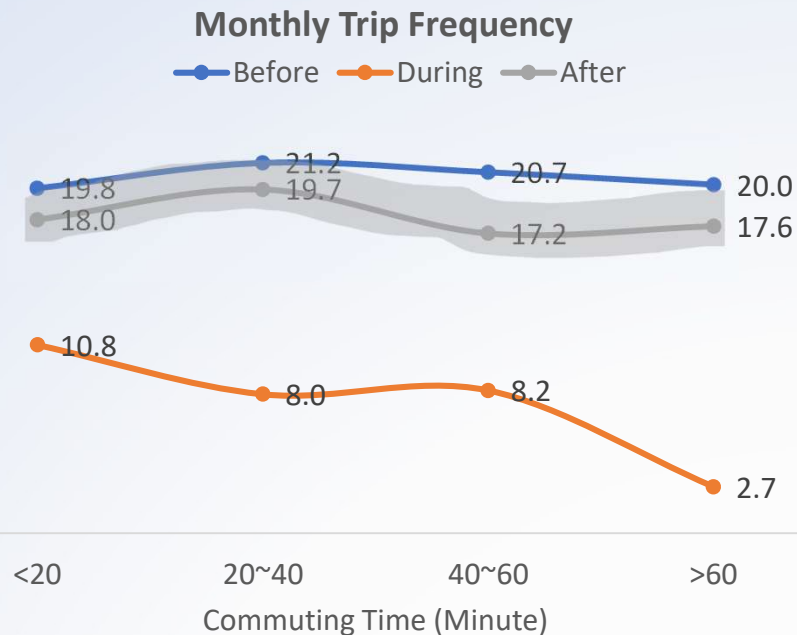
■ Before ■ During ■ After



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

Working by Commuting Time

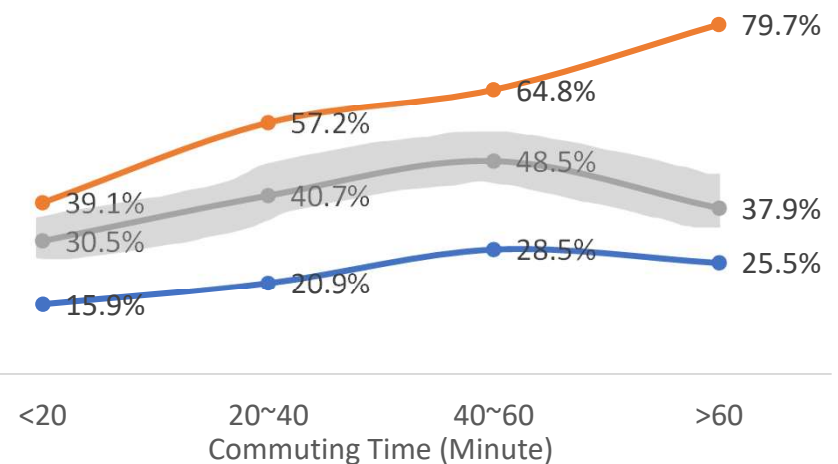
Working trips



Remote working

Percentage of Commuters WFH for
1+Day/Week

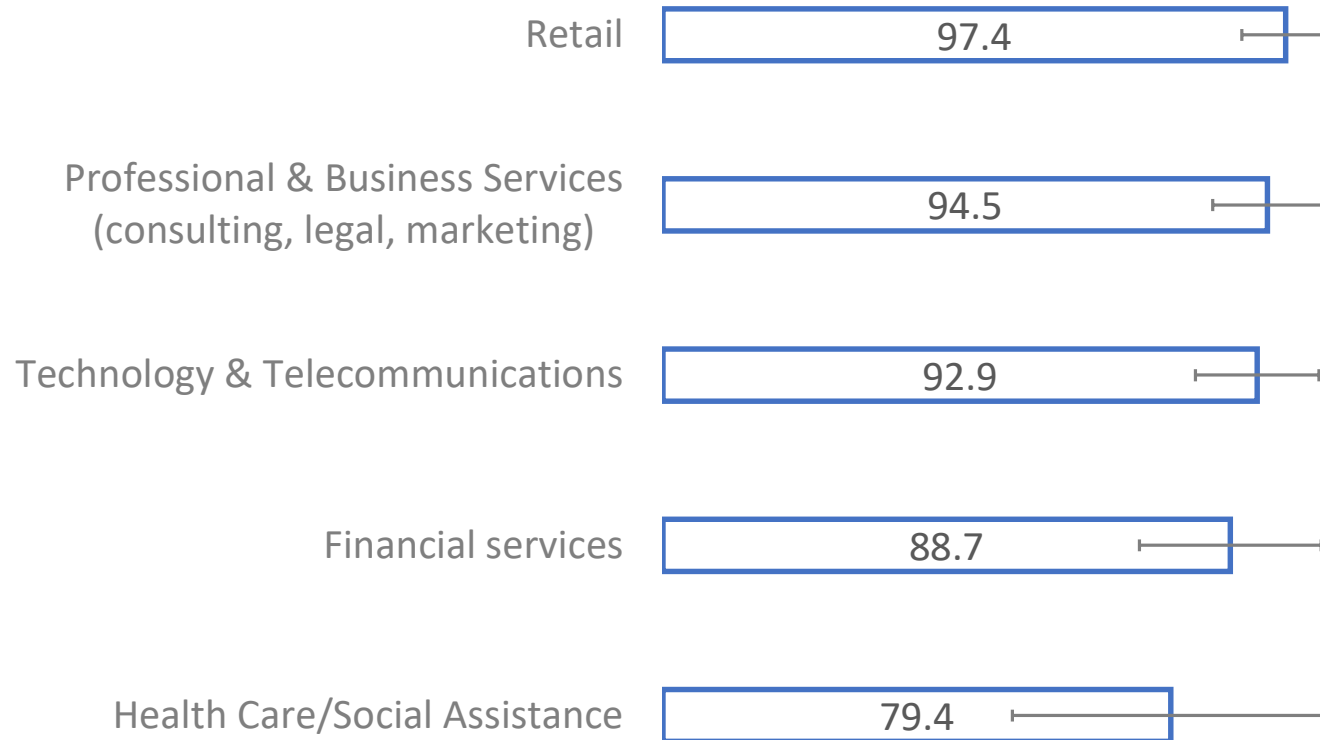
— Before — During — After



- 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?



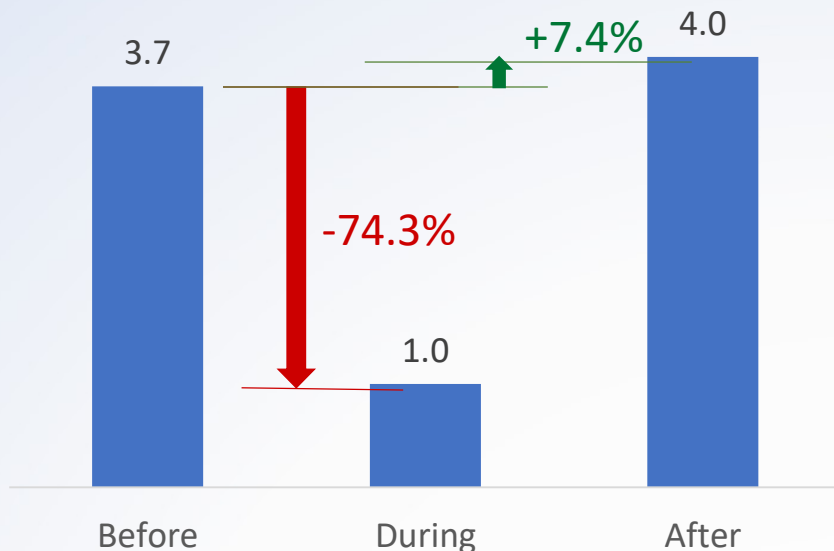
A blurred background image showing a group of people, likely students, sitting around a table in a classroom or meeting room. They appear to be engaged in a social activity, possibly a game or a discussion. The text "Social Activities" is overlaid in the center of the image.

Social Activities

Social Activities

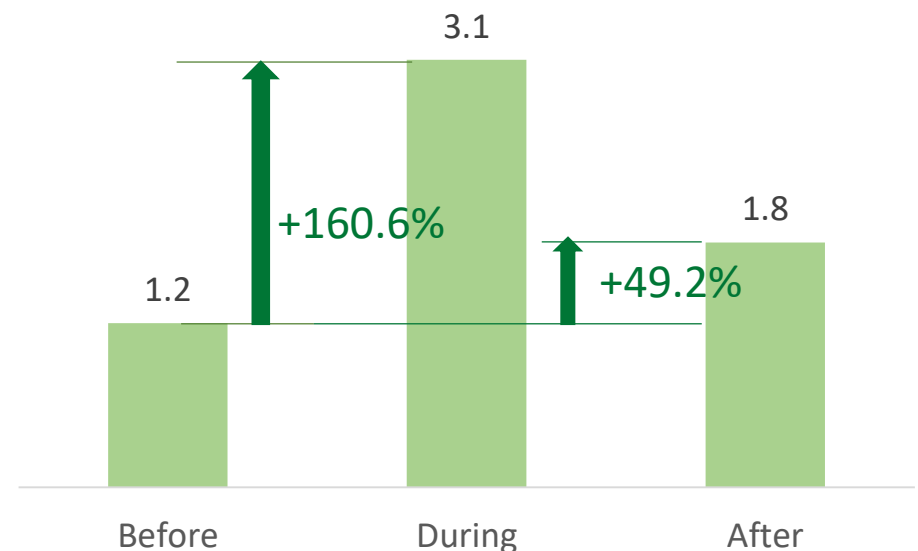
Person trips

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

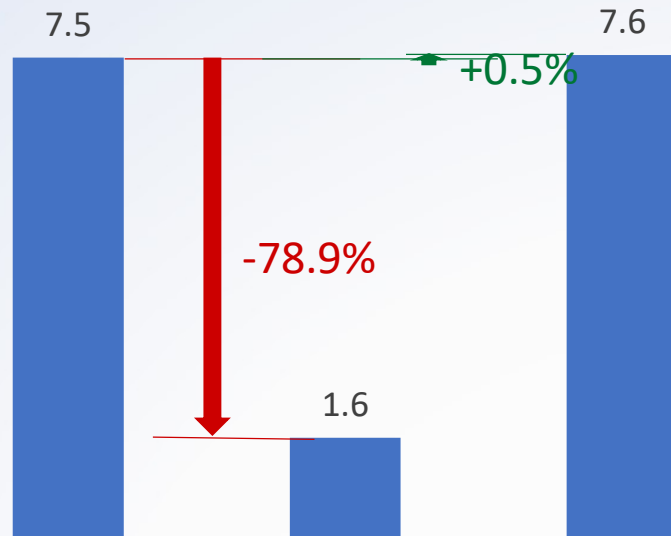
Entertainment



Entertainment activities

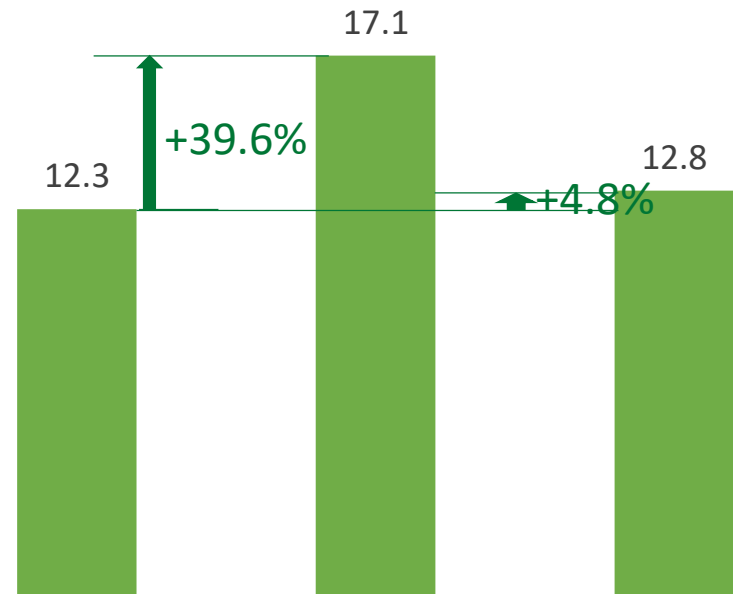
Person trips

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

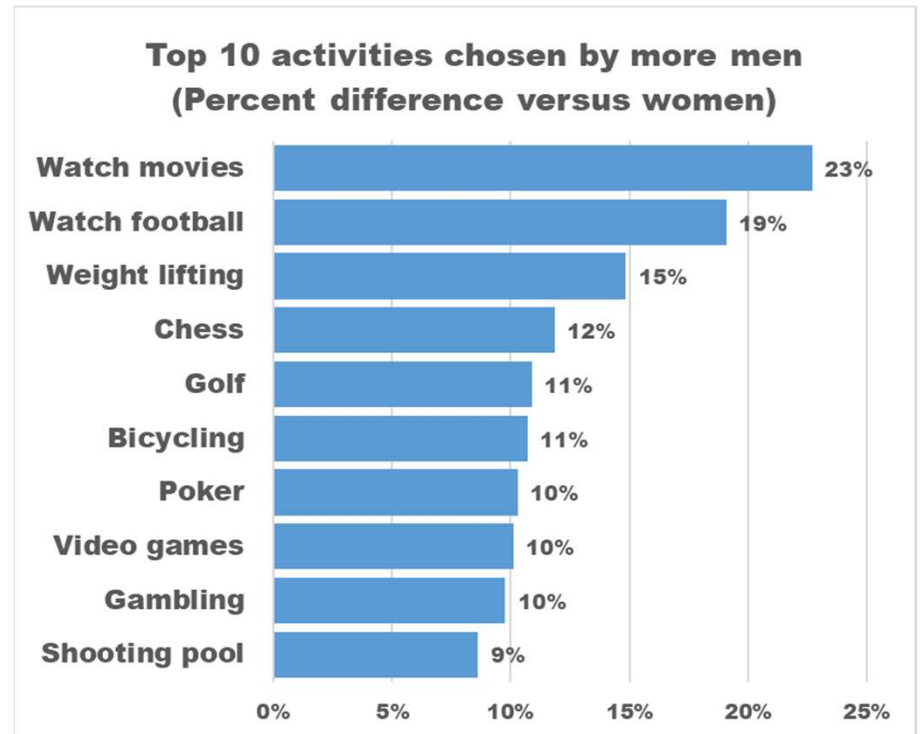
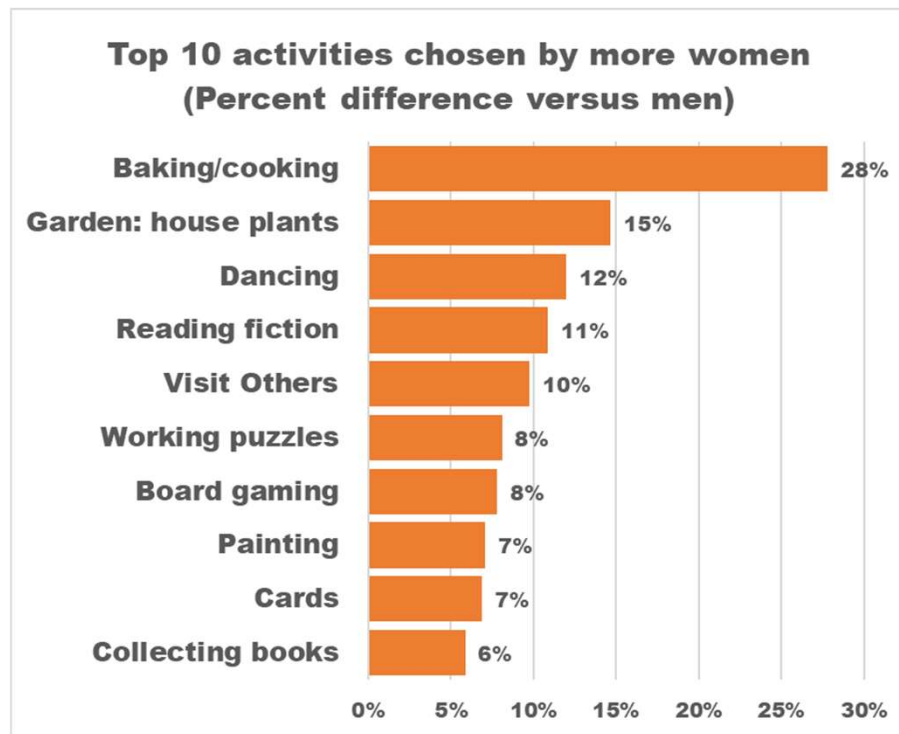
Assistant Professor

Civil and Environmental Engineering

University of South Florida

manessm@usf.edu

Gender Differences in Activity Participation (Pre-COVID)



Survey Source: Social Capital and Leisure Activity Survey

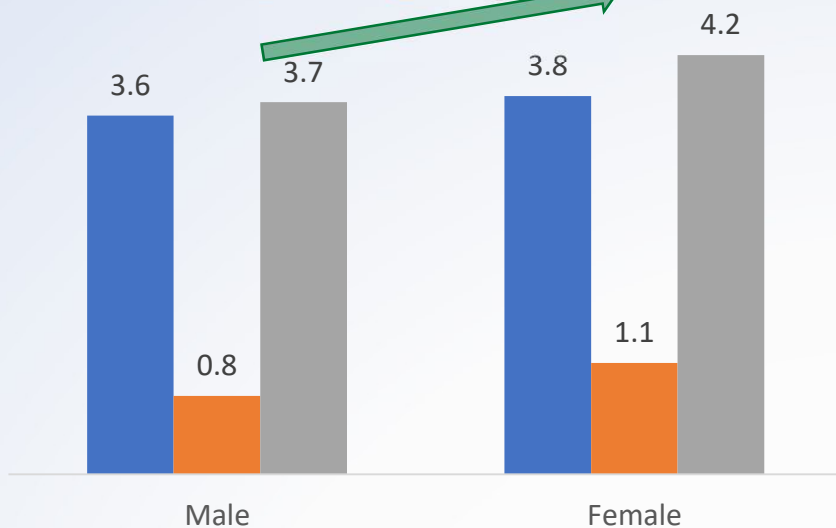


Social Activities by Gender

Person trips

Social trip frequency per month

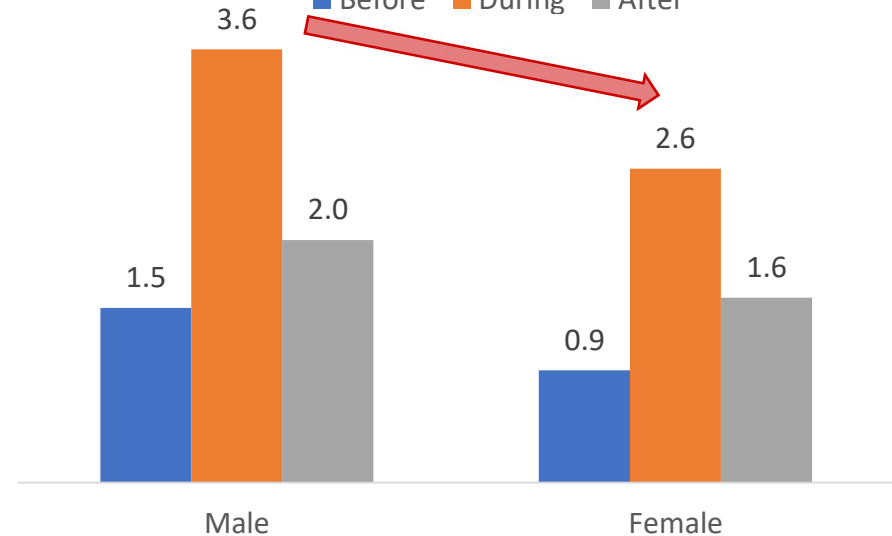
■ Before ■ During ■ After



Tele-activities

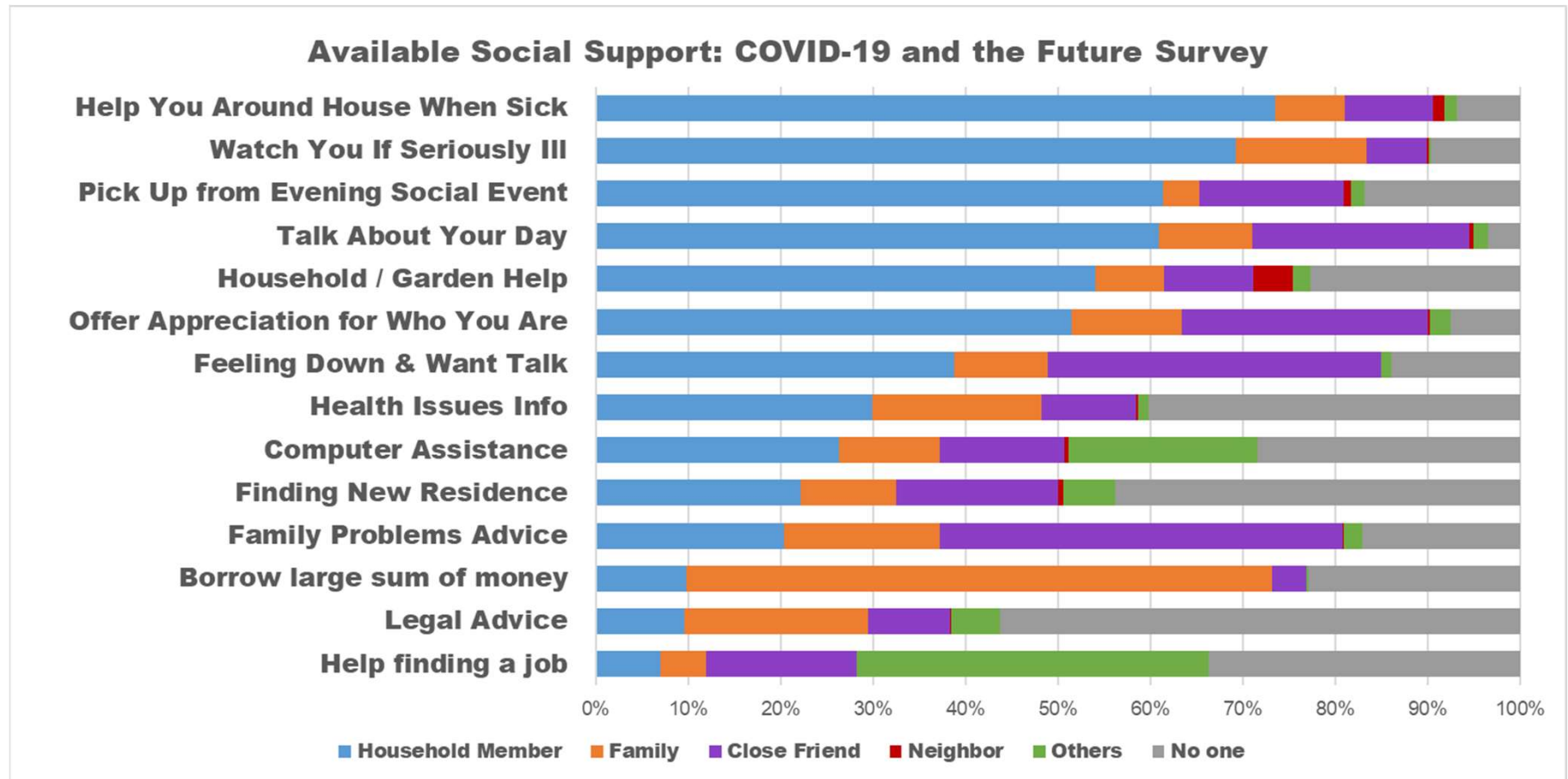
Online social hours per week

■ 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?

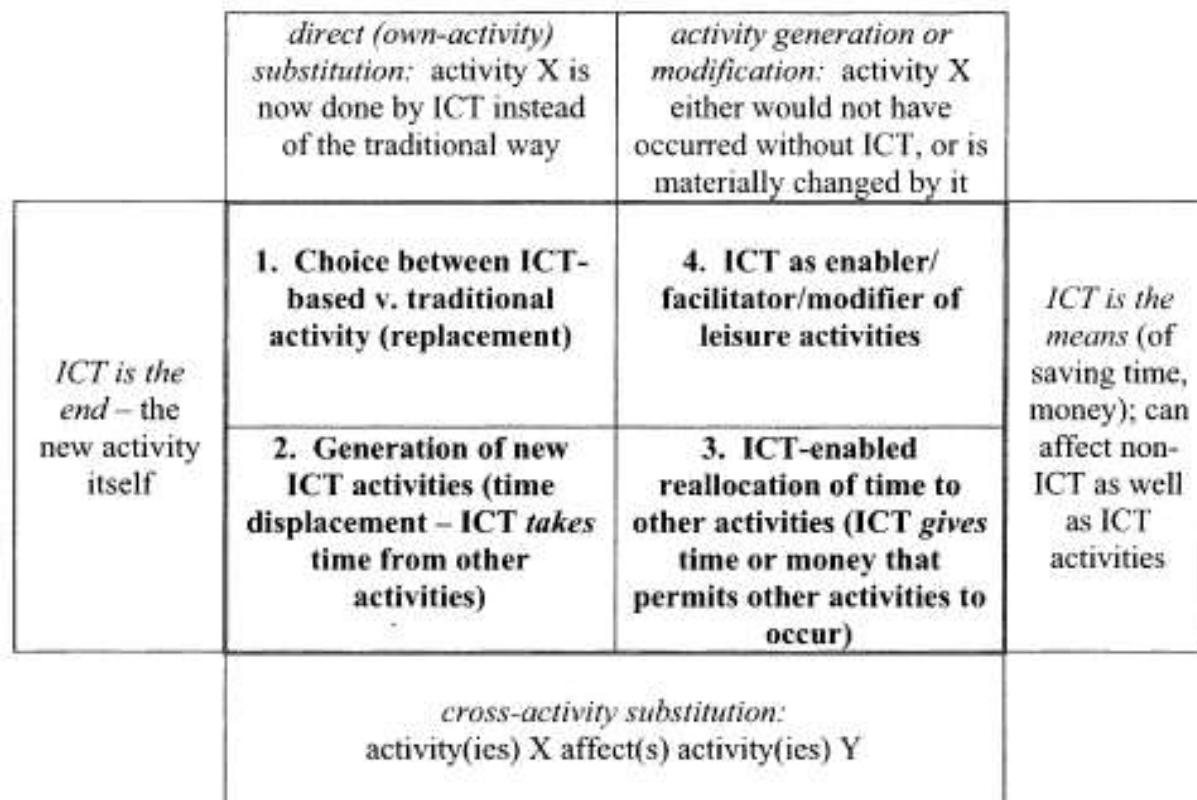


Figure 2. Relationships among types of ICT impacts.

- 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>

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)





Conclusions

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- 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.



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