

Summer 8-20-2021

# Online Grocery Shopping: A Staple of the Present – And Maybe the Future?

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## Citation Details

Chao, Henry B., "Online Grocery Shopping: A Staple of the Present – And Maybe the Future?" (2021).  
*altREU Projects*. 7.

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# Online Grocery Shopping: A Staple of the Present--and maybe the Future?

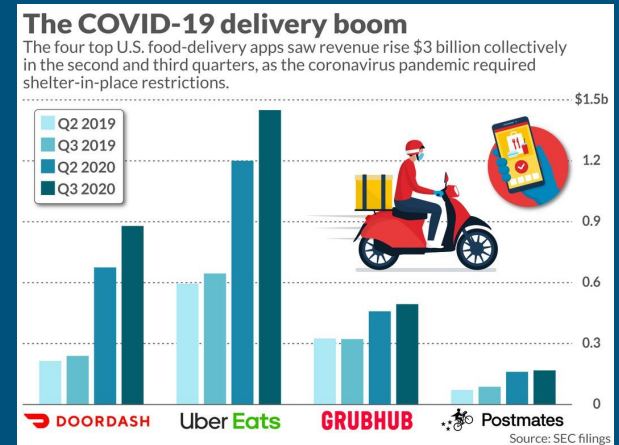
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Mentor: Gabby Abou-Zeid



Source: ZestLabs

# Background

- While many industries have struggled, e-commerce has flourished during to the COVID-19 pandemic
- According to marketwatch.com the overall revenue of food delivery apps like Grubhub, Doordash, Uber eats, etc. more than doubled from Spring & Summer 2019 compared to the same period in 2020
- According to the New York Times, Amazon's profits increased 220% from 2020 Q1 to 2021 Q1



Source: marketwatch.com

# Background

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- From 2019 to 2020, online grocers' share of the market went up from 3.4% to 10.2%, according to [supermarketnews.com](https://www.supermarketnews.com)
- Major players in online grocery shopping include:
  - Instacart
  - Amazon Fresh
  - Freshdirect

# Research Questions

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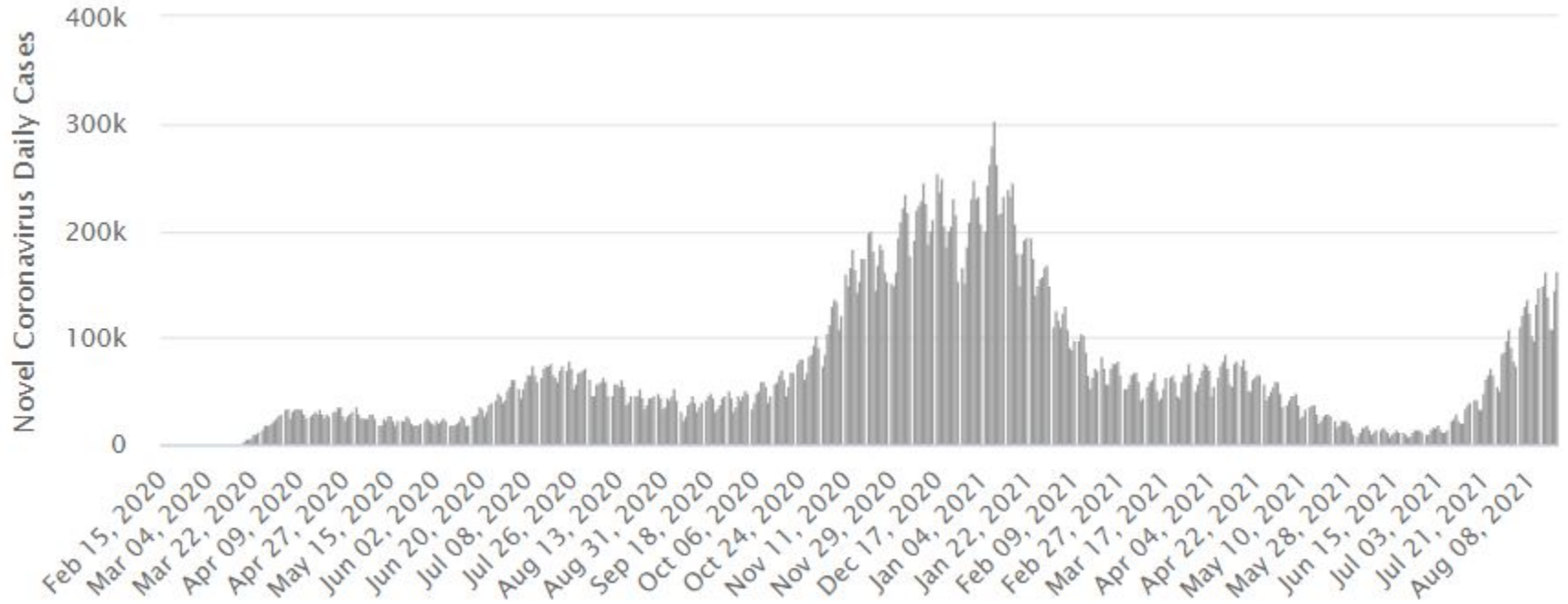
- The goal of this project is to understand how the pandemic has impacted people's shopping tendencies, including:
  - How much has the pandemic helped online grocery shopping grow?
  - What groups of people are more likely to shop for groceries online?
    - In particular, how do people's experiences with COVID affect how they shop?
  - What is the future of online grocery shopping, even after the pandemic is over?

# Data

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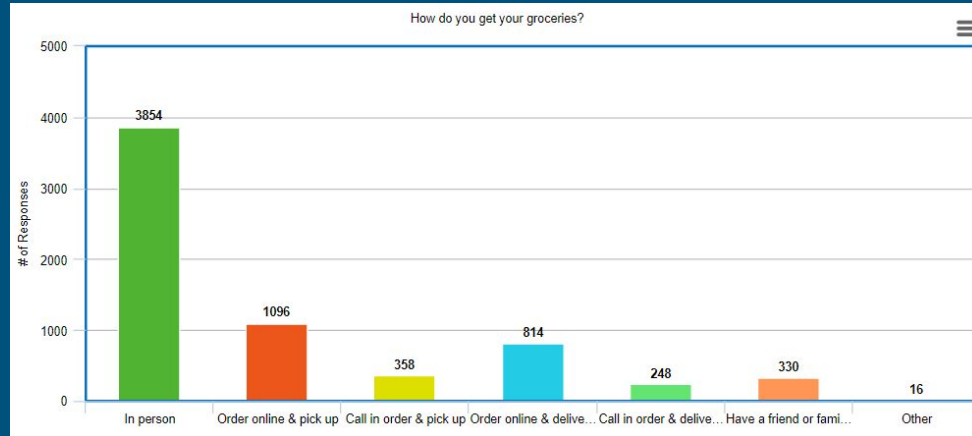
- For this research, most of the time was spend working with data collected by a team led by Dr. Kelly Clifton of PSU
- The data consists of over 8000 total surveys collected in 2 waves
  - Wave 1: Collected in Sep-Oct 2020
  - Wave 2: Collected in Jan-Feb 2021
- Question topics include...
  - Household demographics (age, gender, race, income, etc...)
  - Personal experiences with COVID
  - Food shopping tendencies
  - Miscellaneous opinions (ex. Do you think mask mandates help prevent the spread of COVID?)
- All data was processed and analyzed using R and/or Excel

# Daily COVID cases



# How much has the pandemic helped online grocery shopping grow?

- Some simple statistics from Wave 1 (Fall 2020):
  - 40% of respondents said that they ordered food/household items online “more often” compared February 2020 (pre stay-at-home orders)
  - 30% said that they ordered groceries online for the first time since the start of the pandemic
  - 23% used a delivery app for the first time since the start of the pandemic



Source: meta-chart.com



# What groups of people are more likely to shop online?

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- In particular for this question, I wanted to look at it through the lens of individual COVID experiences
- In order to do this, I analyzed the data with use of a latent class model (LCM)
- The goal of a latent class model is to find “hidden” categorical variables by using various observed categorical variables

# Creating the model

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- Using the Wave 1 data, I fed the model 8 different variables related to personal COVID experience, most notably including:
  - Whether they or a member of their household contracted or is vulnerable to COVID
  - Whether they had been laid off (either temporarily or permanently)
  - They were concerned about losing their housing
  - Whether they were now working from home
- The model created 3 different classes based on these inputs

# Class 1

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- Large share of people who were laid off, concerned about losing housing
- 85% faced a decrease in income due to COVID
- Thus this class will be nominally known as those **financially affected** by COVID

# Class 2

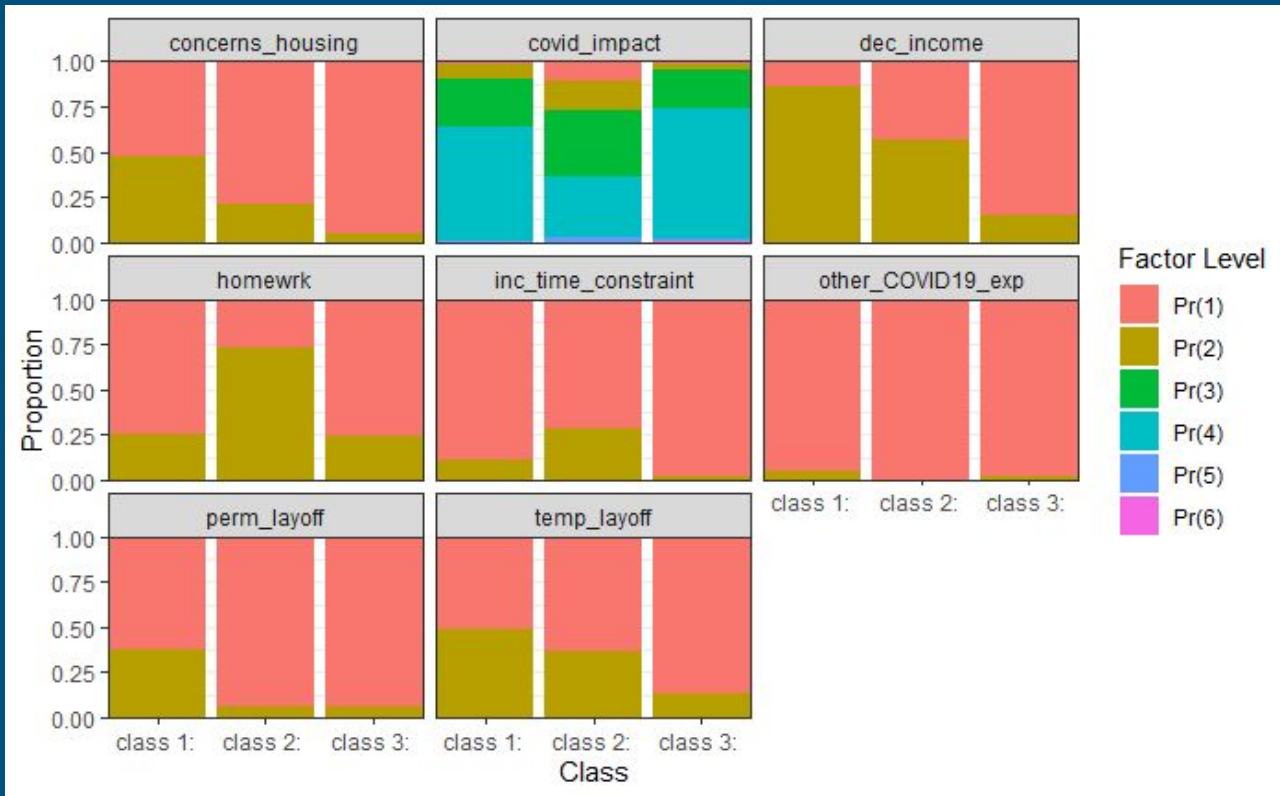
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- High density of people affected directly by the virus
- Almost 30% of people had someone in their household who was diagnosed with COVID
- Many of the households that didn't had someone especially vulnerable to it
- 73% of people in this class worked from home
- As such, this class will be known as those **medically affected** by COVID

# Class 3

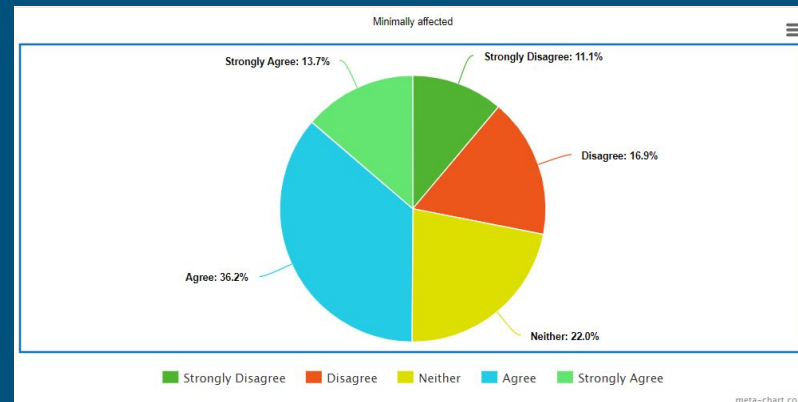
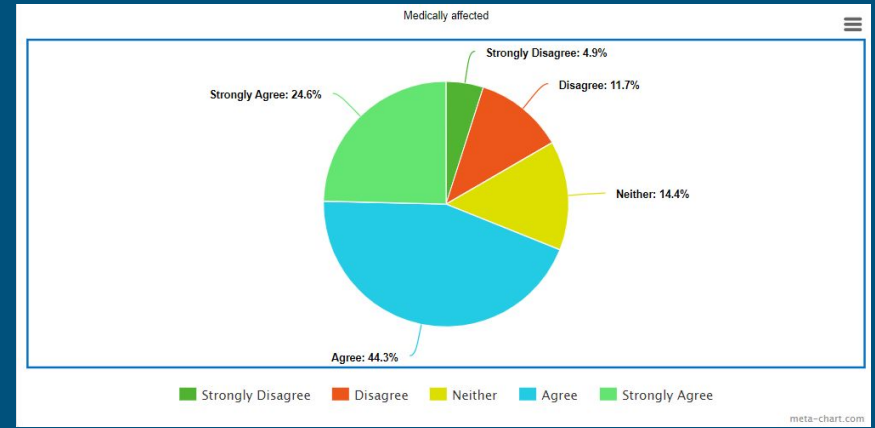
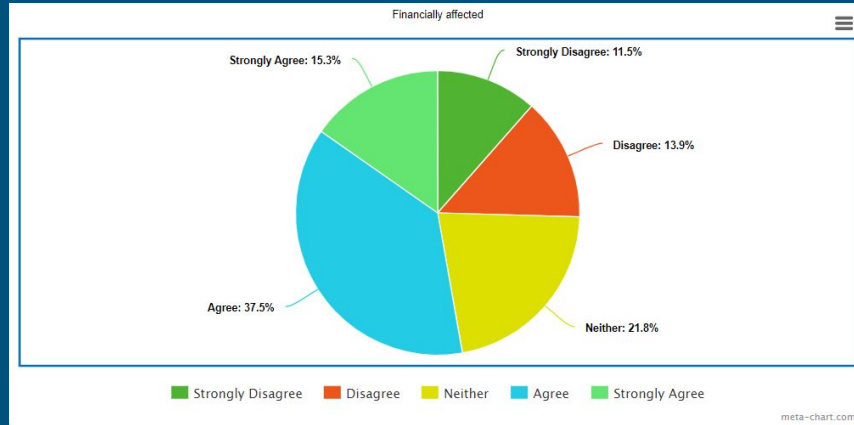
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- Experienced few hardships as a direct result of COVID
- Those who were **minimally affected** by COVID



- Brown indicates YES
- Red indicates NO

Please indicate the extent to which you agree with the following statements. - I am concerned about shopping in a store.



# Characterizing classes' shopping tendencies

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- Estimated monthly grocery shopping trips for each class:
  - Financially affected: 5.5
  - Medically affected: 4.2
  - Minimally affected: 4.4
- Estimated monthly online + phone grocery orders:
  - Financially affected: 0.7
  - Medically affected: 2.1
  - Minimally affected: 0.1
- 47% of people medically affected said that they ordered groceries online for the first time during the pandemic (30% average)



# What is the future of online grocery shopping, even after the pandemic is over?

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- Example:
  - Say we have a person whose close family member contracted COVID sometime during the pandemic. As a result, they started shopping online. How likely are they to continue shopping online, even after the pandemic is over?
- For the sake of the discussion, we refer to this as the “stickiness” of online shopping
- To do this we will actually use Wave 2 data, since it contains different details

# LCM of Wave 2

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- Slightly different input, due to survey question differences
- Instead of the 3 resulting classes, I used 4, due to the prominence of a group that responded “not applicable” to many questions
- The other 3 classes were similar in structure to those of Wave 1

# How does “stickiness” manifest?

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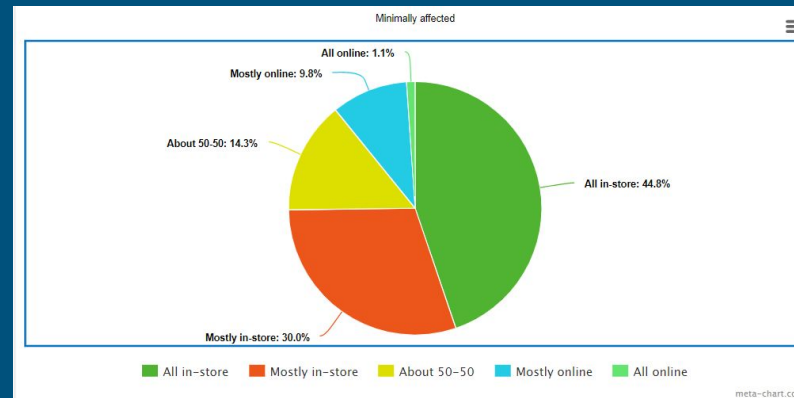
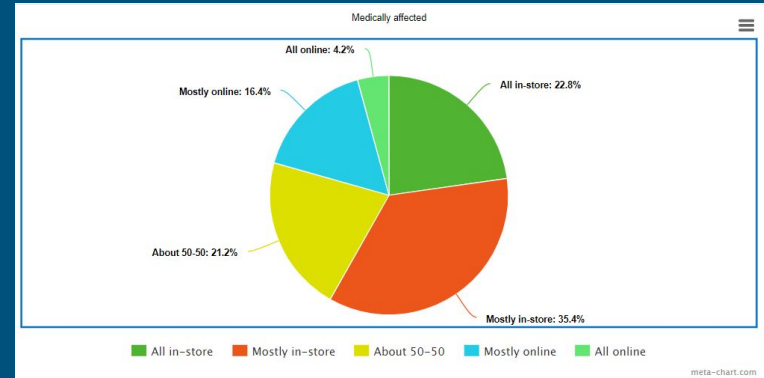
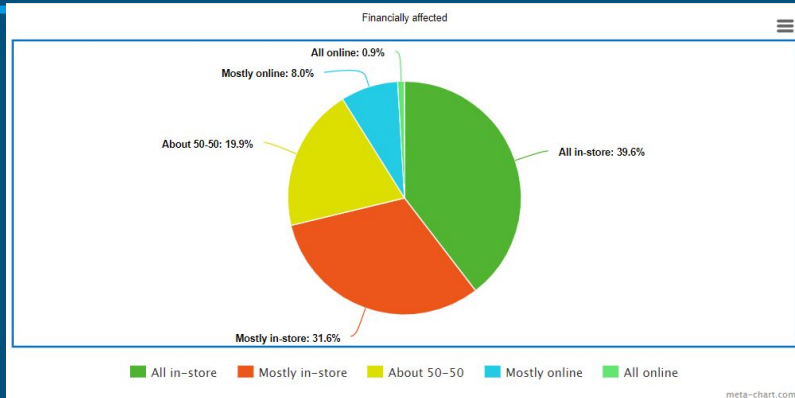
- If a respondent both...
  - Started ordering online more since the start of the pandemic
  - They anticipated shopping online more or the same compared to the day they were asked
- Then they are *sticky*

# Stickiness

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- Breakdown by class:
  - Financially affected class: 24% sticky
  - Medically affected class: 33% sticky
  - Minimally affected class: 28% sticky
- Also want to look at: how people anticipate shopping a year from today?

# A year from today...



# Conclusions

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- It definitely seems as though COVID has substantially helped the niche of online grocery shopping grow
- Is it enough to bring about the demise in-store shopping? Probably not anytime soon
- With Wave 3 data currently being collected and processed, there is so much more to explore...

# Acknowledgements

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- Dr. Christof Teuscher and altREU
- Dr. Kelly Clifton & Gabby Abou-Zeid: PSU
- Dr. Christina Currans: University of Arizona
- Dr. Rebecca Lewis & Amanda Howell: University of Oregon
- National Science Foundation
- National Institute for Transportation and Communities