



**Data Glacier**

Your Deep Learning Partner

# Exploratory Data Analysis

Data Pipeline Project:

Survey of Attitudes on Climate Change

**March 18, 2022**

# Agenda

Executive Summary

Problem Statement

Approach

EDA

EDA Summary

Recommendations

# Executive Summary

- This report presents the results from a technical project utilizing a data pipeline and data from multiple surveys from different platforms.
- We began by creating surveys using Typeform, Survey Monkey and Google Forms, and eventually concentrated our efforts on Typeform and Survey Monkey.
- The focus of our surveys was attitudes about climate change.




# Problem Statement

- The task was to create multiple surveys and then to construct a data pipeline able to extract the usable data entered by survey respondents. The data from the different sources was integrated into one master file, then cleansed and processed, with NaN values and extreme outliers removed (such as one birth year reported as 1000). Finally, birth year bins were created for use in the exploratory data analysis.

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# Approach


- Surveys were limited in length and complexity so they could be completed easily within 90 seconds. This was meant to encourage as many people as possible to complete the forms.
  - We posted links to our surveys on LinkedIn and Facebook, requesting that people complete our survey and share the link with others.
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## Approach: Technical Aspect

We sought to make the surveys across the different formats compatible so that the results would be consistent and able to be represented in a single master data file.

The following two slides provide details of the pipeline for extracting, combining, and visualizing the data from the survey responses.


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## Pipeline: Fetching the Data

- The pipeline starts by creating a “MasterData” instance (a self defined class).
- MasterData uses Typeform and Survey Monkey’s API to fetch the survey results.
- It extracts the relevant information (e.g. filtering the metadata) and stores it as a dictionary.
- It provides methods to reload the results and return the merged results as a Pandas dataframe.

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## Pipeline: Visualizing the Data

- The pipeline then creates an instance of the class DataViz.
  - DataViz uses the pandas dataframe created by MasterData and provides a method for production of jpg files from this dataframe.
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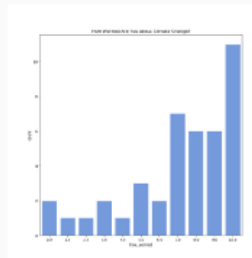


# Survey Results Visualized on a Dashboard

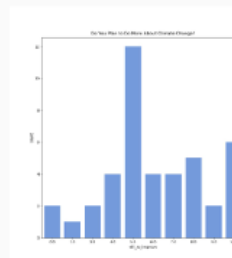


## CLIMATE CHANGE ATTITUDES Survey Results Dashboard

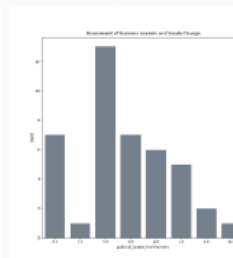
### Level of concern and assessment of Leaders



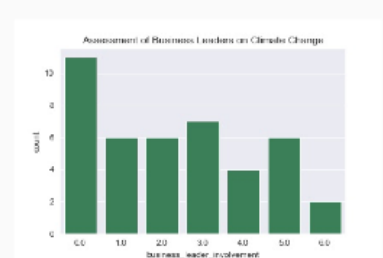
On a scale of 0 to 10, how worried are you about climate change?



On a scale of 0 to 10, do you plan to do more personally about climate change in the coming 12 months?



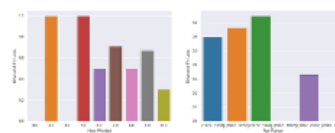
On a scale of 0 to 10, how do you assess the performance of world leaders on dealing with climate change?



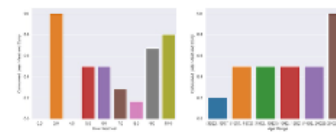
On a scale of 0 to 10, how do you assess the performance of business leaders on dealing with climate change?

### Personal Action Taken within the Past 12 Months.

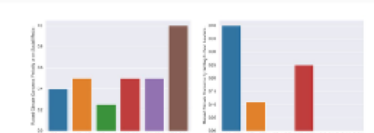
#### Drove or Flew Less, by How Worried and by Age



#### Consumed Less Meat or Dairy, by How Worried and by Age



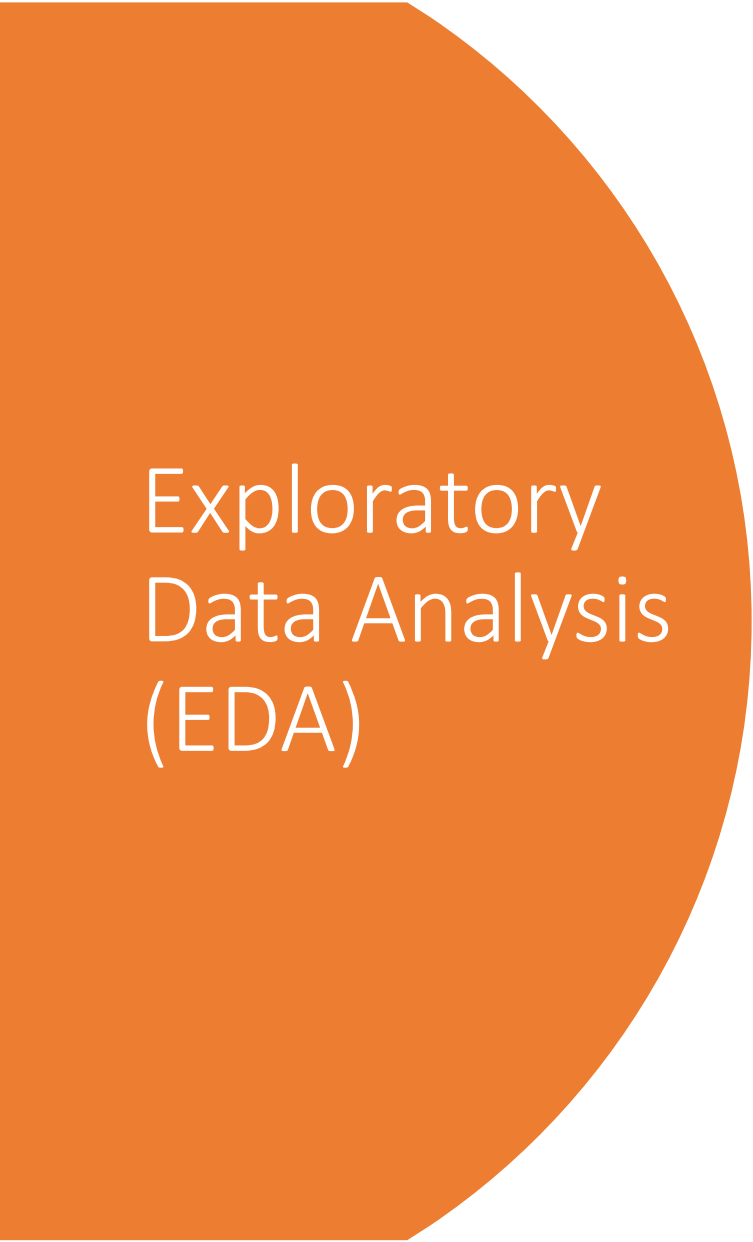
#### Posted on Social Media or Talked about Climate Change, Versus Wrote to Government Officials by Age.



#### Survey Information

These are the results of a technical pipeline project by interns at Data Glacier. Surveys created through Typeform and Survey Monkey were posted online at LinkedIn, Facebook and elsewhere, with results as shown above. The survey was completed in the first quarter of 2022.



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## Exploratory Data Analysis (EDA)

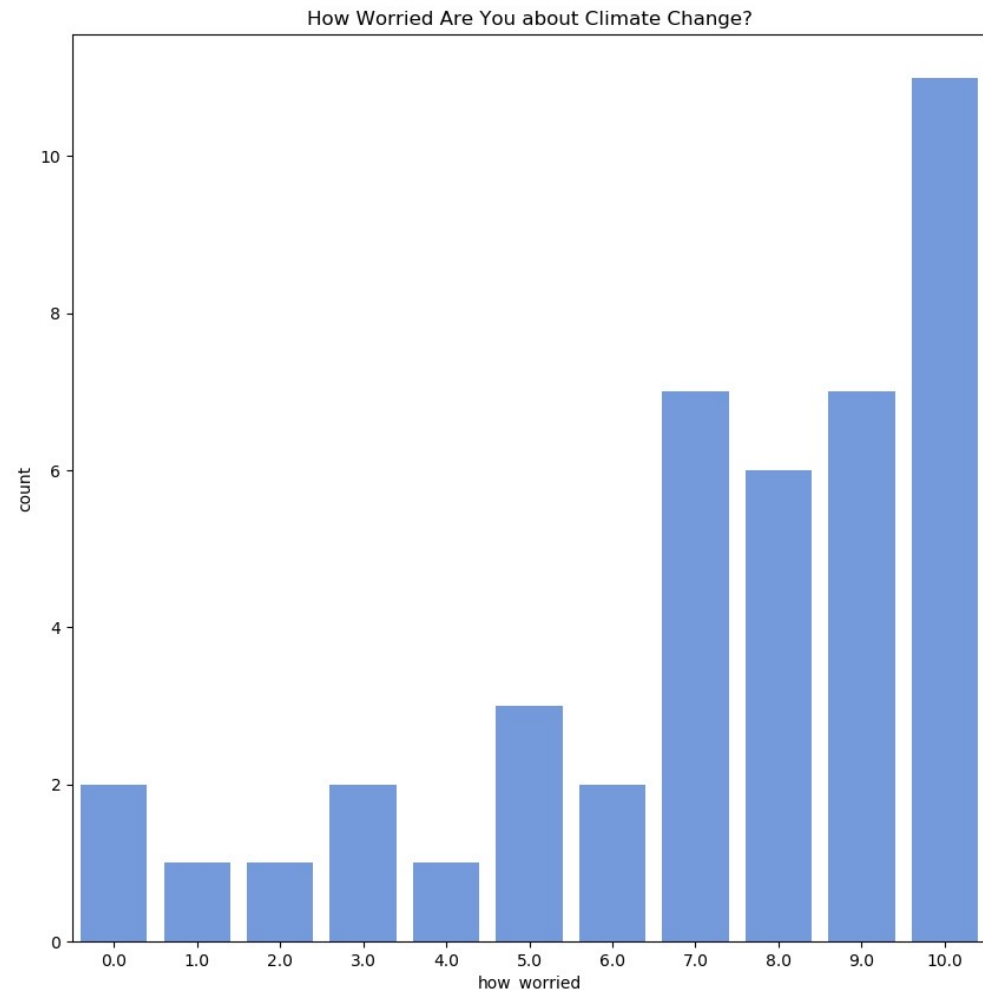
- The rest of this report will present an exploratory data analysis of our survey results, with related recommendations.



# How worried?

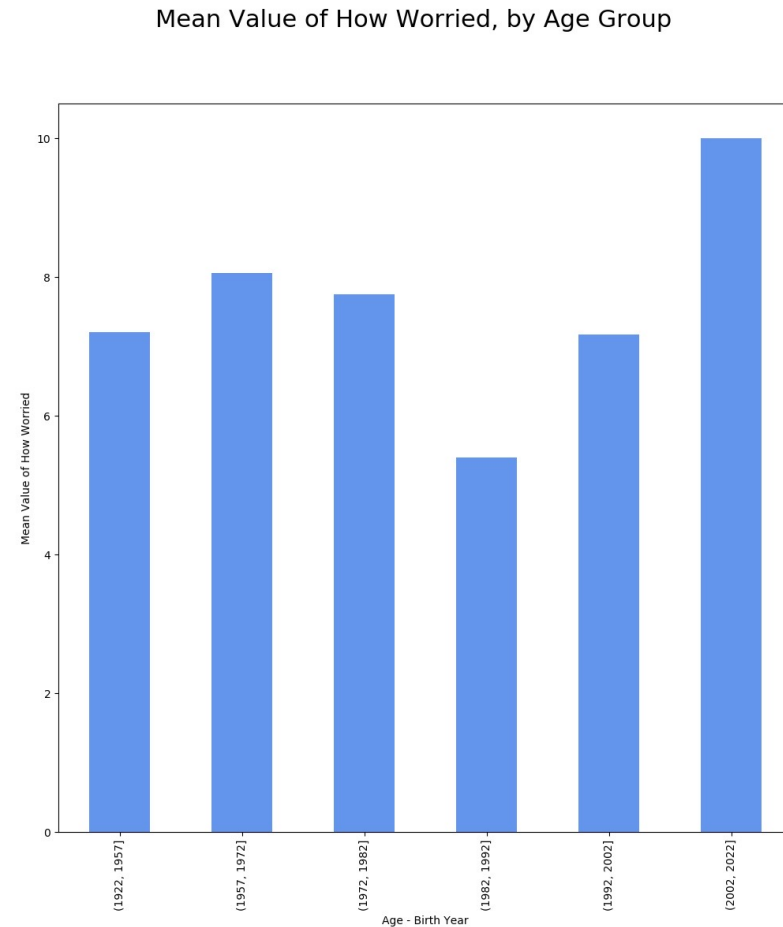
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- In response to the question, “How worried are you about climate change?” given a scale from zero (not at all) to ten (extremely), a majority responded with 7 or more. Many selected ten, indicating the highest level of worry.

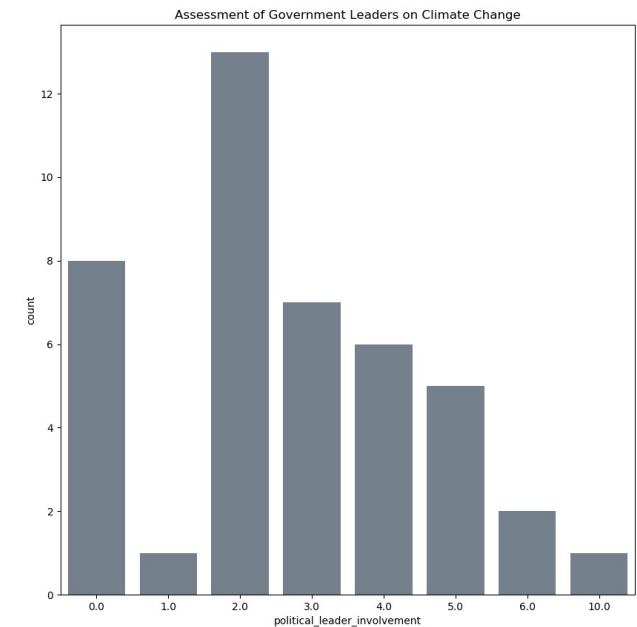


# How worried by age range

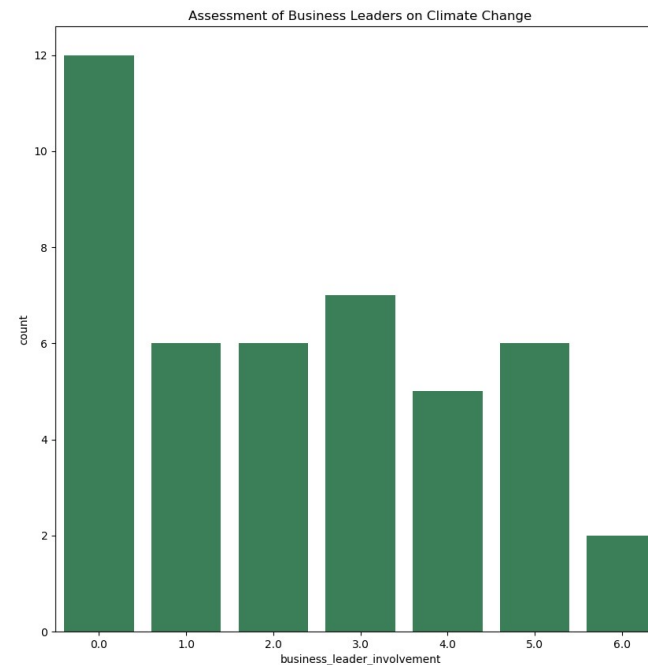
- The youngest respondents appeared the most worried about climate change.
- The chart to the right shows the mean values of the “how worried” responses by age group.



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- In response to the question, “Are world leaders doing enough to address climate change?” on a scale from zero (not at all) to ten (absolutely), a majority responded with three or less, indicating widespread dissatisfaction with the level of effort being made by world leaders in response to the climate crisis. The chart to the right shows the counts of responses at each level. Note there was one response at ten and no other responses above six, with the largest number of respondents rating world leaders’ performance at two.



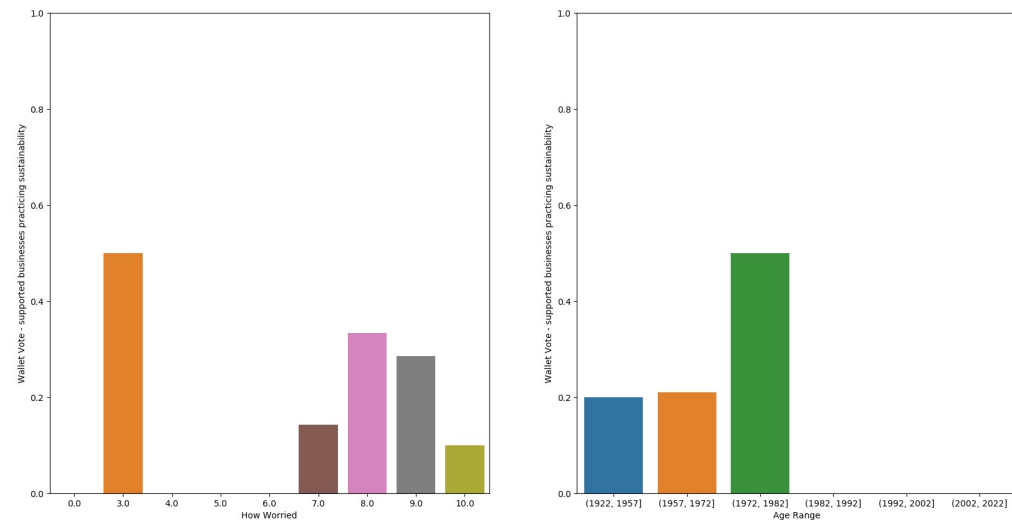
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- In response to the question, “Do you believe a majority of business leaders are making adequate efforts toward environmental sustainability?” on a scale from zero (not at all) to ten (absolutely), a majority responded with three or less. The results for business leaders indicated even greater dissatisfaction than for leaders in government. The chart to the right shows the counts of responses at each level. There were no responses at levels higher than six and the most popular choice of response was zero.



# Voting with your wallet

- In response to the Yes/No question, have you 'Voted with your wallet' or in other ways put pressure on businesses to increase their efforts toward environmental sustainability?" the results showing the proportions for "yes" presented by "how worried" and also by age range are shown. Those from older age groups were much more likely to say "yes" to "voting with the wallet", favoring businesses with good environmental practices in their purchases and other commercial transactions.

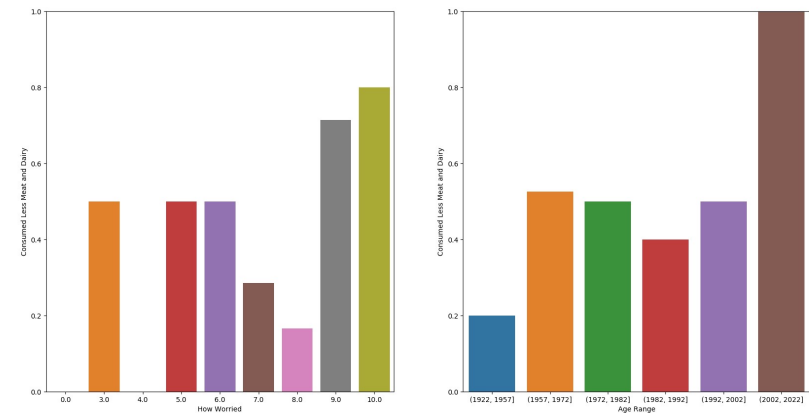
Supported Businesses Practicing Sustainability, by How Worried and by Age



# Consuming Less Meat and/or Dairy

- With regard to farming and agriculture, in response to the Yes/No question, have you “decreased your consumption of dairy and/or meat products” the proportion of “yes” results are shown by age range as well as by how worried the person is about climate change. The youngest group responded “yes” 100% of the time to consuming less meat and dairy, while for those with the highest level of worry about climate change (rated at 10), they responded “yes” 80% of the time.

Consumed less Meat or Dairy, by How Worried and by Age

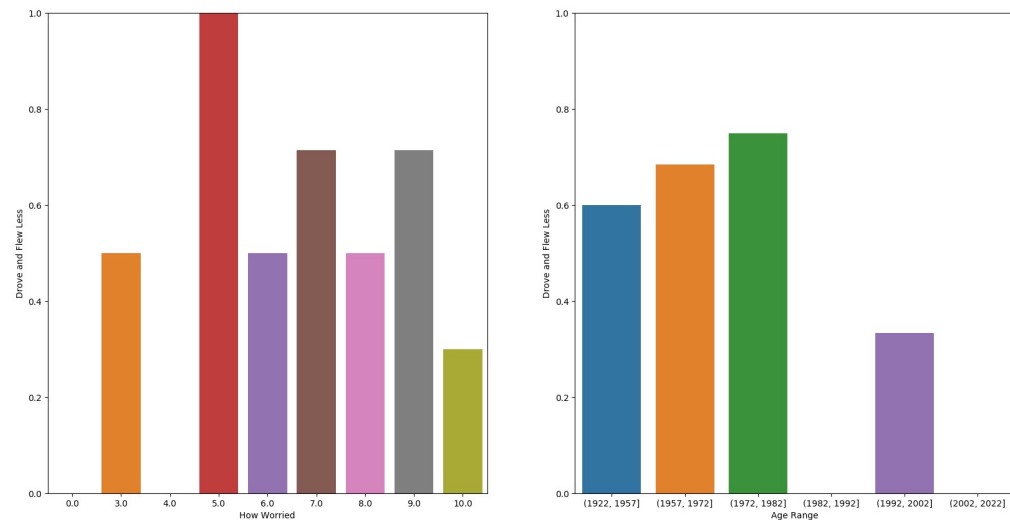




# Choosing to Drive or Fly Less

- The proportions of people who have chosen to drive or fly less in the last 12 months, by degree of their worry about climate change (left) and by their age range (right) are shown in the charts on this page.
- One sees the younger survey respondents are less likely to have responded affirmatively to this question, which might be a result of this youngest group perhaps owning fewer cars.
- The respondents most worried about climate change were only moderately likely to have reduced their flying or driving in the last twelve months. This may be because the respondents who indicated the highest levels of worry tended to be from the youngest age group, as was seen in an earlier slide.

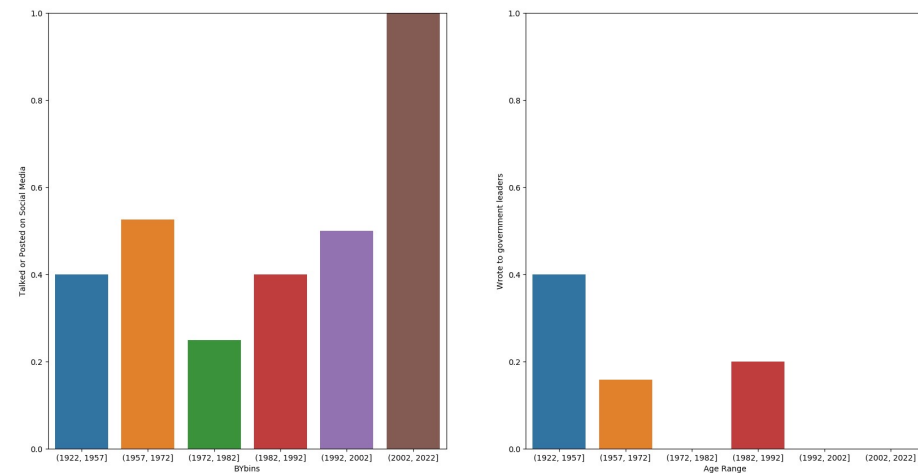
Drove or Flew Less, by How Worried and by Age



# Writing to Government or Posting on Social Media?

- These bar plots show the proportion of “yes” responses to the question, have you in the last 12 months “talked about climate change or posted about it on social media?” or “made your concerns about climate change heard by members of your government?”
- The oldest respondents are doing both, however, the tendency to write to government appears to be diminishing in favor of voicing one’s concerns verbally and on social media.

Talked or Posted about Climate Change versus Wrote to Govt Leaders, by Age



# Descriptive statistics

- There were not many outliers and not much data cleansing was required when creating and preparing the master data file.
- The table included on this page shows some descriptive statistics after this data cleansing was completed.
- None of the questions were mandatory so the counts for the fields are different. There were 43 responses to the question of how worried the respondent is about climate change, and the mean response was 7.2 out of 10 (very worried). Government and business leaders are not generally viewed as performing well on issues relating to climate change, with mean values for their performance rated between 2 and 3 out of 10. The mean birth year for the respondents was 1972.

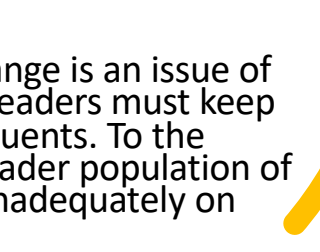
	how_worried	political_leader_involvement	business_leader_involvement	will_to_improve	birth_year
<b>count</b>	39.000000	40.000000	40.000000	40.000000	40.000000
<b>mean</b>	7.487179	2.800000	2.300000	6.200000	1972.600000
<b>std</b>	2.634506	2.065591	1.910833	2.533873	17.192425
<b>min</b>	0.000000	0.000000	0.000000	0.000000	1931.000000
<b>25%</b>	7.000000	2.000000	0.000000	5.000000	1961.750000
<b>50%</b>	8.000000	2.500000	2.000000	6.000000	1970.000000
<b>75%</b>	9.500000	4.000000	4.000000	8.000000	1989.500000
<b>max</b>	10.000000	10.000000	6.000000	10.000000	2003.000000

# EDA Summary

- The level of personal action on climate change correlated moderately well with the expressed level of worry about climate change.
- The type of action on climate change taken varied with the age, with younger respondents being more likely to change their diet and older respondents more likely to drive less and conserve on home energy use.
- Only the oldest respondents, those born before 1958 said they had written to government leaders about climate change. Younger respondents shared their concerns on social media instead.

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## Recommendations to government and business leaders

- Businesses should assess views in relation to their own industry, with special attention to the attitudes and behavioral trends of the youngest group – whose attitudes and behavior probably best represent future trends.
  - Young people are reducing their consumption of dairy and meat and they are sharing their concerns about climate change on social media. In other ways they are less inclined to “vote with the wallet.”
  - Older consumers are more likely to drive less, to write to government officials, and to spend less on home energy.
  - These attitudes and behaviors should be assessed regularly by business leaders, with specific questions targeted by industry. As concerns about climate change increase, staying ahead by understanding current thinking of consumers will be essential.
  - Government leaders should recognize that climate change is an issue of tremendous concern to citizens. To remain electable, leaders must keep abreast of these climate concerns held by their constituents. To the extent our survey results represented views of the broader population of citizens, elected leaders are perceived as performing inadequately on addressing climate change.
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# Thank You