It's a Trap!:
Use of Trap Questions and Data Quality

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Ipsos Public Affairs

2022 FCSM Research & Policy Conference
October 25th – October 27th, 2022
Washington D.C.

Abstract

Researchers often have concerns over data quality due to inattentive or unmotivated respondents. Various measures have been developed to assess whether respondents are providing accurate responses. Besides speeding and response non-differentiation, researchers sometimes imbed trap questions that can be used to detect when someone is not paying attention. A compliance trap directs a respondent to select a particular response (e.g., "Select 'Somewhat agree' for this item") regardless of the question. We studied whether cleaning out respondents who fail such traps would improve data quality. In a study with over 3,500 completes from an online probability-based panel, respondents were randomly assigned to experience two compliance traps or not. We examined respondent reactions following their presentation and we also looked at any reduction in bias using 10 demographic items for which we had benchmark values. We also looked at how trap failure was related to speed to complete (another indicator of sub-optimal behavior). For both trap conditions, we found that higher trap failure had a modest association with faster completion times. We found that there was no difference in average bias between the full samples versus the samples that had eliminated participants due to trap failures. It appears that trap failures are not as closely related to data quality as many have believed.

Introduction

- **Concerns over data quality due to unmotivated or inattentive respondents.**

- **Optimal responding vs. sub-optimal responding.**

- **Several methods to identify suboptimal responses that might impact data quality:**

  - **Speeding**
  - **Item nonresponse**
  - **Grid non-differentiation or straightlining**
  - **Consistency checks**
  - **Compliance trap questions, attention checks, red-herrings**

- **One form of sub- optimal response may not be strongly predictive of other forms of sub optimal response simultaneously and may be influenced by very different causes (Thomas, 2011).**

Study Design

- **Our study uses an experimental design to assess the relationship between data quality and use of trap questions.**

- **We tested different types of trap questions as well as respondents' reactions to trap questions.**

- **Furthermore, we also tested whether order of response options or asking respondents to select a negative or positive response made a difference.**

Study Design

- **We conducted a study between *January 14 and February 11, 2022*, utilizing the KnowledgePanel, one of the largest online probability-based panels in the U.S.**

- **Mode: Web-based**

- **Sample Type: General Population**

- **n = *3,539* completes.**

Experimental Study: 3x2x2 Design

TRAP TYPE
1. Straightforward
2. Disguised
3. No Trap

ORDER OF RESPONSES
1. A-E
2. E-A

POSITIVITY
1. Agree/Disagree
2. Sometimes True/ Very often true

Study Design-Continued

REACTIONS TO TRAPS

- **Overall reaction (rated: Positive, Neutral, Negative).**
- **Confusion about the purpose of the question.**

CONSISTENCY CHECK

- **Asked two similar questions to check the correlation between consistency and trap failure.**

BENCHMARK COMPARISON

- **We removed the sub-optimal responses and looked at their impact to determine the extent of bias in the sample.**

Trap Conditions

Straightforward	Disguised
TRAP 1	
1. To show that you are still reading these questions, please select the [randomly assigned: "Disagree" or "Agree"] response below. Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree	1. Political issues are important to many people. To show that you are still reading these questions, please select the [randomly assigned: "Disagree" or "Agree"] response below. Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree
TRAP 2	
2. This is an open item to confirm correct response presentation – please select the ["Sometimes true" or "Very often true"] response below. Not at all true Sometimes true Often true Very often true Always true	2. People's experiences in the U.S. vary. This is an open item to confirm correct response presentation – please select the ["Sometimes true" or "Very often true"] response below. Not at all true Sometimes true Often true Very often true Always true

Assessment by Trap Type

✅ **More people failed the first trap compared to the second trap.**
✅ **More people failed the disguised trap compared to the straightforward trap.**

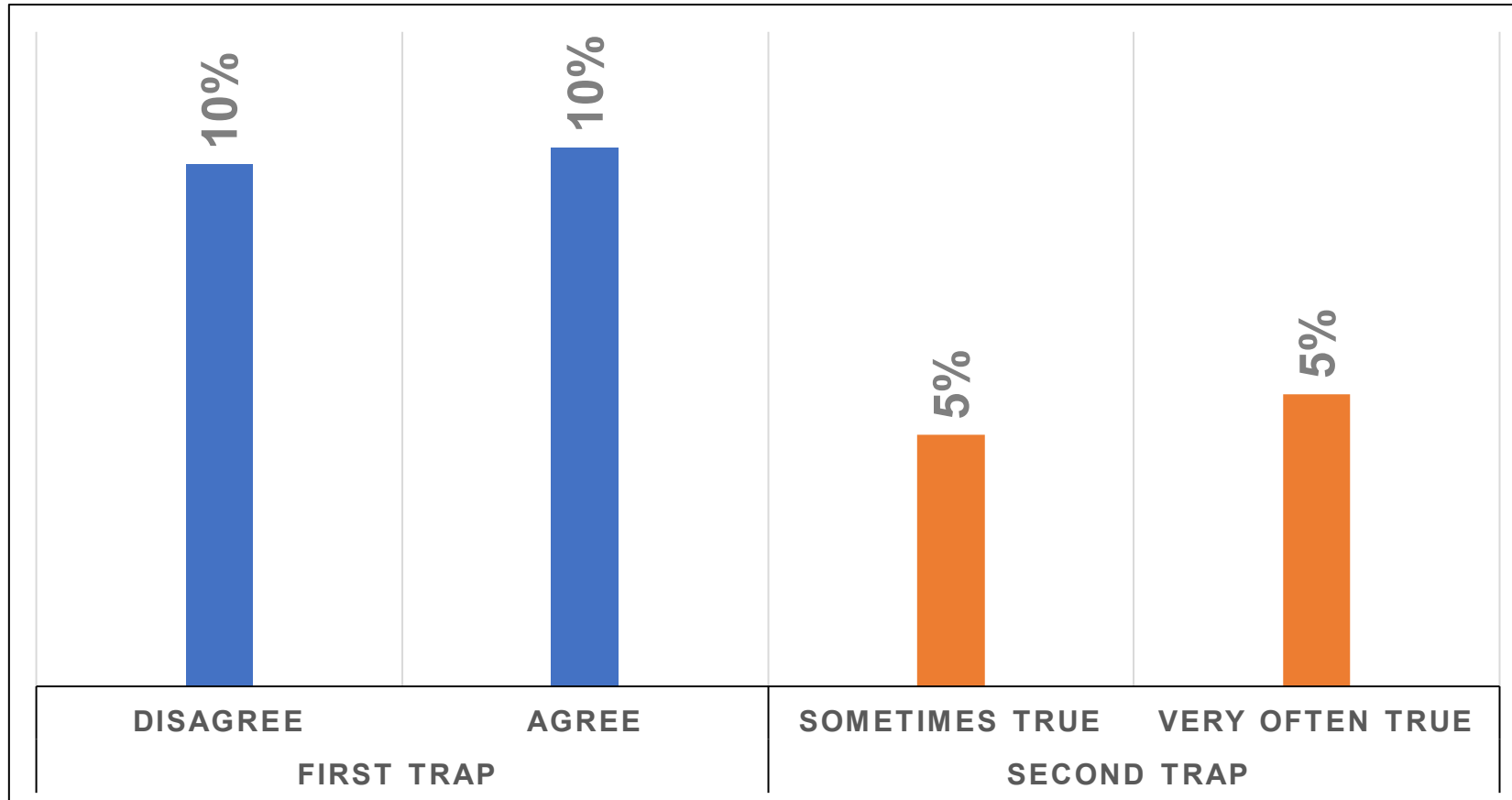| Traps	Straightforward	Disguised
Failed First	7%	13%
Failed Second	3%	8%
Failed at least one	5%	9%
Failed both	2%	6%

Trap Type and Positive vs. Negative Response Experiment

POSITIVITY ① Agree/Disagree or ② Sometimes true/Very often true

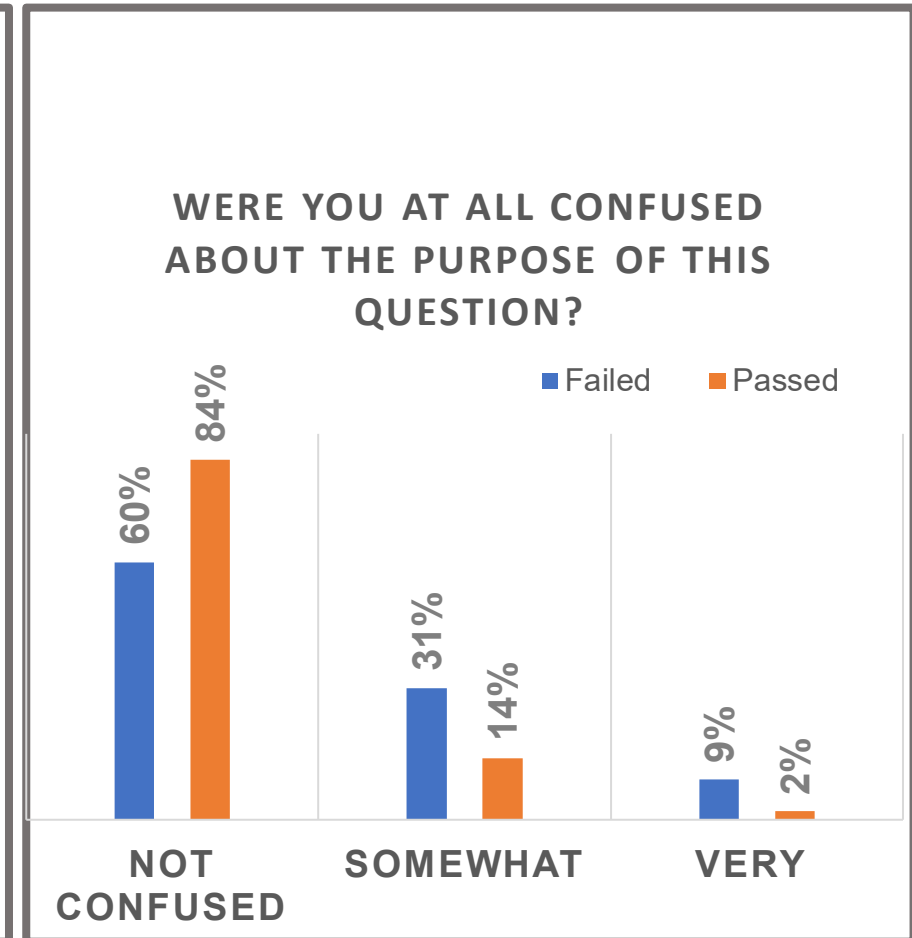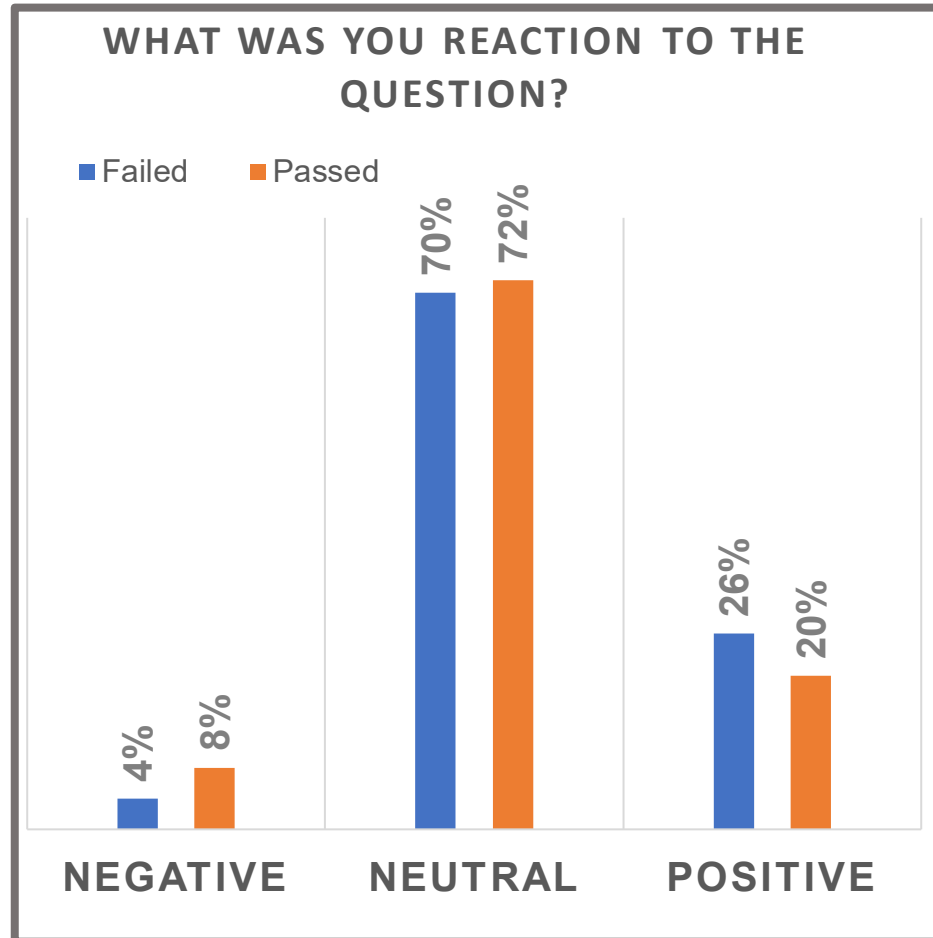No difference by the response category they were assigned.

10%	10%	5%	5%
DISAGREE	AGREE	SOMETIMES TRUE	VERY OFTEN TRUE
FIRST TRAP		SECOND TRAP	

Reactions to Trap Questions – Trap 1

First Trap Question

[Political issues are important to many people.] To show that you are still reading these questions, please select the "Disagree"/"Agree" response below.

Strongly disagree
Disagree
Neither agree nor disagree
Agree
Strongly agree

WHAT WAS YOU REACTION TO THE QUESTION?

- Failed
- Passed

	Failed	Passed
NEGATIVE	4%	8%
NEUTRAL	70%	72%
POSITIVE	26%	20%

WERE YOU AT ALL CONFUSED ABOUT THE PURPOSE OF THIS QUESTION?

- Failed
- Passed

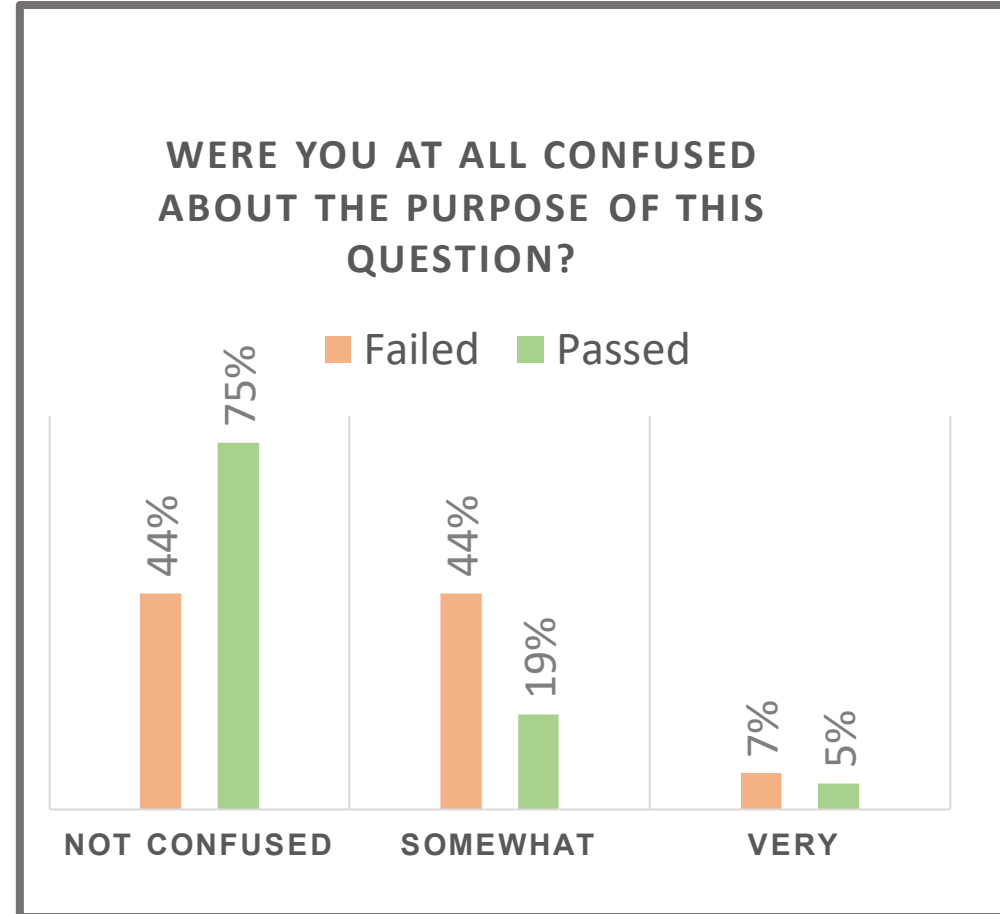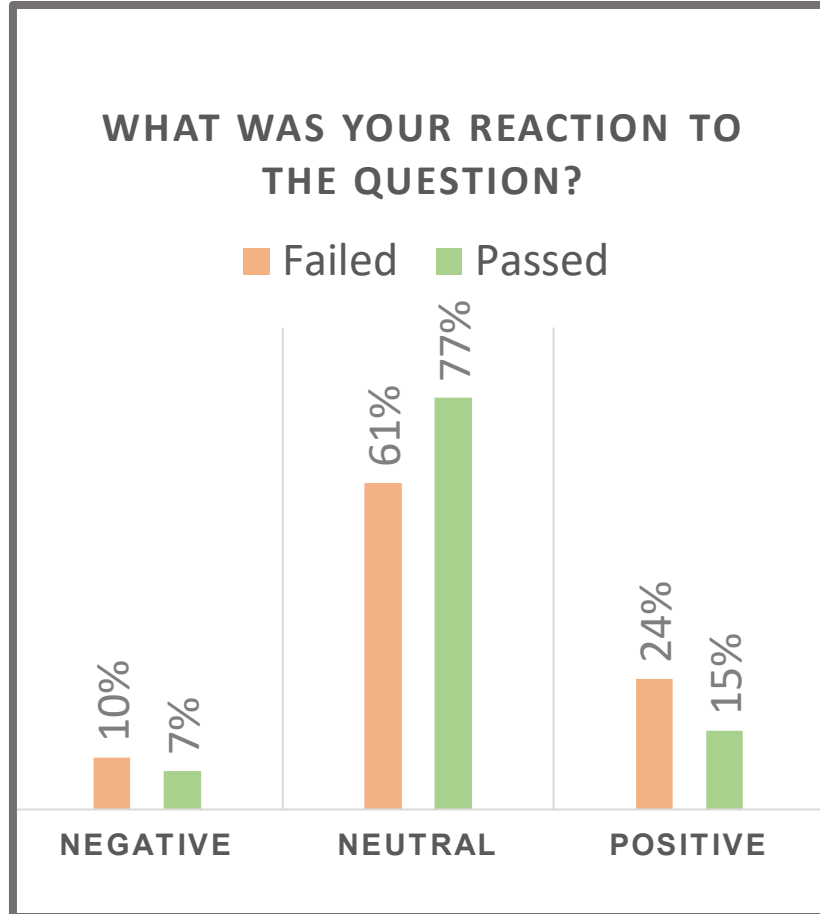|	Failed	Passed
NOT CONFUSED	60%	84%
SOMEWHAT	31%	14%
VERY	9%	2%

Reactions to Trap Questions –Trap 2

Second Trap Question

[People's experiences in the U.S. vary.] This is an open item to confirm correct response presentation – please select the "Sometimes true"/ "Very often true" response below.

    Not at all true
    Sometimes true
    Often true
    Very often true
    Always true

WHAT WAS YOUR REACTION TO THE QUESTION?

Legend: ■ Failed ■ Passed

	Failed	Passed
NEGATIVE	10%	7%
NEUTRAL	61%	77%
POSITIVE	24%	15%

WERE YOU AT ALL CONFUSED ABOUT THE PURPOSE OF THIS QUESTION?

Legend: ■ Failed ■ Passed

	Failed	Passed
NOT CONFUSED	44%	75%
SOMEWHAT	44%	19%
VERY	7%	5%

Is speeding correlated with failure?

We broke down the speeders by:

- Bottom 2.5%
- Next 2.5%
- Next 5 %
- Next 10 %
- Slowest 80%

Fastest

	FAILED NONE	FAILED AT LEAST ONE	FAILED BOTH
FASTEST 2.5%	78%	10%	12%
NEXT 2.5 %	93%	5%	2%
NEXT 2.5%	95%	3%	3%
NEXT 10%	95%	3%	1%
SLOWEST 80%	88%	8%	4%

Consistency Check and Trap Failure

Consistency Check 1

All things considered, how satisfied are you with your life overall?

A. Very dissatisfied
B. Somewhat dissatisfied
C. Neither satisfied nor dissatisfied
D. Somewhat satisfied
E. Very satisfied

Consistency Check 2

How would you rate your overall life satisfaction?
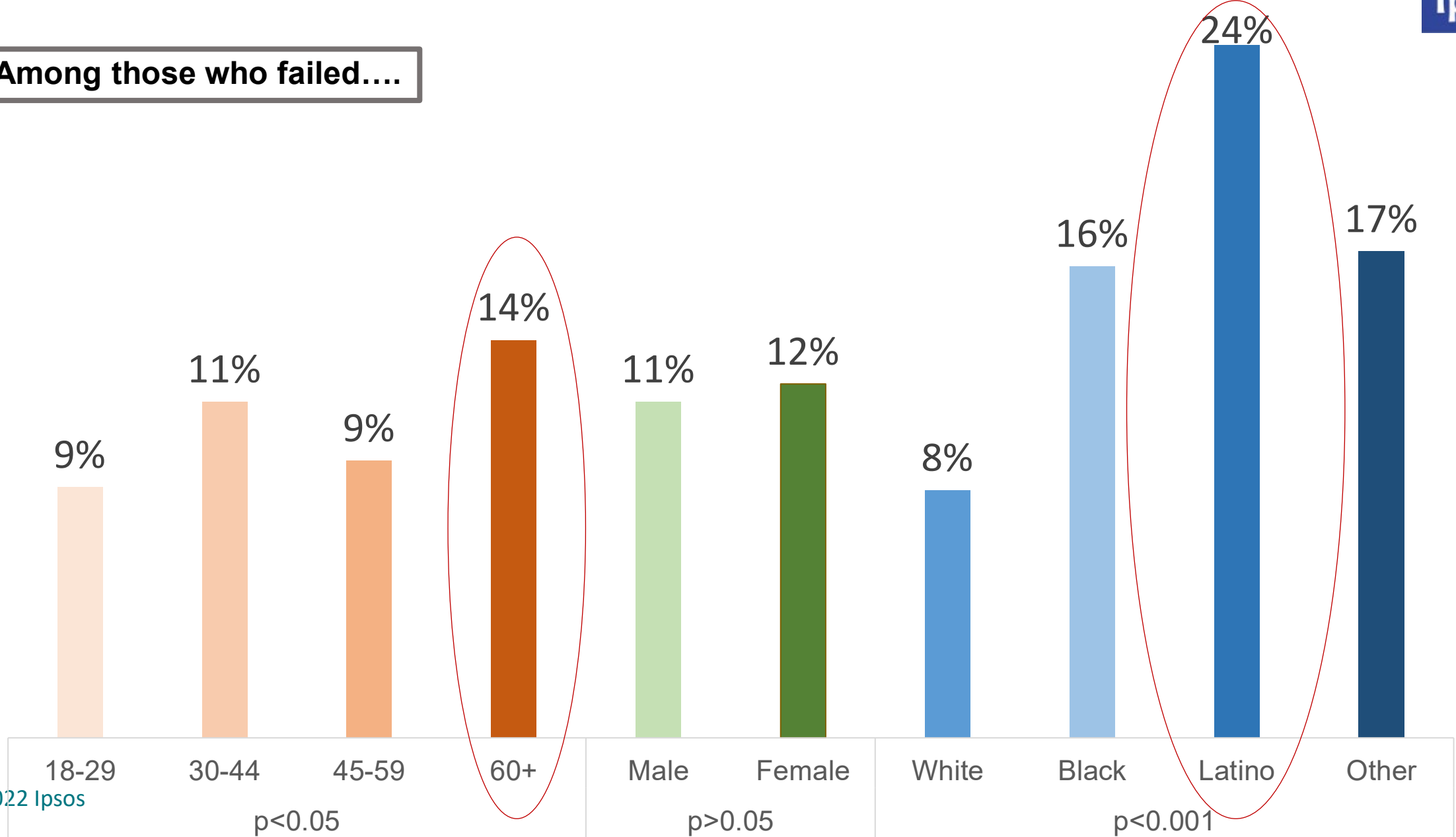
A. Very poor
B. Poor
C. Fair
D. Good
E. Very Good

Only 10% not consistent

(> 0.05)	Failed Trap	Passed Trap
Not consistent	10.3%	11.6%
Consistent	89.7%	88.4%

Failure by Demographics- Age, Gender, Race/Ethnicity

Among those who failed….

18-29	30-44	45-59	60+	Male	Female	White	Black	Latino	Other
9%	11%	9%	14%	11%	12%	8%	16%	24%	17%

p<0.05   p>0.05   p<0.001

Failure by Demographics- Education, Income

Among those who failed…

23%	15%	11%	7%	18%	15%	13%	11%	8%	7%
LT HS	HS	Some college	College Plus	LT 25k	25k to 50k	50k to 75k	75k to 100k	100k to 150k	150k +

p<0.001   p<0.001

Benchmark Comparison
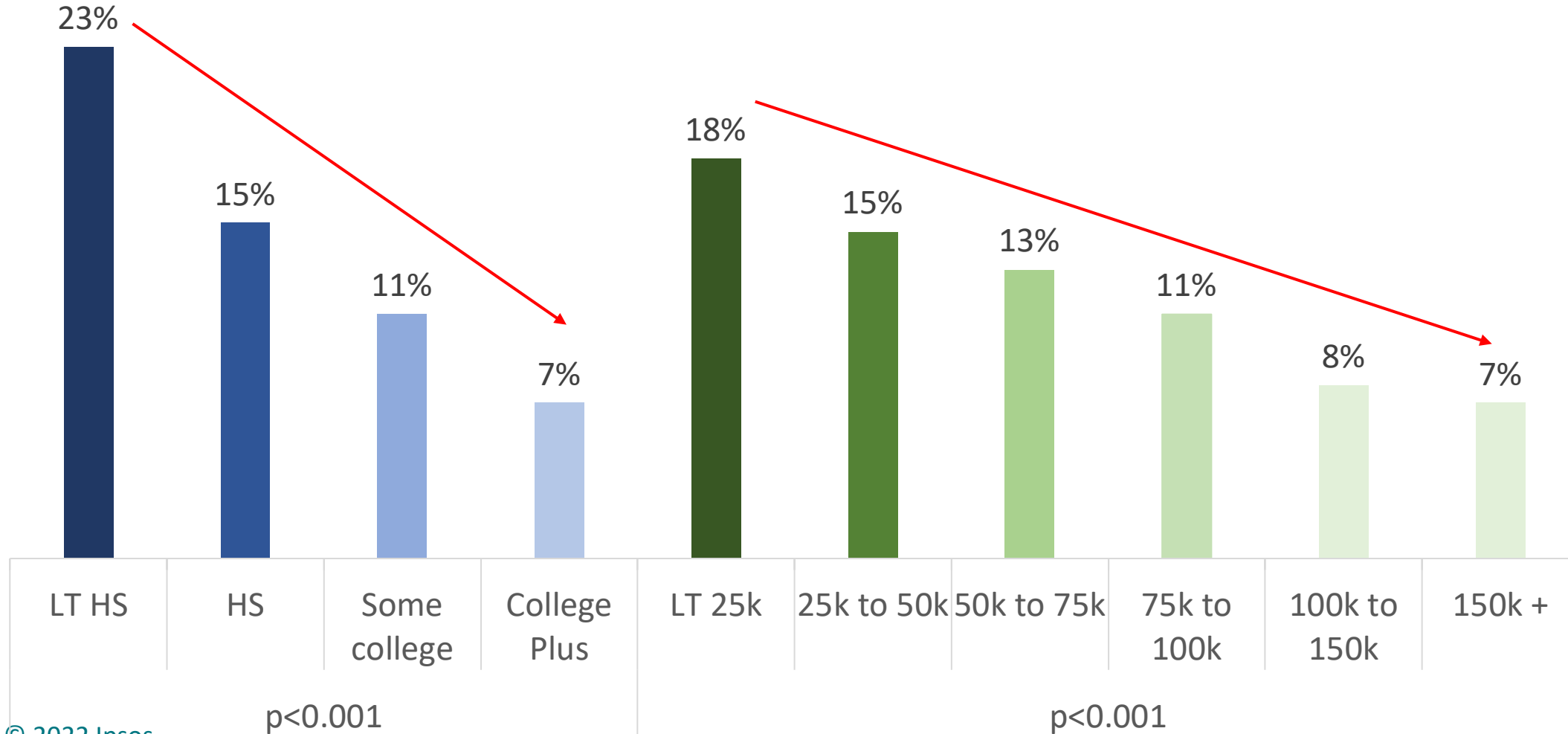
Research Question:

If we remove sub optimal respondents, how much bias we are introducing?

- **We have 4 groups of sub-optimal respondents:**
  - Those who failed 2 compliance traps only
  - Those who failed 1 or 2 compliance traps
  - Those who failed the consistency trap only
  - Those who either failed at least 1 compliance trap or failed consistency trap

- **Removed them from the dataset one group at a time and reweighted the data.**

Benchmark Comparison

- **We asked a number of questions that had national benchmark values:**

  - ○ **Right Direction**
  - ○ **Excellent or very good health**
  - ○ **Married**
  - ○ **Citizen**
  - ○ **2 or more people living in the household**
  - ○ **At least 1 child under 18 in HH**
  - ○ **Own home**
  - ○ **3 bedrooms or more in House**
  - ○ **Moved in house more than 5 years ago**
  - ○ **2 or more vehicles one ton or less**
  - ○ **Has landline phone**
  - ○ **Speaks other than English at home**

Benchmark Comparison - Average Absolute Deviation

To assess bias, we calculated the average absolute deviation:

- **Reweighted the data after removing each sub optimal group.**

- **Calculated the difference between the benchmark and weighted benchmark distributions for each subset.**

- **Took the absolute value for each difference.**

- **Averaged the total absolute difference for each of the 12 benchmarks to obtain the average absolute deviation against the national benchmarks.**

Benchmark Comparison - Results

Benchmark Questions	National Benchmark	ALL Weighted	No Trap Presented	Failed both trap	Passed at least 1 trap	Passed both traps	Passed consistency check	Passed both consistency and compliance
Right Direction	29.2%	0.3%	2.6%	0.9%	1.5%	2.0%	0.0%	0.5%
Excellent or very good health	57.4%	14.0%	13.0%	14.5%	14.7%	14.4%	11.0%	11.4%
Married	54.7%	4.2%	6.1%	3.3%	3.3%	2.9%	3.7%	2.8%
Citizen	92.0%	3.5%	3.8%	3.4%	3.4%	3.9%	3.3%	4.0%
2 or more in HH	85.6%	0.9%	0.6%	1.1%	0.7%	0.6%	0.9%	0.8%
At least 1 child under 18 in HH	33.2%	0.6%	3.5%	2.5%	2.7%	2.8%	2.5%	3.5%
Own home	70.1%	3.5%	3.5%	3.5%	3.7%	3.8%	4.0%	4.8%
3 bedrooms or more in HH	69.6%	3.3%	4.9%	2.5%	2.7%	2.9%	3.3%	3.6%
Moved in house more than 5 years ago	60.8%	5.2%	6.2%	4.8%	4.6%	5.1%	5.3%	5.5%
2 or more vehicles one ton or less	70.1%	1.4%	1.8%	1.2%	1.6%	1.8%	1.9%	2.1%
Has landline phone	37.3%	2.0%	2.3%	1.8%	1.3%	1.2%	1.7%	0.6%
Speaks other than English at home	21.9%	1.5%	1.8%	1.4%	1.9%	2.5%	1.6%	2.8%
Average Deviation		**3.4%**	**4.2%**	**3.4%**	**3.5%**	**3.7%**	**3.3%**	**3.5%**

Takeaways

Conclusions and Discussion

- **Disguised trap question caught more sub optimal respondents.**

- **Failing trap may not always indicate sub optimal response.**

- **Sub optimal identifications may not be correlated.**

- **Removing suboptimal responses did not impact the data quality.**

- **We will repeat this research with a longer questionnaire.**

Thank you!

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