INNOVATIONS IN SAMPLE DESIGN

A Comparison of Address-Based Sample & Panel Frame Sample for Federal Statistics

October 2024

GAME CHANGERS

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SUMMARY

1. Evolving Sampling Methods to Address Response and Representation Issues in Federal Statistics Surveys

2. Evaluation of Traditional ABS vs Panel Frame Sample Case Study
   - FHWA's 2022 NextGen NHTS

3. Conclusions and Future Research

ADDRESS-BASED SAMPLING METHODS FACE CHALLENGES

CHALLENGES OF CURRENT METHODS

Address-Based Sampling (ABS) is generally considered the gold standard for general population surveys, but challenges for this method are growing:

- Historic underrepresentation of key demographic groups (e.g., People of Color, Hispanics)
- Overall response rates are declining year-over-year impacting underrepresented groups most and increasing recruitment costs

HOW CAN WE ADAPT?

Utilize a Probability Panel Frame Sample (PFS) to address representation issues and cost constraints due to declining response rates

- Probability-based recruitment into the panel, similar to ABS
- Study samples are selected from the probability-based panel, with higher response rates and lower cost for each individual study

IPSOS KNOWLEDGEPANEL - PROBABILITY-BASED PANEL THAT ADDRESSES THESE CHALLENGES

ABS used to select samples for each panel recruitment wave

- Multiple waves recruited per year
- Census geography and other third-party data sources allow for targeting population subgroups (e.g. Hispanics, low education)
- Overall goal: Produce a randomly-selected mini version of the U.S. adult population
  - Serve as sampling frame for individual studies

SAMPLING FROM KNOWLEDGEPANEL

Two-step process: 1) Weight entire panel to the US population distribution on a range of sociodemographic characteristics, 2) Use this weight as the measure of size in a probability proportional to size random selection

- Results in demographically balanced, nearly self-weighting samples
- Design weights emulate those of a stratified, proportionally allocated sample

CASE STUDY: US DOT FHWA NEXTGEN 2022 NATIONAL HOUSEHOLD TRAVEL SURVEY

The United States Department of Transportation (US DOT) Federal Highway Administration (FHWA's) National Household Travel Survey (NHTS) provides a national data source on personal and household travel for trend analysis.

It informs on non-commercial travel by all modes, including characteristics of the people traveling, their household, and their vehicles.

NEXTGEN RESEARCH & EVOLUTION

The 2022 NHTS included a comparison of traditional address-based sample (ABS) and a probability-based panel frame sample (PFS) as part of its NextGen research.

15,000 Households in the National Sample to conduct an A/B test

- 7,500 Address-based Sample (ABS)
- 7,500 Panel Frame Sample (PFS) from Ipsos KnowledgePanel

2022 NHTS COMPARISON OF SAMPLE SOURCES

Address-based Sample (ABS)

- Geographically stratified sample using Census Block Group data from the most recently available American Community Survey 5-year estimates (ACS)
- Invited to survey through mailed survey materials
- Trust must be established in invitation and outreach materials
- Participation is offered in Spanish and English
- Incentive distribution is handled by survey administrators

Panel Frame Sample (PFS)

- Panel members are recruited via ABS
- Representative sample selected from panel for NHTS
- Non-internet households are provided a tablet to participate
- Trust is established with panel members improving response and answers to sensitive questions
- Invited to survey through email invitation
- Participation is offered in Spanish and English
- Incentives are handled by panel administrators via normal system

DEMOGRAPHIC COMPARISON OF NHTS SAMPLE METHODS

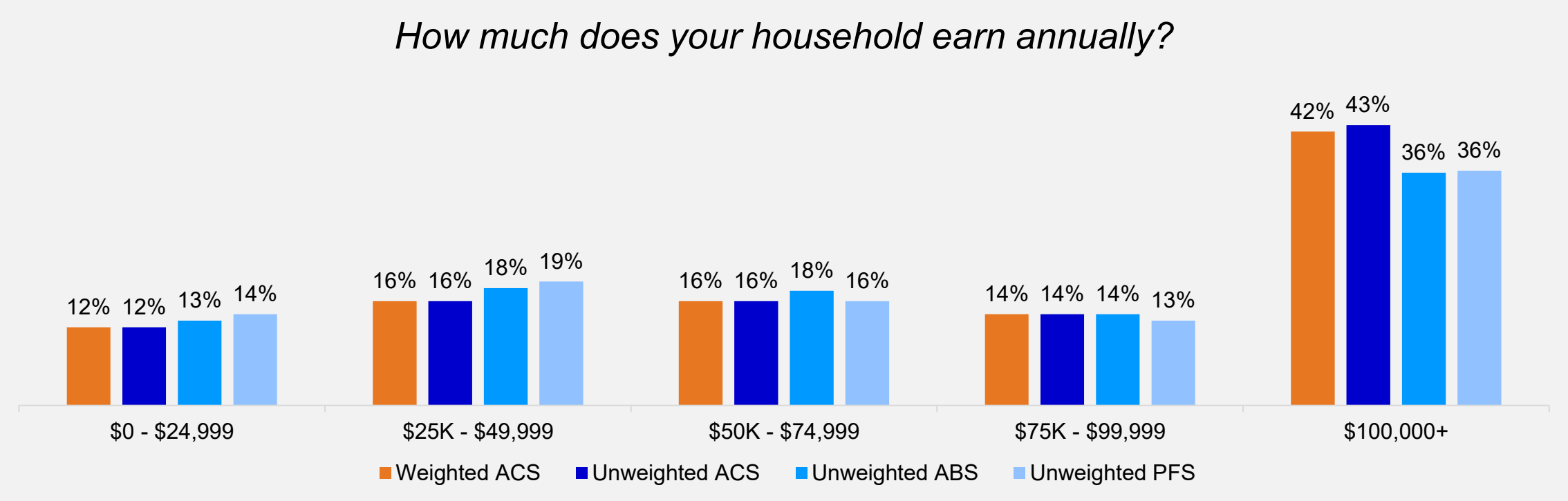
Our analysis will compare unweighted American Community Survey (ACS), unweighted NHTS ABS, and unweighted NHTS PFS to weighted ACS data across:

- Income
- Race and Ethnicity
- Age
- Vehicle ownership

Goal is to compare how representative each source is in terms of demographics for the unweighted samples.

REPRESENTATION: HOUSEHOLD INCOME

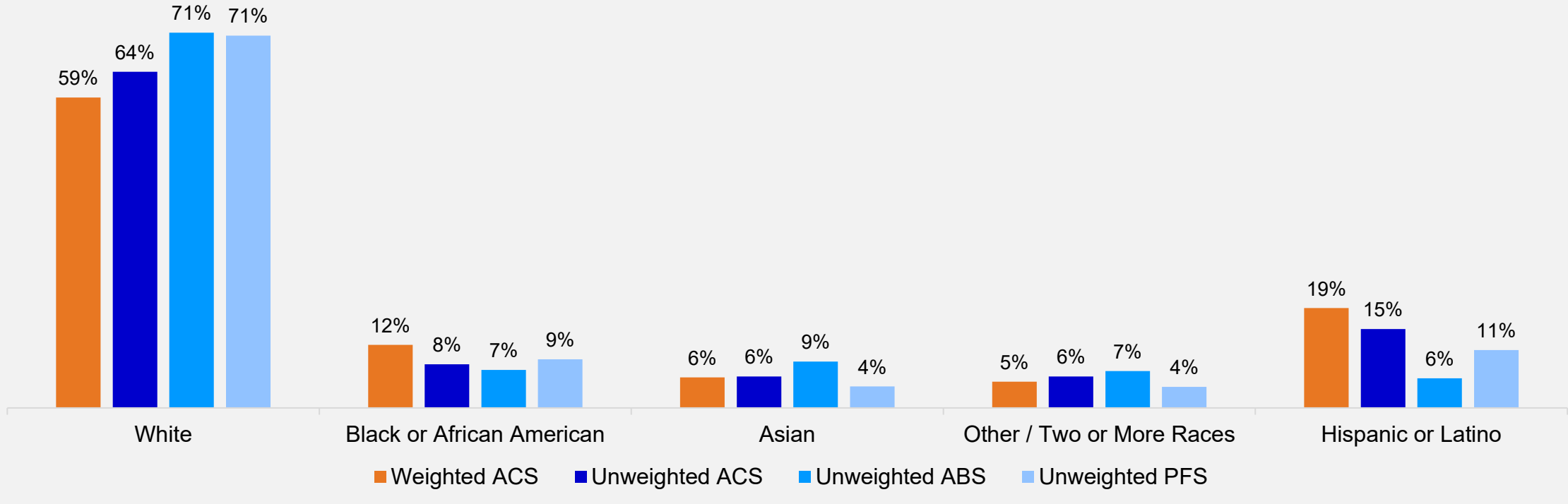
The NHTS ABS and PFS are reaching historically hard-to-survey households, obtaining a higher share of low-income households than the ACS in the unweighted sample, with underrepresentation of high-income households.



Source: 2017-2021 American Community Survey (ACS) 5-year Estimates

REPRESENTATION: ADULT RACE AND ETHNICITY COMBINED

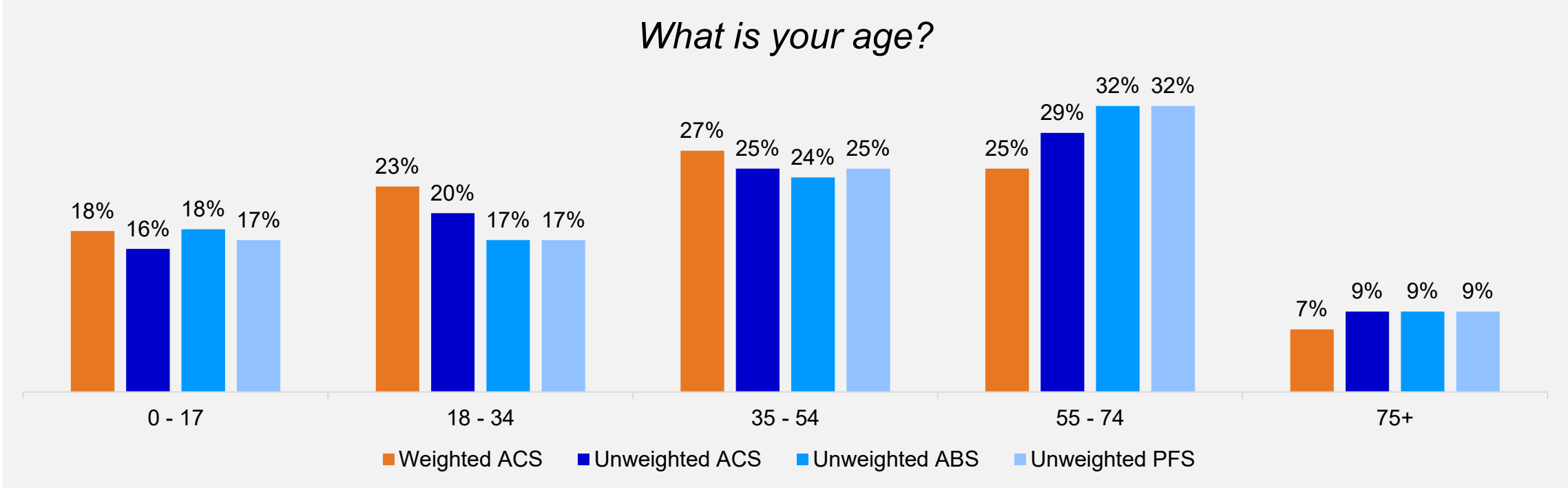
Hispanics and Latinos are underrepresented by NHTS ABS and PFS although PFS performs much better. Respondents from ABS may be less trustworthy of a survey invitation and may not participate since that relationship isn't fostered as it is with panelists.



Source: 2017-2021 American Community Survey (ACS) 5-year Estimates

REPRESENTATION: AGE

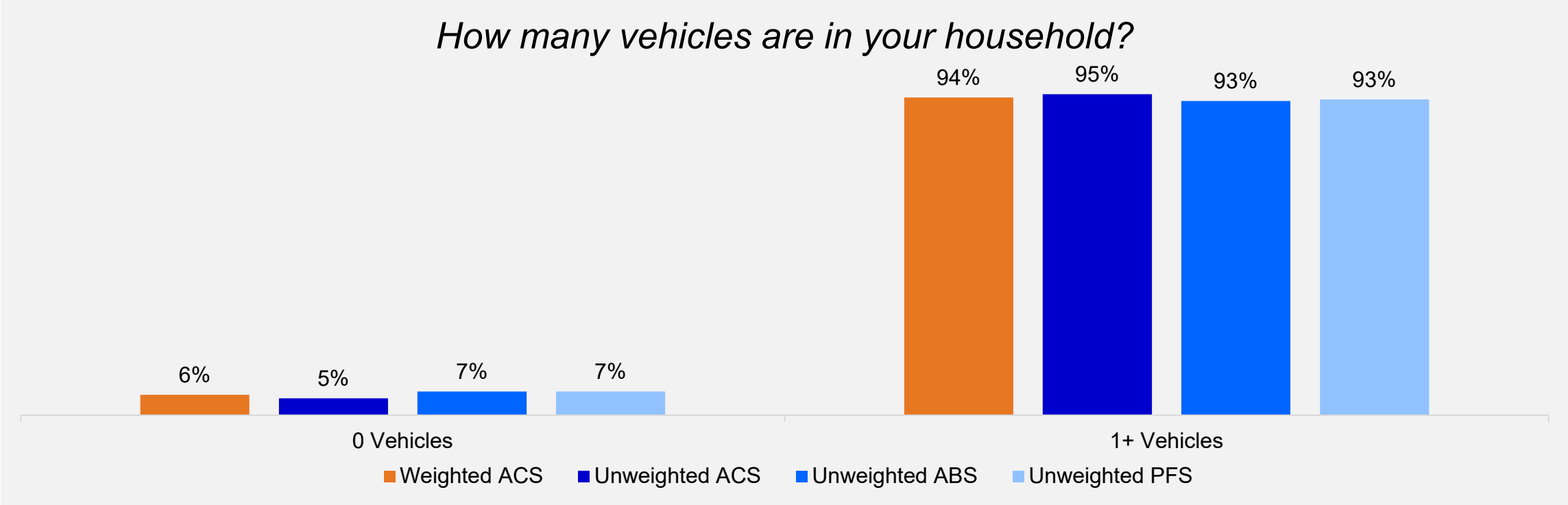
NHTS ABS and PFS samples perform very similarly across age brackets, both overrepresent age 55-74.



Source: 2017-2021 American Community Survey (ACS) 5-year Estimates

REPRESENTATION: HOUSEHOLD VEHICLE OWNERSHIP

NHTS ABS and PFS again perform similarly with slightly better representation of zero-vehicle households than unweighted ACS data.



Source: 2017-2021 American Community Survey (ACS) 5-year Estimates

TRAVEL BEHAVIOR METRICS COMPARISON OF NHTS SAMPLE METHODS

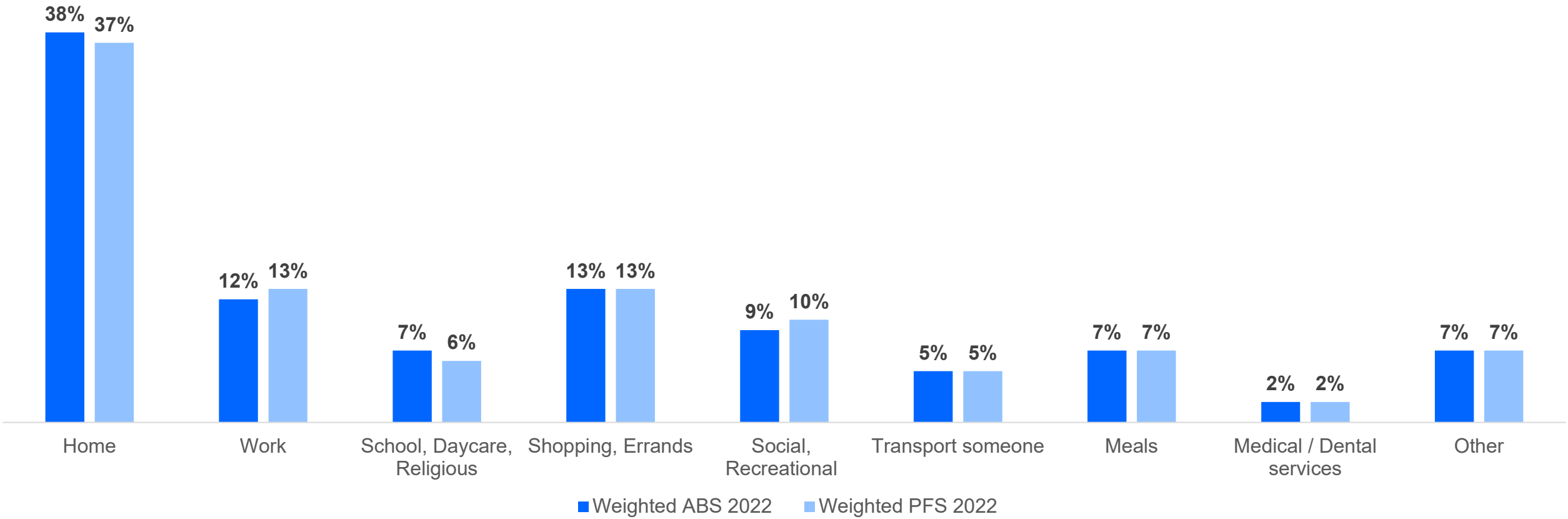
Our analysis will compare weighted NHTS ABS to weighted NHTS PFS across the following key metrics for travel behavior:

- Trip Purpose
- Trip Mode
- Work Commute

Goal is to compare how representative each source is in terms of key travel behavior metrics for the final weighted samples.

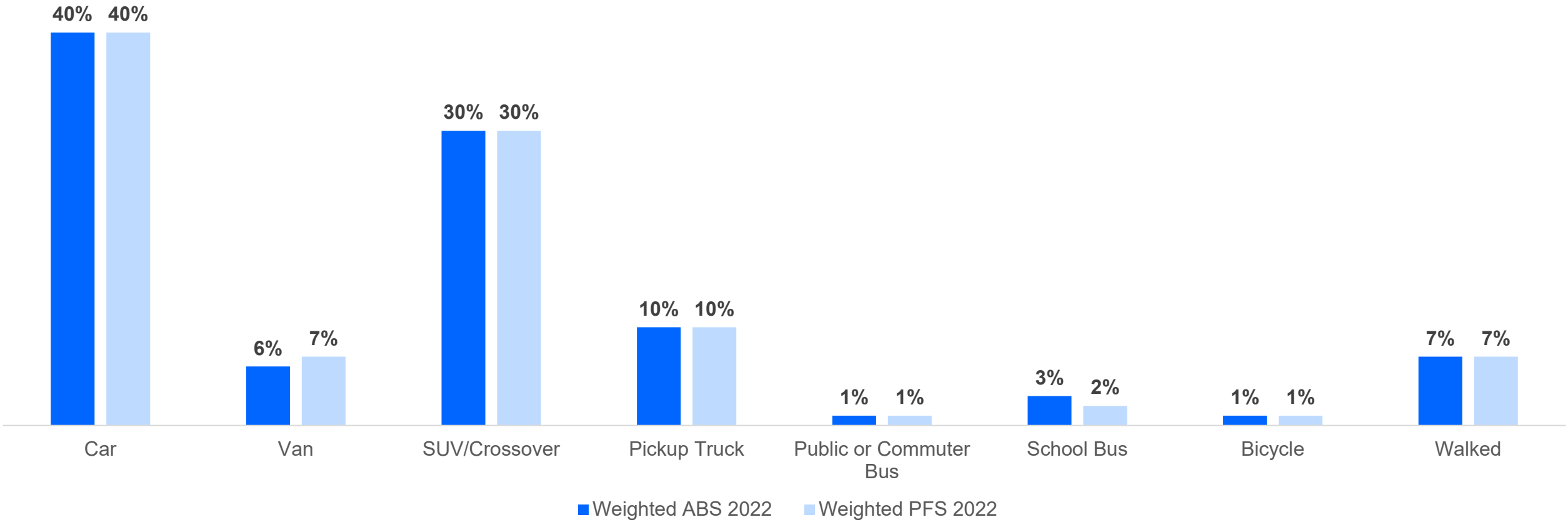
TRAVEL BEHAVIOR METRICS: TRIP PURPOSE

NHTS ABS and PFS again perform similarly across the purpose of trips respondents reported.



TRAVEL BEHAVIOR METRICS: TRIP MODE

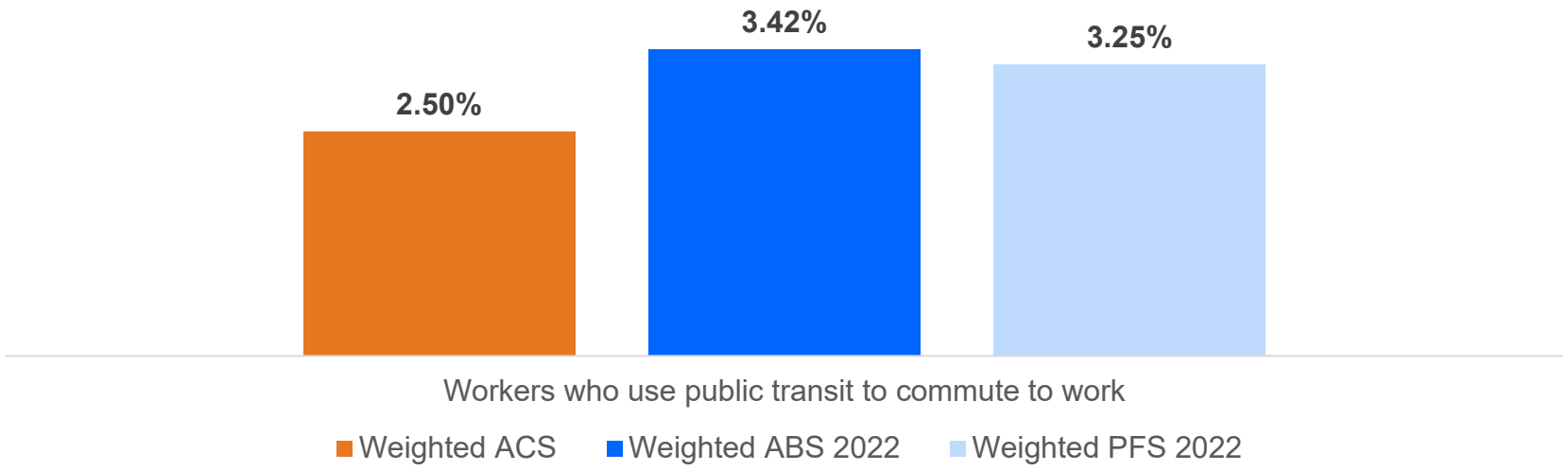
NHTS ABS and PFS again perform similarly across the modes of trips respondents reported.



*The categories with <1% prevalence are as follows: Recreational Vehicle, Motorcycle, Streetcar or trolley car, Subway or elevated rail, Commuter rail, Amtrak, Airplane, Taxicab or limo service, Other ride-sharing service, Paratransit/Dial a ride, E-Scooter, Ferryboat, Other

TRAVEL BEHAVIOR METRICS: TRANSIT COMMUTES

PFS and ABS perform similarly both showing a higher share of workers commuting to work via public transit.



Source: 2017-2021 American Community Survey (ACS) 5-year Estimates

CONCLUSIONS

ABS and PFS results were largely indistinguishable

- ABS and PFS had similar demographic distributions, though PFS outperformed in recruiting Hispanic households.
- ABS and PFS survey estimates were nearly identical, leading to the same statistical inferences in terms of travel behavior.

PFS matched or exceeded ABS in terms of sampling metrics

- **Representation**: PFS better represented Hispanic households a historically underrepresented group.
- **Precision**: PFS provided more narrow confidence intervals for most estimates
- **Cost**: PFS is significantly less expensive than ABS because the survey does not bear the entirety of recruitment costs and panelists will accept lower incentives than ABS participants.

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LIMITATIONS & FUTURE RESEARCH

Case Study Limitations

- Test of ABS vs PFS limited to single study on household transportation
- Nationwide general population test
- Single probability panel used in test

Future Research

- Test probability panels in different contexts (other research areas, targeted subgroups, etc.)
- Test specially-recruited probability panels in local areas as substitute for cross-sectional ABS

CONTACT

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