SURVEY FUTURES

SURVEY DATA COLLECTION METHODS COLLABORATION

Combining probability and non-probability samples

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Introduction

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- Sub-project 2 of Research Strand 1
- Methods for combining - or integrating - probability and non-probability samples.

- In practice this means:
  - Combining parallel probability and non-probability surveys
  - Adjusting non-probability survey data using a “reference” probability survey

Background

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- Probability samples
  - Still the gold standard
  - Increasing challenges - response rates, costs, demand changes

- Non-probability samples
  - Advantages: speed, cost, scale
  - Problems: selection bias, coverage error

- Integration offers potential to combine strengths of both
  - Proviso: if able to deal with selection bias

What did we do?

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- **Evidence review**
  - Evidence from the UK and other countries
  - Focus on empirical studies – those that combine / integrate samples

- **Practitioner guide**
  - Advice to survey statisticians, analysts
  - Covers methods available, when to use them and how (in steps)

- **Working paper**
  - Used existing data collected in two parallel surveys (originally combined using PSW)
  - Aim: reduce selection bias further using additional covariates

Motivations

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- **Primary goal**: reduce selection bias in a non-probability sample

- Additional Motivations
  - Increase overall sample size to improve precision
  - Overcome issues with coverage
  - Improve estimation from small probability samples

Methods

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- **Design-based** - produce weights for a non-probability sample to align it with a “reference” probability sample.
  - Key Methods: Propensity Score Weighting, Calibration

- **Model-based methods** - use statistical models to predict survey outcomes in nonprobability sample -> apply to probability sample.
  - Key Methods: Bayesian Inference, Mass Imputation

- **Hybrid approaches** combine elements of both approaches.
  - Key Methods: Composite estimation, Doubly robust

Strengths and limitations

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- **Design-based**
  - Pros: intuitive, accessible, single set of global weights
  - Cons: ineffective with small probability samples, struggle with high "dimensionality"

- **Model-based**
  - Pros: more flexible, can use small probability samples & incorporate "high-dimensional" covariates
  - Cons: less accessible, computationally intensive, sensitive to model misspecification

Key learnings

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- Wide range of methods available. Recent growth of Bayesian / machine learning.
- Key conclusion: relative paucity of evidence on performance in real world settings.
- Different methods suit different data structures.
- Method secondary compared to the availability of useful covariates.
- Newer methods tend to out-perform traditional.
- Future research: plenty of scope.

Case study

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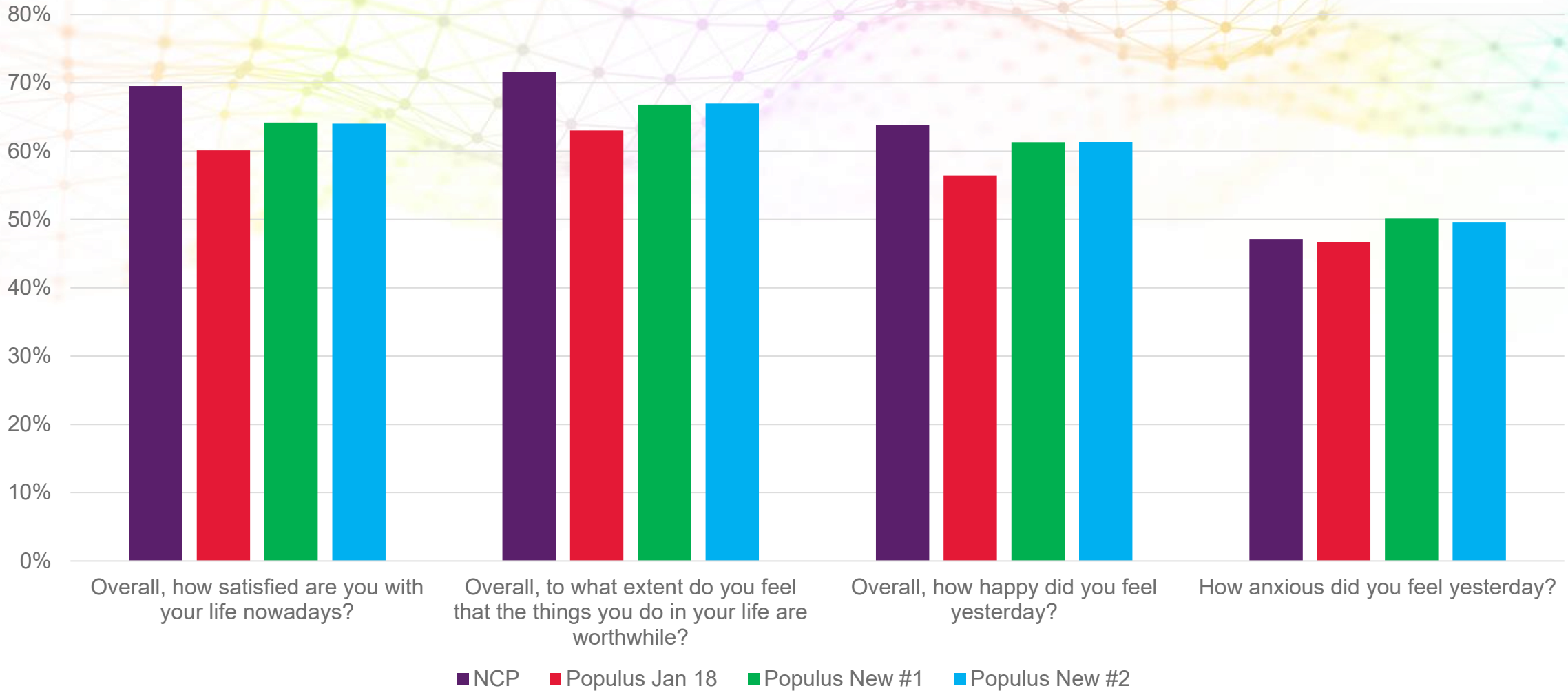

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Discussion points

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- Why are these methods not used more widely, especially in the UK?
- What are the barriers to use?
  - Knowledge gap
  - Statistical skills required
- Do they have potential to expand the use of non-probability surveys in the UK?