A Systematic Review of Stated Preference Experiments in Tobacco Research

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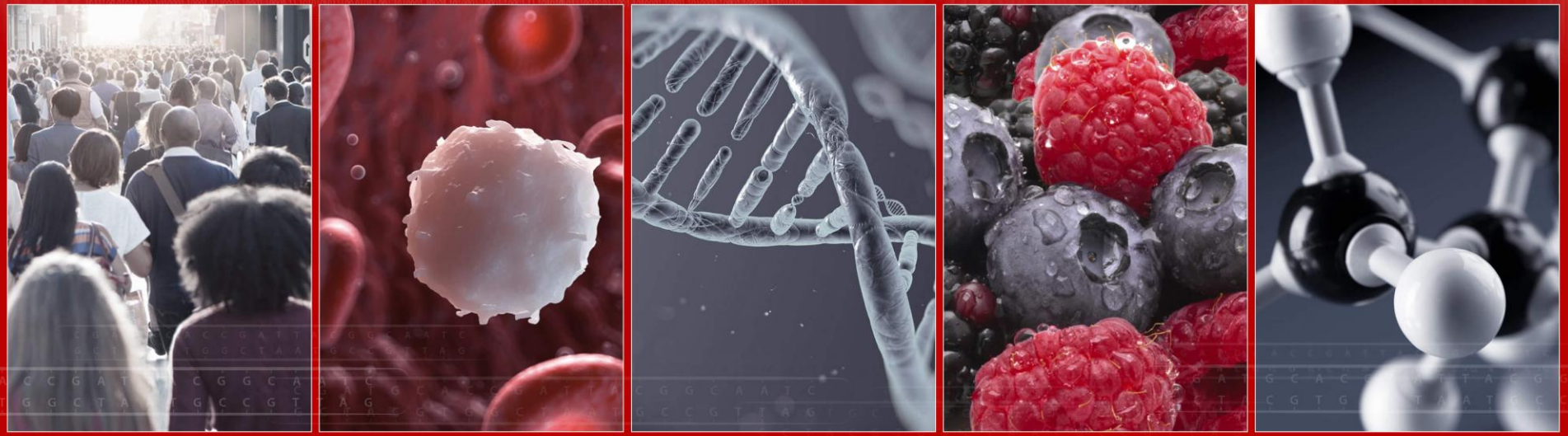

Disclosure

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The authors declare no conflicts of interest.

BACKGROUND
&
REVIEW QUESTIONS

Background & Motivation

Stated preference experiments have been increasingly used in tobacco research to address the needs for evaluating policies regulating emerging products

Revealed preference observational data

- Real world behavior
- Existing policies
- Subject to limitations : lack of variation, confounding

Stated preference experiments

- hypothetical behavior
- Novel products with low prevalence and new policies not implemented
- Address lack of variation, confounding, low reporting/prevalence

Background

Various experimental methods based on hypothetical choices:

- Discrete Choice Experiment (DCE)
- Best-Worst Scaling (BWS)
  - BWS-DCE
- Experimental Tobacco Marketplace (ETM)
- Hypothetical Purchase Task (explore consumption of one product in response to a wide range of price variations, not included)

Example of a tobacco discrete choice experiment

Appendix A: Example of choice set

	Characteristics	Disposable e-cigarette	Rechargeable e-cigarette	Tobacco cigarette
				
$	**Price for the equivalent of 20 tobacco cigarettes (400 puffs)**	**$5** per e-cigarette	**$8** per refill	**[respondent self-reported price]** per pack
	Price of the starter kit	**$0** (no kit needed)	**$20**	**$0** (no kit needed)
	**Are you allowed to smoke the cigarette in public places (restaurants, bars, workplaces, and shopping malls)?**	No	Yes	No
	**Is this cigarette healthier than tobacco cigarettes?**	Yes	No	No
	**Does this cigarette help you quit smoking tobacco cigarettes?**	No	Yes	No
YOU CHOOSE	**Please mark which cigarette type you would buy (CHOOSE ONLY ONE):**	☐	☐	☐

Notes: In the choice sets presented to respondents in our DCE we used the term 'tobacco cigarette' as we believe that this terminology is more familiar to smokers than 'tobacco cigarette'.

Source: Marti et al. 2016 Economic Inquiry

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Example of a tobacco best-worst scaling

Please imagine this is a new e-cigarette that has just become available for purchase. When you look at the 5 features of the e-cigarette, which feature makes you most want to use the e-cigarette and which feature makes you least want to use the e-cigarette.

(1 of 19)

PICK ONE FROM EACH COLUMN

E-cigarette	Most makes me want to use	Least makes me want to use
$5 one-time purchase	○	○
It cannot be modified	○	○
Does not help me breathe easier AND still makes my clothes smell like tobacco	○	○
5 of 10 people are able to quit tobacco cigarettes	○	○
Somewhat similar in size, weight appearance, and feel to a tobacco cigarette	○	○

Click the forward arrow button to continue...

0% 100%

Source: Kistler et al. 2019 BMJ Open

Case 2

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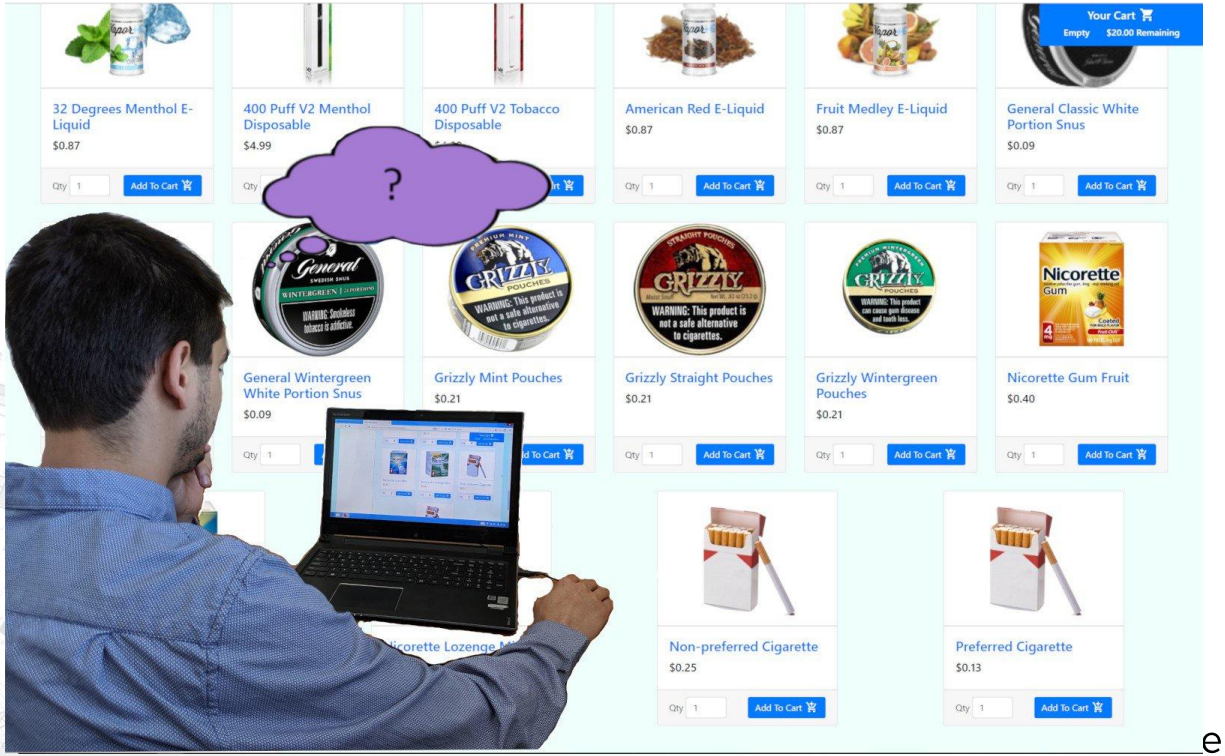
Example of an experimental tobacco marketplace



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Source: SRNT-U

Previous Review Studies

Discrete Choice Experiment (DCE) (Clark et al. 2014; Regmi et al. 2018; Soekhai et al. 2019; Nouwens et al. 2025)

- The number of studies grew rapidly in the last decade
- An ideal tool to inform regulatory policies, but with limitations such as inconsistency in design and report and hypothetical bias
- Regmi et al. 2018 specific to tobacco

Best-Worst Scaling (BWS, BWS & DCE) (Cheung et al. 2016; Whitty and Gonçalves 2018; Hollin et al. 2022; Schuster et al. 2024)

- Becoming a mainstream prioritization method
- No BWS review focusing on tobacco only

Experimental Tobacco Marketplace (ETM) (Bickel et al. 2018)

- An emerging method to explore the conditions where various tobacco products may interact with one another
- Specific to tobacco, some applications in cannabis and alcohol

Motivation & Review Questions

It is time to conduct a systematic review of various tobacco experiments because

- Existing reviews are either not specific to tobacco or outdated
- Increasing number of tobacco experiments in the literature

Questions

- Summarize terminologies and practices of various experiments
- Identify similarities and differences between experimental methods
- Assess the quality and risks for bias in these experiments
- Assess their policy relevance and impact
- Develop a guideline for tobacco experiments

METHODS

Methods – Systematic Review Protocol

Protocol development

- Use PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines
- Registration with PROSPERO (CRD42023447255)

Search strategy

- Search databases: Web of Science, Scopus, EconLit, and PubMed
- Searching terminology
- Last searched on August 31, 2023

Methods – Eligibility criteria

Inclusion criteria

- Written in the English language
- Stated-preference experiment studies on purchasing decisions related to tobacco products
- Choice experiments relevant to the regulation of tobacco marketplaces.

Exclusion criteria

- Revealed-preference studies, secondary data analyses, qualitative studies, case studies, commentaries, and reviews
- Studies that used simulated data or without human subjects/participants
- Studies not about purchasing decisions related to tobacco products or with findings that were not relevant to the tobacco marketplace regulation
- Studies where tobacco products were treated as an attribute or studies focusing only on tobacco cessation treatments.

Methods – Study Screening

Double coding process

Inter-rater Reliability
(Average Cohen's Kappa)

1 Title & Abstract Review:
- 2 Reviewers
- Decision rule: Group Consensus

→ 0.733

2 Full-text Review:
- 4 Reviewers
- Decision rule: Majority Rule

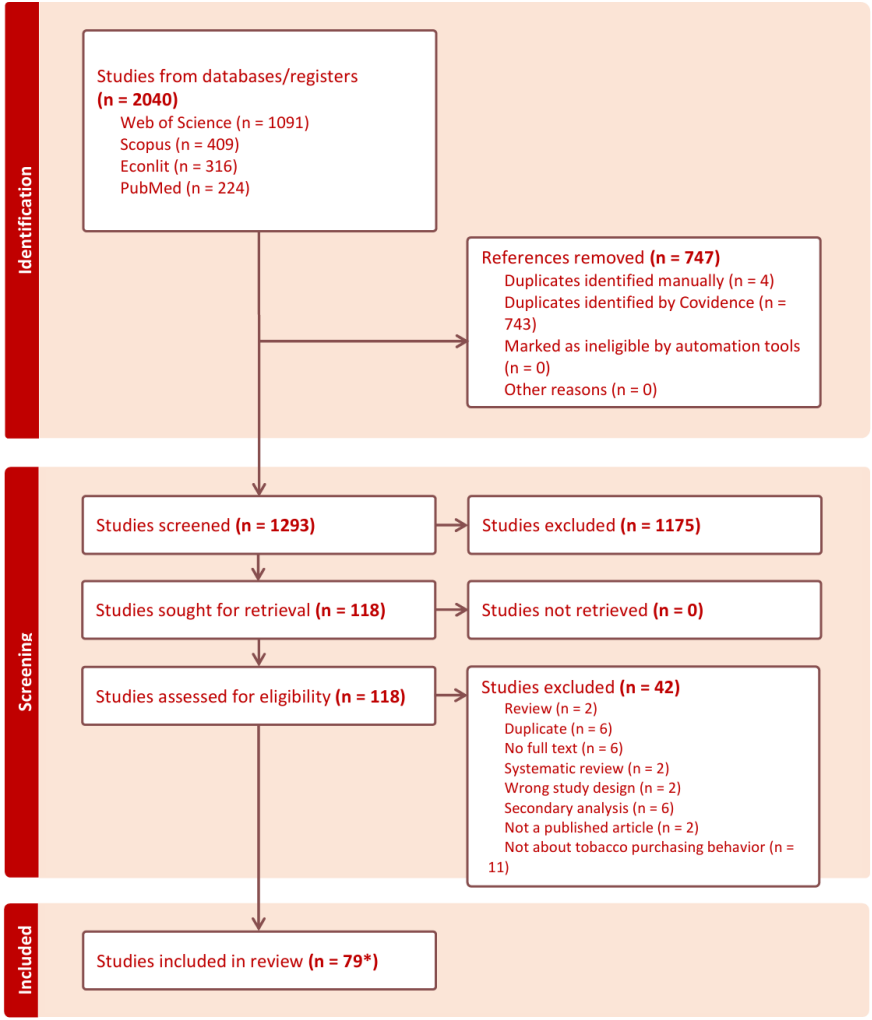
→ 0.768

3 Quality Check
- Post Full-text Review Verification

Search Results

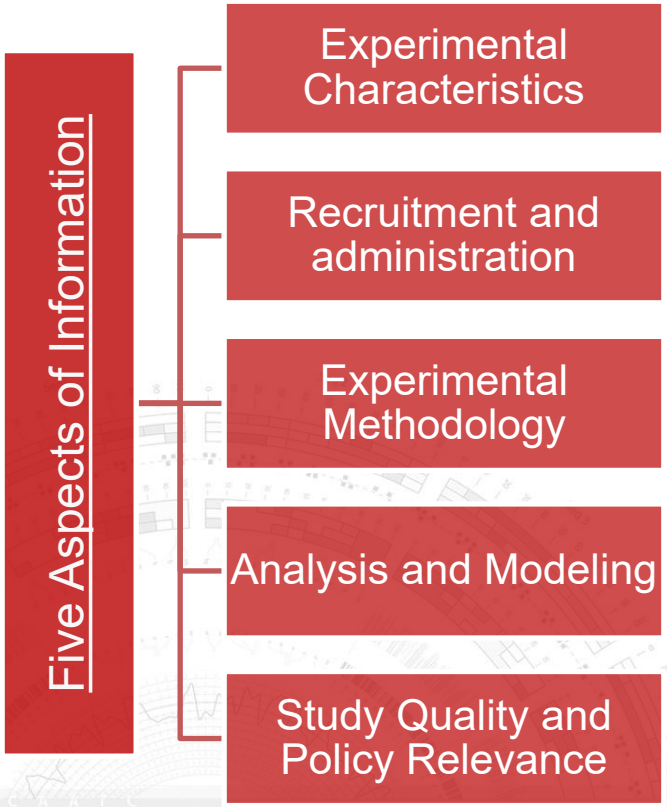
Final analysis comprised

- 79 papers
- 94 experiments



Notes: **Smokers are different: The impact of price increases on smoking reduction and downtrading* was excluded during the identification period because it was not published but included after it was officially published. Since *The Role of Flavor in Electronic Cigarette Use and Appeal* (chapter 4 and 5) and *Using Discrete Choice Experiments to Investigate the Influence of Context on Product Choice* (chapter 2 and 3) have multiple studies, we regard them as separate papers.

Methods – Data Extraction and Quality assessment

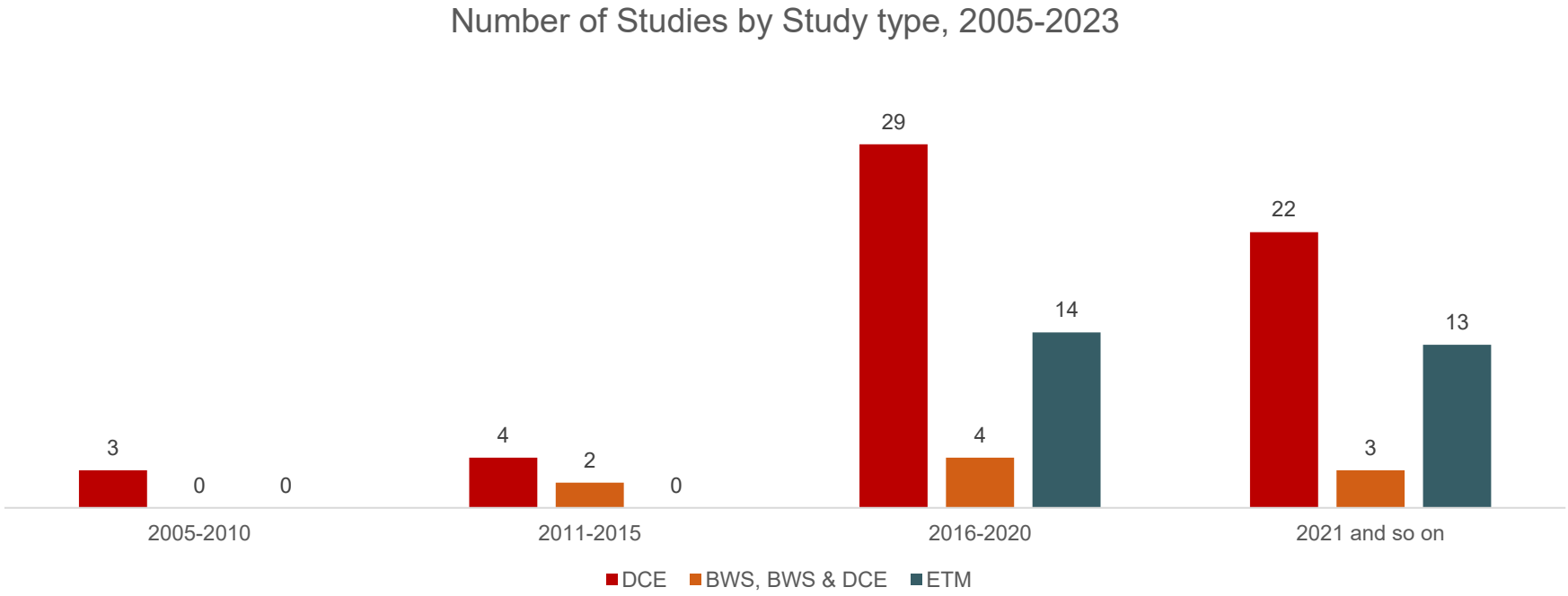


1. PREFS Checklist & Scores
2. Subjective Quality Score
3. Subjective Policy Relevance Score

Purpose, respondent sampling, explanations, findings complete, significance testing, a five-point checklist for assessing the quality and risk of bias of preference studies (Hollin et al. Pharmacoeconomics 2022)

RESULTS- Characteristics/Administration

Results – Publication Trend



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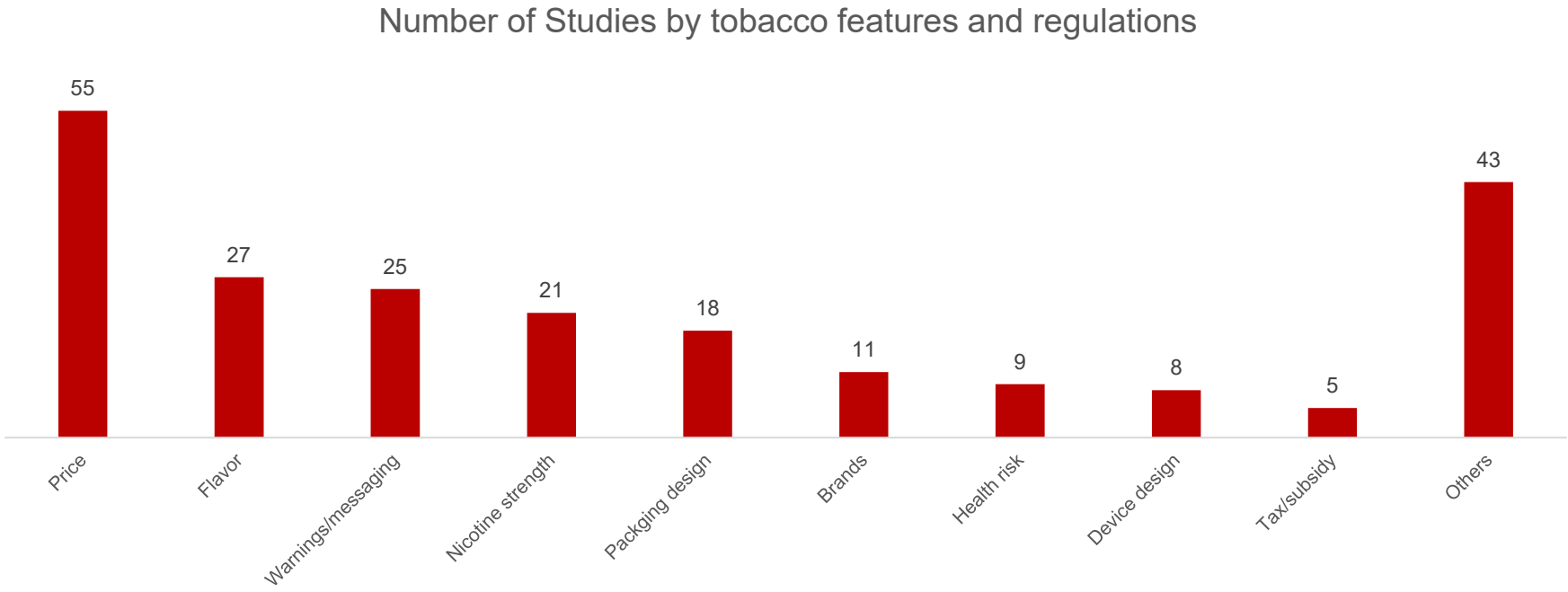
Results – Product focus



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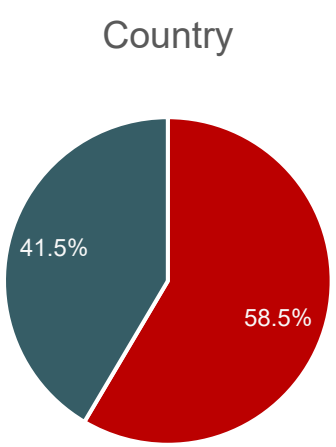
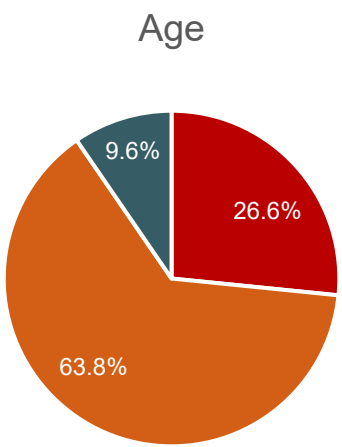
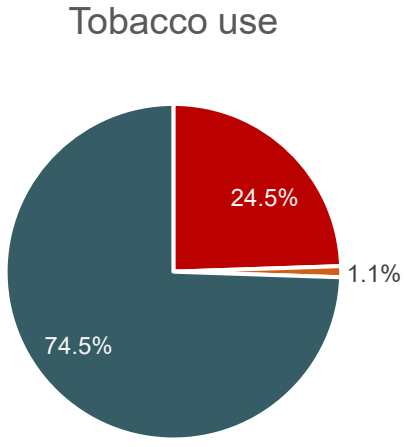
Results – Sampling Characteristics







N=94	Mean (SD)	Min/max
Sample size	725(903)	20/5,284

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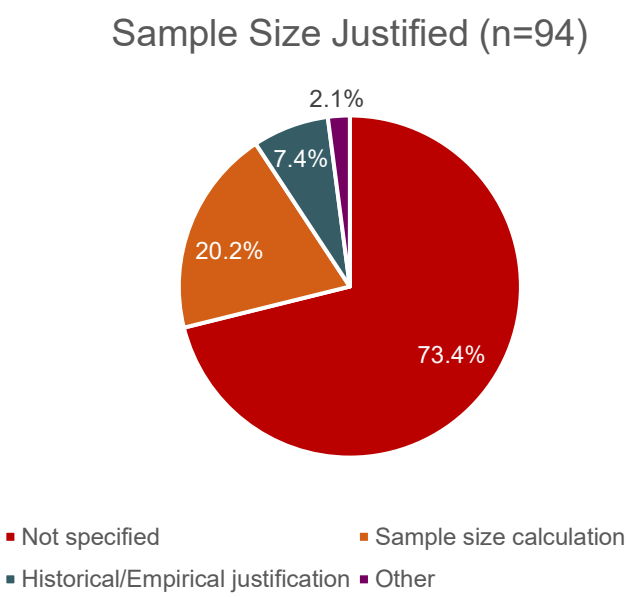
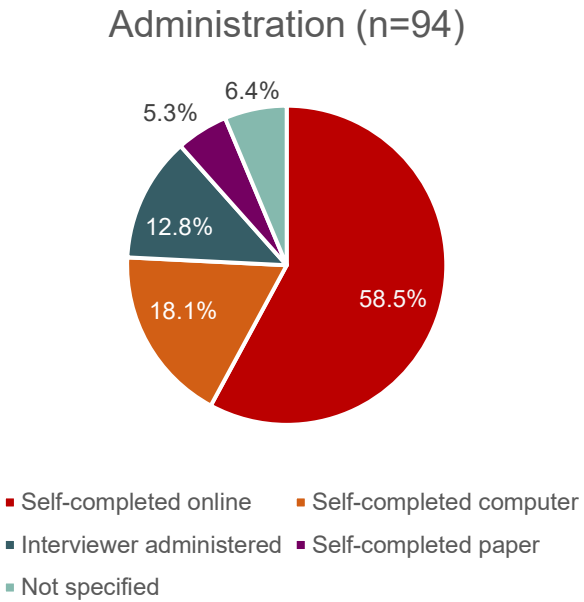
Results – Recruitment and administration





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RESULTS-Experimental methods

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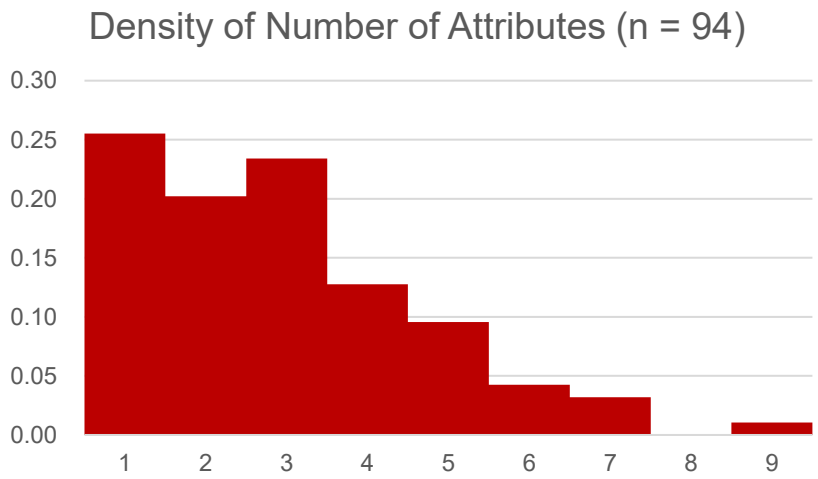
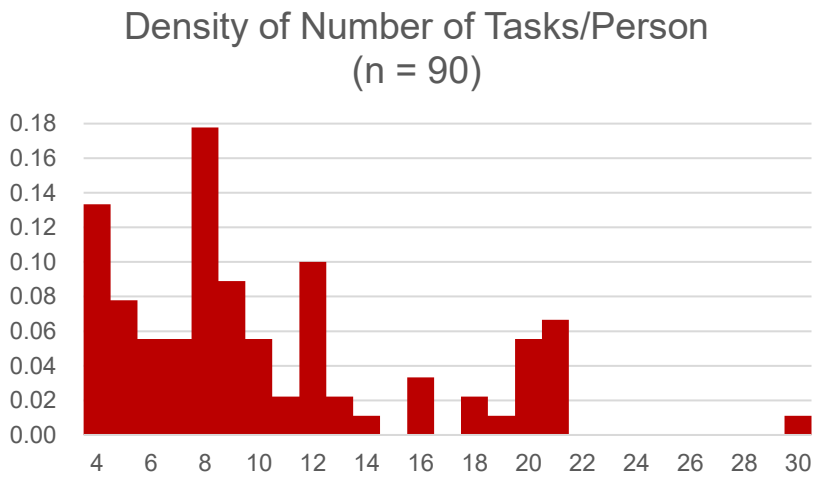
Results – Experimental Settings

Complexity



Participant burden



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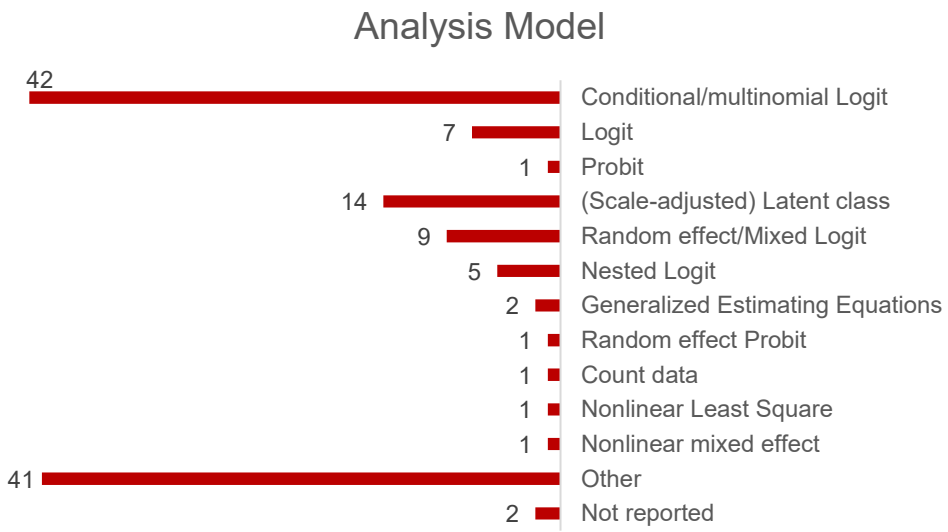
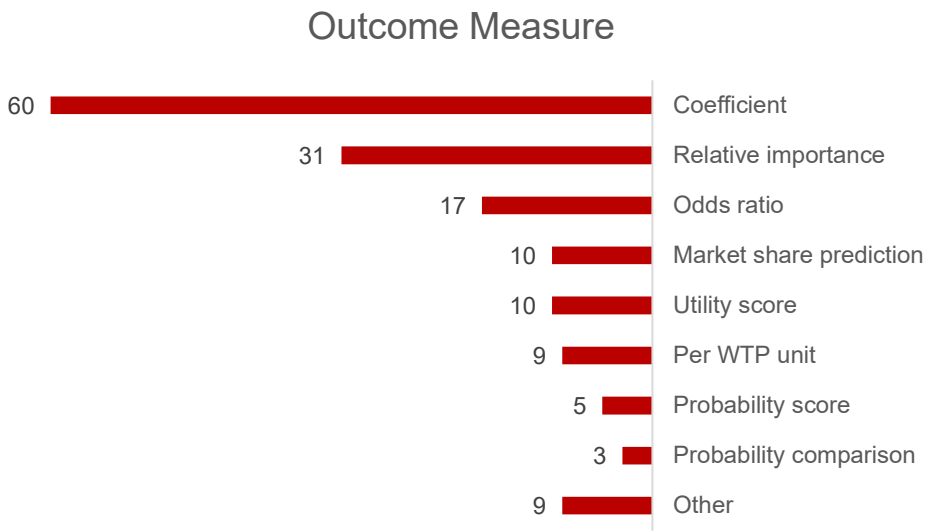
Results – Analytical Methods





- Repeated measures from same individuals and hierarchical nature of experimental data

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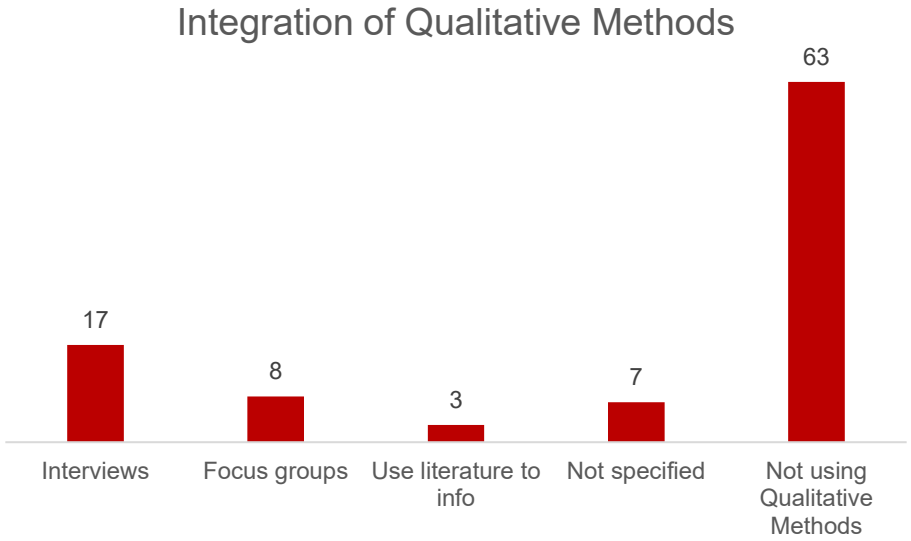
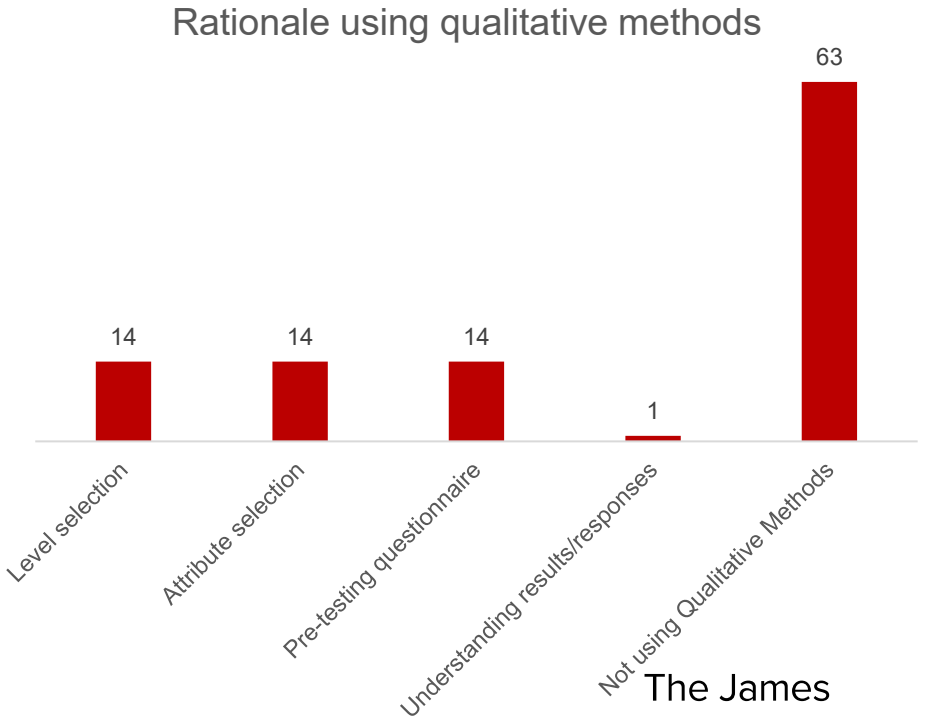
Results – Experimental Methodology





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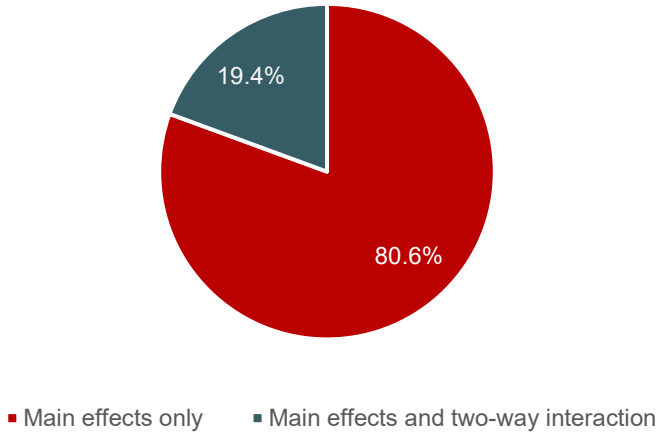
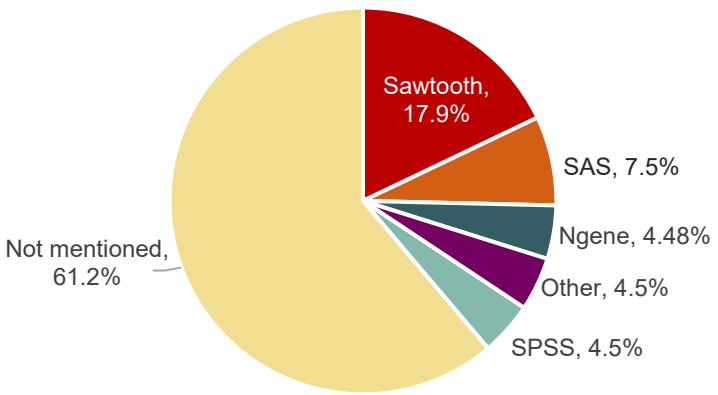
Results – Experimental Methodology

Design Plan



Design Software (DCE/BWS only)



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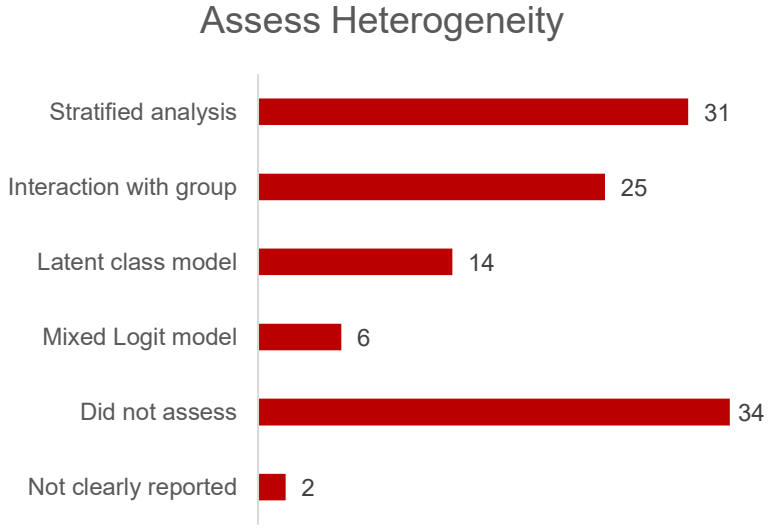
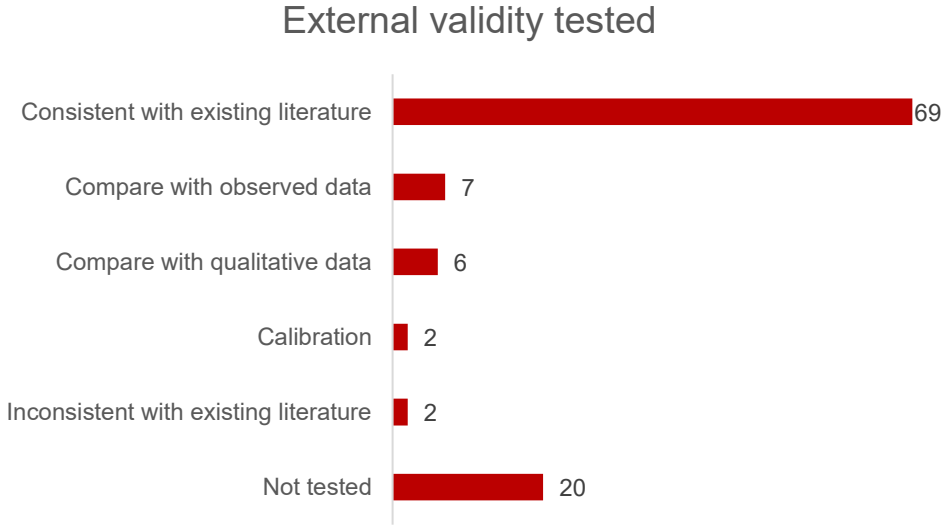
Results – Additional approaches to validate data



Ability to comprehensively assess heterogeneity with repeated measures



Address hypothetical biases and integrate different data

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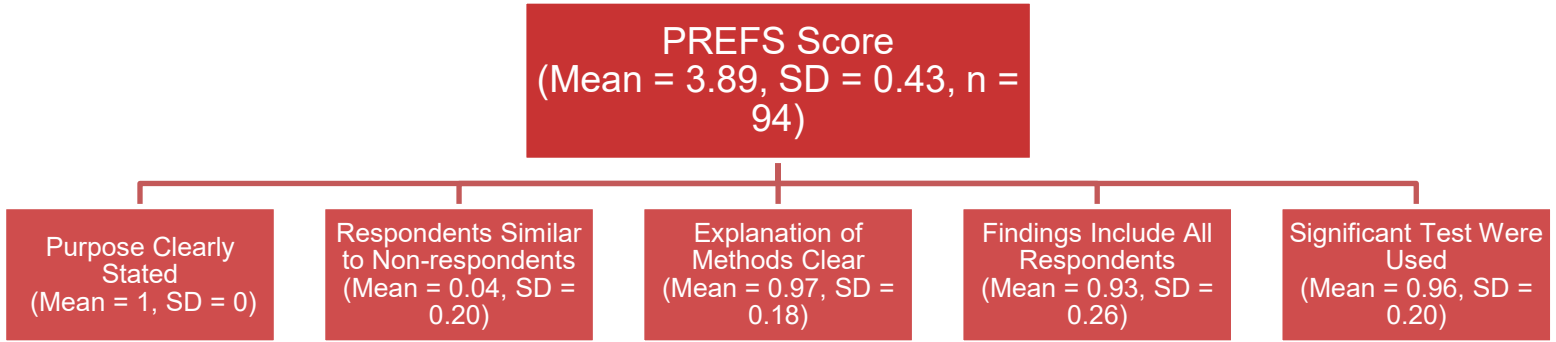
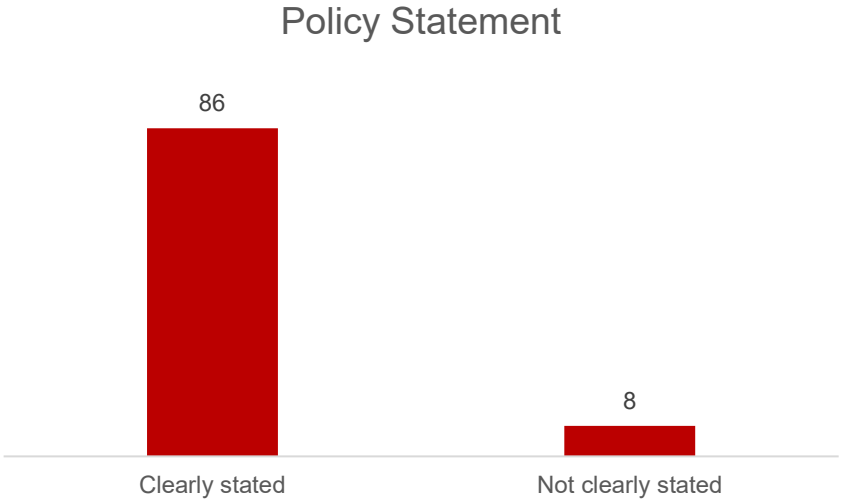
RESULTS-Quality and policy relevance

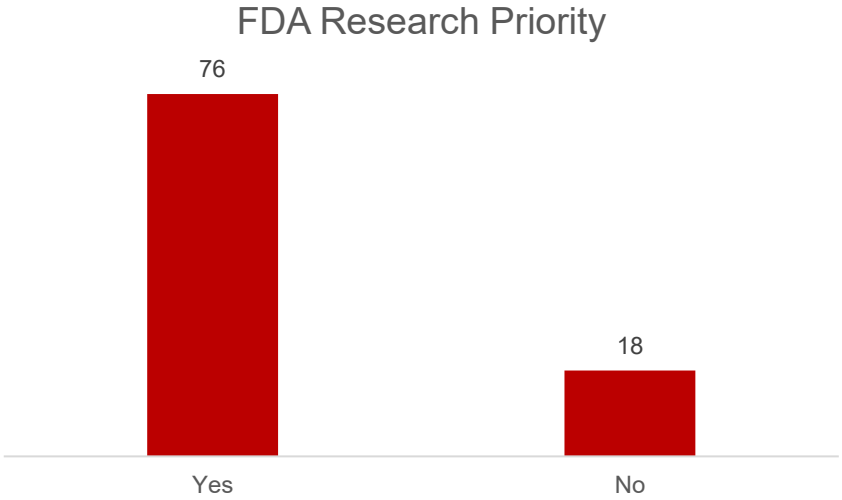
Results – Assessment of Study Quality and Policy Relevance



Purpose, respondent sampling, explanations, findings complete, significance testing, a five-point checklist for assessing the quality and risk of bias of preference studies (Hollin et al. Pharmacoeconomics 2022)

Results – Assessment of Study Quality and Policy Relevance





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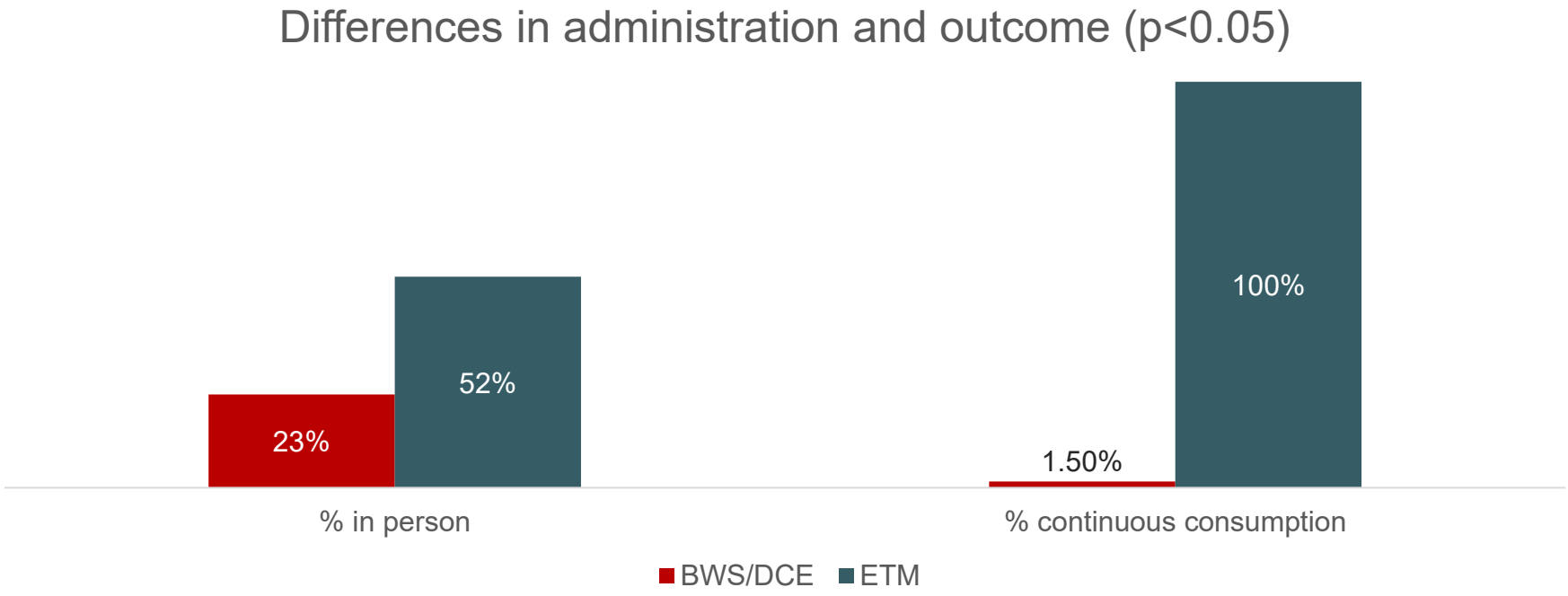
RESULTS-Comparison between experimental methods

Differences between ETM and BWS/DCE



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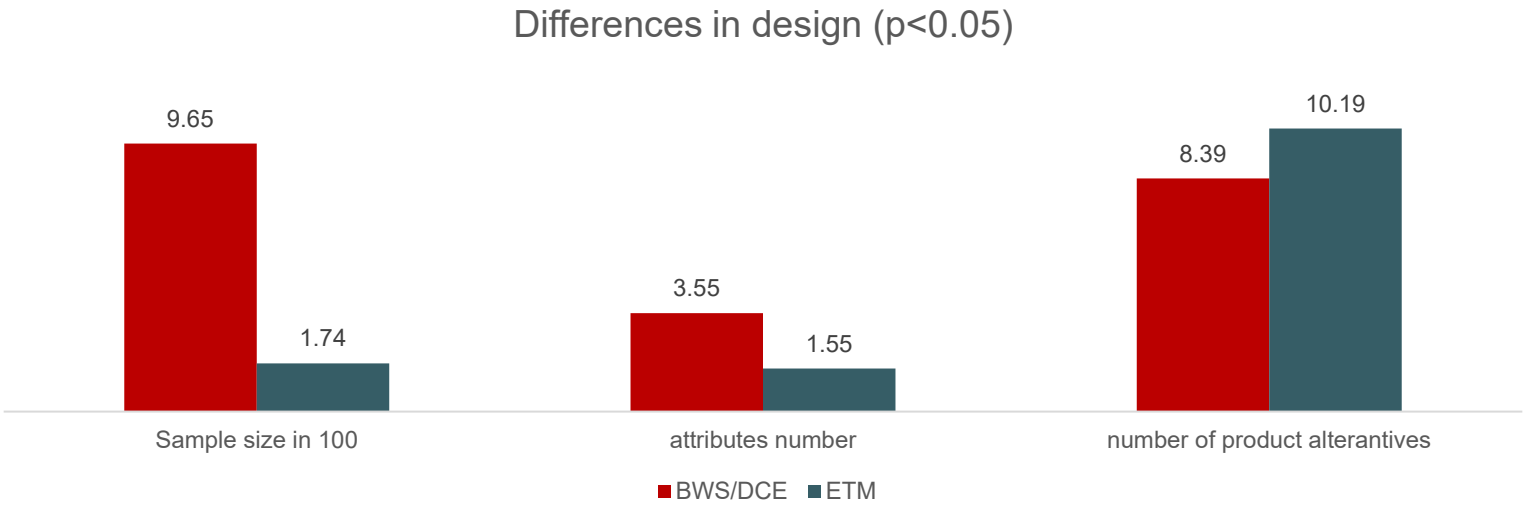
Differences between ETM and BWS/DCE



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Convergence between BWS/VCE and ETM

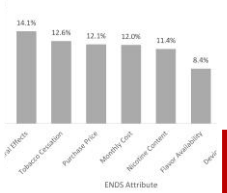
- Both can be administered online to obtain large sample sizes or conducted in person with additional sessions of using real products
- Both within and between subject variations can be built into BWS/VCE and ETM (e.g., most ETMs and split-sample choice experiments utilize between-subject randomizations)
- Both volumetric choice experiments and ETMs elicit consumption units or measures
- Both methods can contain a wide range of opt-out or status quo product options

CONCLUSIONS

Conclusions

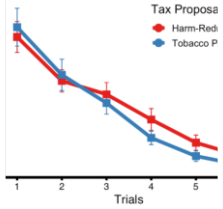
- DCEs and BWS/DCE contain more product attributes and have larger sample sizes
- ETM is more likely to be administered in person and can contain more tobacco products.
- Areas that call for improvement include needs to use qualitative data to design and interpret experimental data, assess heterogeneity in data, test external validity, and report comparable measures and outcomes.
- Significant differences in experimental methods provide an opportunity to address different research needs but also present a challenge for harmonizing data.

Which experimental methods fit you research needs?



DCE/BWS

- More manipulations
- Large sample online
- Within subject
- Price is not necessary
- Binary choice



ETM

- More products
- In lab with real spending/products
- Between subject
- Price is always included
- Consumption

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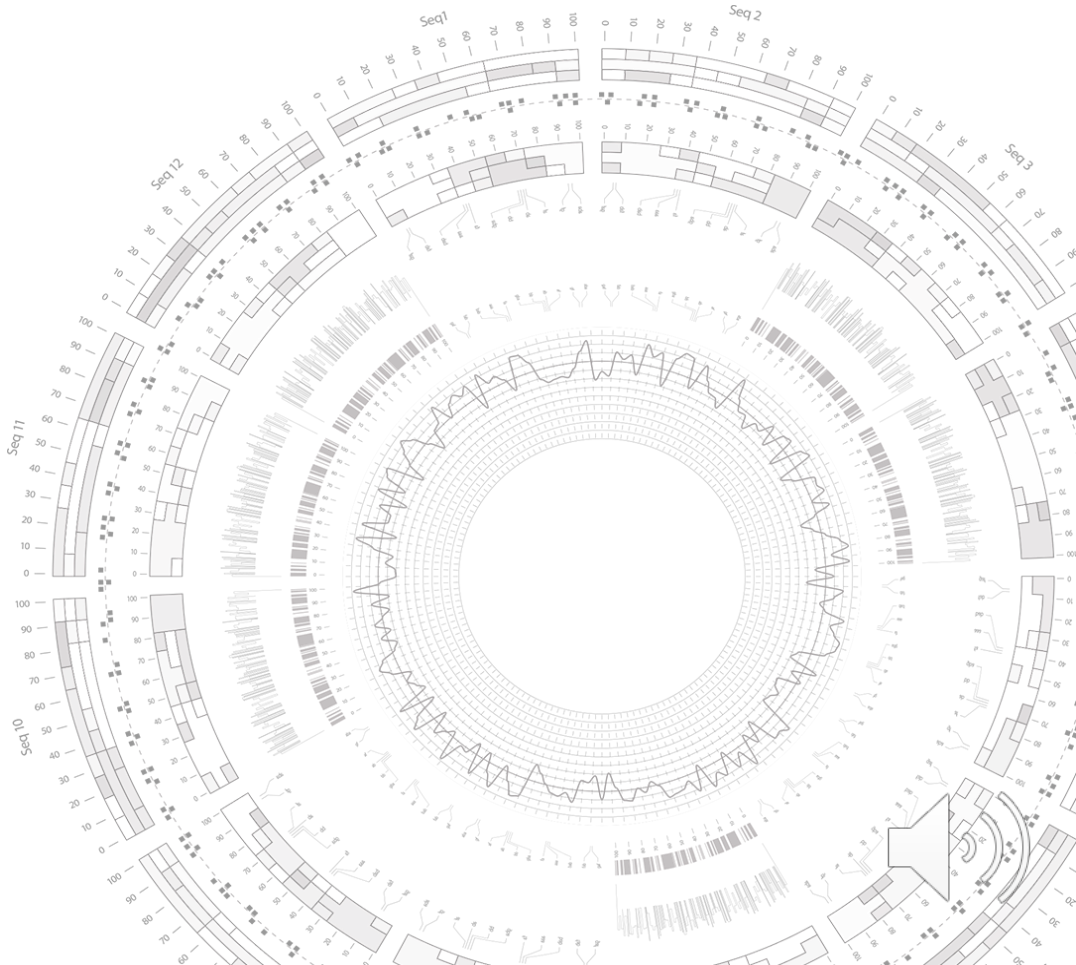
Questions and comments



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Search Terminologies

Tobacco products:

- “tobacco" OR “smoke*” OR "cigar*" OR "e-cigarette*" OR "electronic cigarette*" OR "electronic nicotine delivery*" OR "electronic nicotine device*" OR "vape" OR "vaping" OR "e-liquid" OR "hookah" OR "water pipe" OR "nicotine pouch*" OR "smokeless tobacco" OR "snus" OR "snuff" OR "loose leaf" OR "dissolvable tobacco”

Methods:

- “choice experiment*” OR “DCE” OR “conjoint analys*” OR “VCE” OR “best–worst” OR “worst-best” OR “BWS” OR “maximum difference” OR “maxdiff” OR “max diff” OR “stated preference” OR “preference-based” OR “ngene” OR “sawtooth” OR “pairwise choice*” OR “pairwise comparison” OR “contingent valuation” OR “experimental tobacco marketplace” or “experimental marketplace”

We search (Tobacco products) AND (Methods)

Additionally, we examined articles that cited one prior literature review on DCE in tobacco control .

Methods – Five Aspects of Information

- Study characteristics:
  - Study type, tobacco product, and year of publication
- Sampling and survey characteristics:
  - Sample size, sample size justified, country, age, type of sample, and administration.
- Experimental methodology characteristics:
  - The number of tasks per person, total number of tasks, the number of alternatives, the number of attributes, the maximum number of attribute levels, attributes, use of blocking (DCE specific), opt-out option, status quo,
  - Using qualitative methods, type of qualitative methods, rationale using qualitative methods, design features (DCE and BWS specific, including design plan, design software, type of design), analysis model, analysis software, assess heterogeneity, outcome measure, and external validity tested.
- Assessment of study quality and policy relevance:
  - PREFS scores, subjective quality scores, policy relevant scores, policy statement, and FDA research priority.