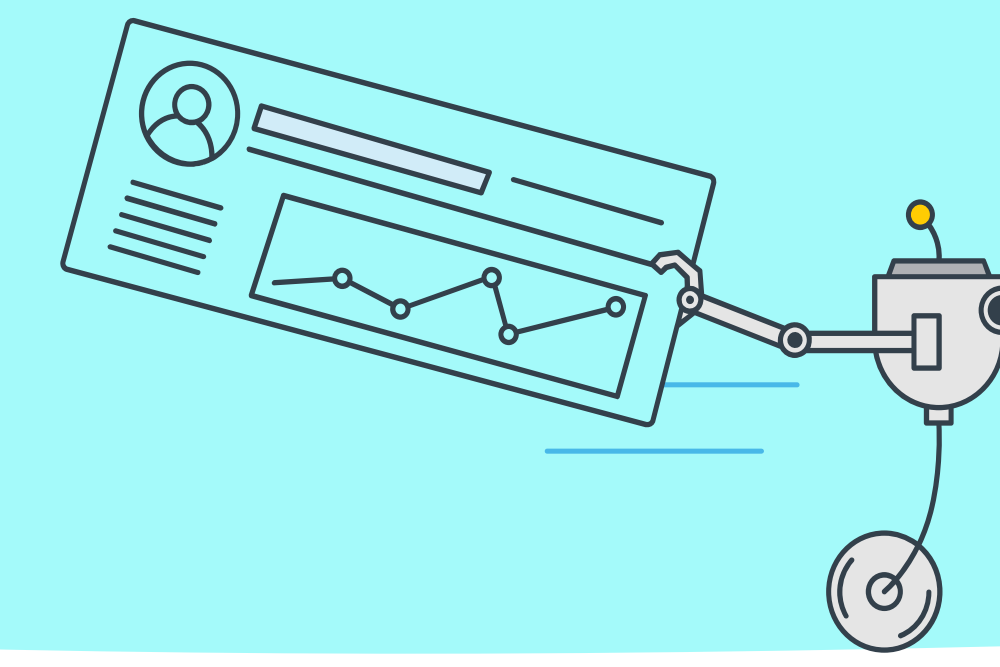


Enhance Attribute Identification with Artificial Intelligence: Feasibility Assessment for More Nuanced and Resource Efficient Patient Preference Research

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BACKGROUND

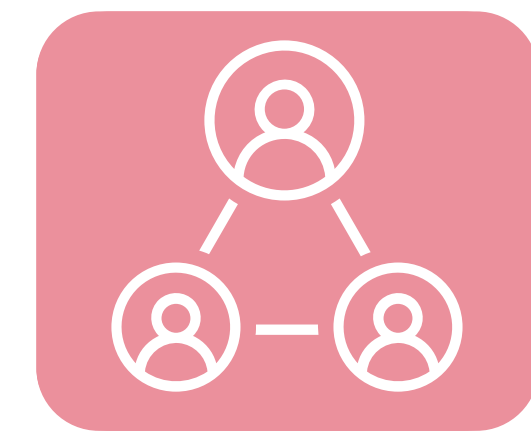
CONTEXT: Patient preference research (PPR) explores what patients value most and the trade-offs they are willing to make. It is valuable from drug development to clinical use and is key to multi-stakeholder engagement and patient-centered research.[1]

Integrating PPR in health technology assessments (HTA) improve uptake, adherence and overall satisfaction.[2] Despite its importance, it remains underutilized due to methodological and procedural challenges thus affecting the efficiency of results.[2] With introduction of artificial intelligence (AI), these challenges can be overcome. AI can help identify these preferences more accurately and efficiently, saving time and resources.[3]

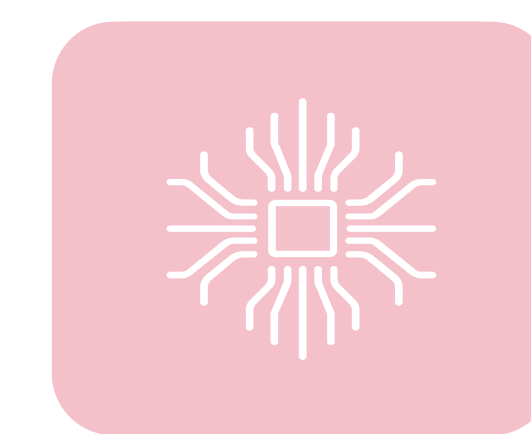
OBJECTIVES: This research explores how AI can enhance attribute identification and streamline PPR. A proof-of-concept exercise was conducted.

Our proof-of-concept exercise demonstrates promising results, with a potential 40% reduction in the burden on PPR. Additionally, AI with human-in-the-loop can effectively generate numerous patient-important attributes, capturing nuances often missed by traditional methods.

By leveraging AI with patient validation, we can optimize efficiency and resource use—addressing key barriers to PPR utilization in HTAs and promoting broader adoption.



Human validation



Leveraging AI



Efficient PPR

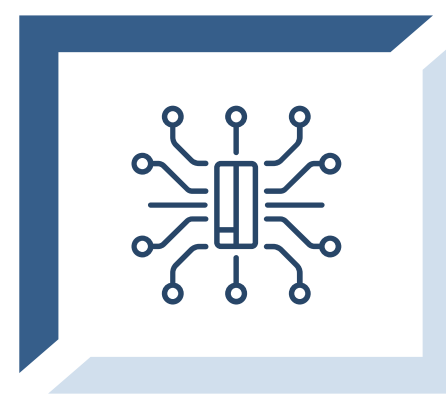
TRADITIONAL VS AI POWERED METHODS FOR ATTRIBUTE IDENTIFICATION

We conducted a proof-of concept study to assess AI/LLM (large language models) in identifying attributes for PPR, exploring whether AI with human-in-loop can boost its efficiency. Using tobacco control as a proof-of-concept exercise, we compared AI-identified attributes with those in published studies. Key differences between traditional and AI-powered methods are outlined below:

Attribute identification process



Attributes are identified through expert consultation, literature reviews, and focus groups, often focusing on predefined factors

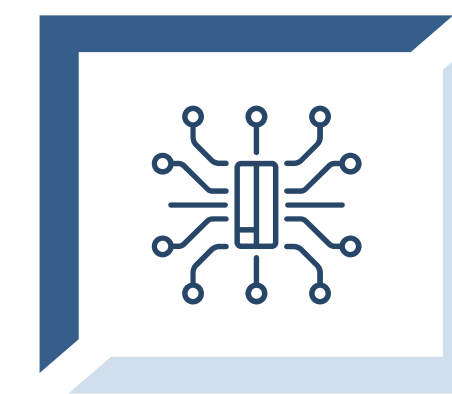


AI automates attribute identification from published literature and other diverse sources such as social media, sentiment analysis and emerging trends. This nearly reduces the resources by half and provides the researchers an advanced starting point.

Bias reduction



Researcher biases limits study effectiveness by overlooking factors like social acceptance or habit-forming behaviors when focusing too narrowly on price and health warnings.



AI offers an unbiased starting point for attribute identification, reducing confirmation biases and ensuring a comprehensive understanding of preferences.

Efficiency & Speed



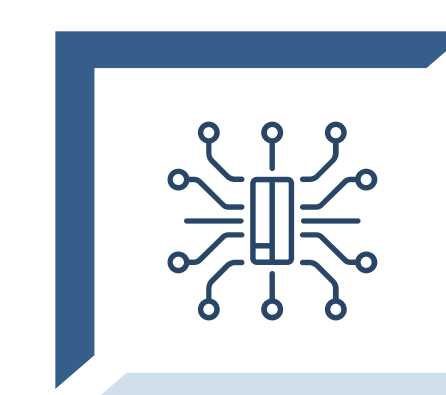
AI can automate survey design and pre-testing, cutting preparation time by nearly 40%.

It can dynamically adjust choice sets based on real-time feedback from pilot testing.

Participant diversity & Inclusion



Traditional methods struggle to capture perspectives from diverse groups and often rely on published journal articles.

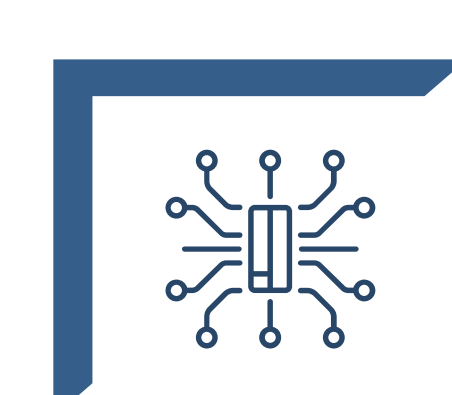


AI analyzes diverse sources like patient forums and social media, capturing underrepresented voices and making study outputs more globally reflective of tobacco consumption.

Adaptability to emerging trends



Traditional studies lag in addressing new products or policies, like e-cigarettes, due to lengthy research timelines



AI continuously monitors emerging trends and integrates them into study designs quickly addressing new issues like vaping waste or youth smoking trends to keep studies current.

RESULTS (CASE STUDY: ATTRIBUTES IN TOBACCO CONTROL STUDIES)

Based on the feasibility of our AI tool (proof of concept exercise) to support PPR, the following attributes were extracted through literature reviews, discussions published online in forums or media outlets, and social media sentiment analysis:

Core Attributes (Found in Traditional DCEs) [4-8]

- ✓ **Monetary factors:** Price and taxation levels of tobacco products, consistently influencing consumer decisions.
- ✓ **Packaging and health warnings:** Graphic health warnings (HWLs) and plain vs. branded packaging.
- ✓ **Cessation aids:** Preferences for nicotine replacement therapies (patches, gums) and digital cessation programs.
- ✓ **Product types:** Focus on traditional cigarettes, e-cigarettes, and water-pipe tobacco.
- ✓ **Social and behavioral factors:** Smoking behaviors and public health regulations (e.g., flavor bans) to reduce usage.



Additional Attributes Identified by AI

- ✓ **Mental health impact:** Nicotine consumption for anxiety and stress management.
- ✓ **Environmental concerns:** Concerns about environmental waste via vaping devices and cigarette butts (AI detected through forums and social media analysis).
- ✓ **Social acceptance and peer Influence:** Extent of social influence on smoking behaviors through social circles or peers.
- ✓ **Access to Cessation Services:** Barriers to digital tools or in-person programs due to location/technology access.

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