

Preferences for adopting a mobile health app: A best-worst scaling and discrete choice experiment

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INTRODUCTION

- Mobile health (mHealth) applications, particularly mobile patient portal (MPP) apps, enhance patient engagement and are associated with improved adherence, health behaviors, and clinical outcomes.
- Despite these benefits, adoption remains suboptimal due to usability challenges, limited digital literacy, and privacy concerns, with disparities across age and education groups.
- MPP apps serve as key communication interfaces between patients and healthcare systems, enabling access to health records, appointment management, and provider communication.
- Prior research has focused on intention-based models, offering limited insight into how users prioritize specific app attributes during decision-making.
- Traditional approaches often overlook how users make trade-offs among competing app features, which is critical in real-world adoption decisions.
- This study conceptualizes MPP adoption as a multi-attribute decision process and applies choice-based methods to examine how attribute priorities vary across demographic subgroups.

METHODS

- U.S. adults (≥18 years) were recruited via CloudResearch and completed an online Qualtrics survey; eligibility required familiarity with mobile patient portal (MPP) apps.
- Accordingly, the following four MPP app attributes were evaluated:
 - **Perceived usefulness:** Access to health information, communication, appointment management
 - **Expected outcomes:** Efficiency and convenience in health management
 - **Ease of use:** Simplicity of learning and navigation
 - **Privacy safeguards:** Protection of personal health information
- Preferences were first assessed using **best-worst scaling (BWS)**, where participants identified the most and least important attributes. Relative importance scores were calculated using standardized best-worst counts and normalized ratios.
- A **discrete choice experiment (DCE)** was conducted to elicit trade-offs, using a balanced, non-dominant design (2-level attributes; equal number of favorable features per alternative). Each respondent completed 9 tasks across 8 randomized survey versions.
- Choice data were analyzed using conditional logit models stratified by age. Attribute importance was quantified using marginal changes in predicted probabilities (ΔP), with analyses conducted in SAS 9.4.
- MPP app feature use was also assessed using multiple-response items, with an open-ended option to capture additional features.

RESULTS

- Table 1 presents BWS results (best/worst frequencies, B–W scores, ratio scores):
 - **Age < 40 years:** Expected outcome ranked highest (34.3%), followed by perceived usefulness (25.9%) and privacy safeguards (24.2%); ease of use was lowest (15.6%).
 - **Age ≥ 40 years:** Similar pattern observed—expected outcome highest (32.4%) and ease of use lowest (16.7%); privacy safeguards (27.7%) slightly exceeded perceived usefulness (23.2%).
 - Overall, **expected outcome consistently ranked as the most important attribute**, while **ease of use was the least important** across all subgroups.

Table 1. Best-worst scaling results

(a) Adults aged < 40

No.	Content attribute	Total count			Scaled B-W scores		
		Best	Worst	(B-W) score	Average (B-W) score	Sqrt (B/W)	Relative importance (%)
1	Expected outcome	26	13	13	0.250	1.414	34.25
2	Perceived usefulness	8	7	1	0.019	1.069	25.89
3	Privacy safeguards	8	8	0	0.000	1.000	24.22
4	Ease of use	10	24	-14	-0.269	0.645	15.63

(b) Adults aged ≥ 40

No.	Content attribute	Total count			Scaled B-W scores		
		Best	Worst	(B-W) score	Average (B-W) score	Sqrt (B/W)	Relative importance (%)
1	Expected outcome	110	63	47	0.184	1.321	32.44
2	Perceived usefulness	32	36	-4	-0.016	0.943	23.15
3	Privacy safeguards	65	51	14	0.055	1.129	27.72
4	Ease of use	49	106	-57	-0.223	0.680	16.69

RESULTS (cont'd)

- Table 2 reports conditional logit results:
 - **Age < 40 years:** Expected outcome was the strongest determinant ($\beta = 0.23$, $p < 0.01$; $\Delta P = 5.7\%$), followed by privacy safeguards ($\beta = -0.14$, $p < 0.05$); perceived usefulness and ease of use were not significant.
 - **Age ≥ 40 years:** Expected outcome remained significant ($\beta = 0.13$, $p < 0.001$), and ease of use also emerged as a significant determinant ($\beta = -0.12$, $p < 0.001$).

Table 2. Discrete choice experiment: Conditional logit model results

(a) Adults aged < 40

Attribute	β coefficient (Standard error)	p value	Marginal effect	Relative importance (%)
Expected outcome	0.231 (0.072)	0.001	0.057	43.22
Perceived usefulness	0.036 (1.608)	0.982	0.009	6.72
Privacy safeguards	-0.145 (0.065)	0.025	0.036	27.16
Ease of use	-0.122 (0.074)	0.099	0.030	22.89

(b) Adults aged ≥ 40

Attribute	β coefficient (Standard error)	p value	Marginal effect	Relative importance (%)
Expected outcome	0.133 (0.032)	< 0.001	0.033	49.99
Perceived usefulness	-0.010 (0.028)	0.731	0.002	3.66
Privacy safeguards	-0.000 (0.421)	0.999	0.000	0.04
Ease of use	-0.124 (0.032)	< 0.001	0.031	46.31

DISCUSSION

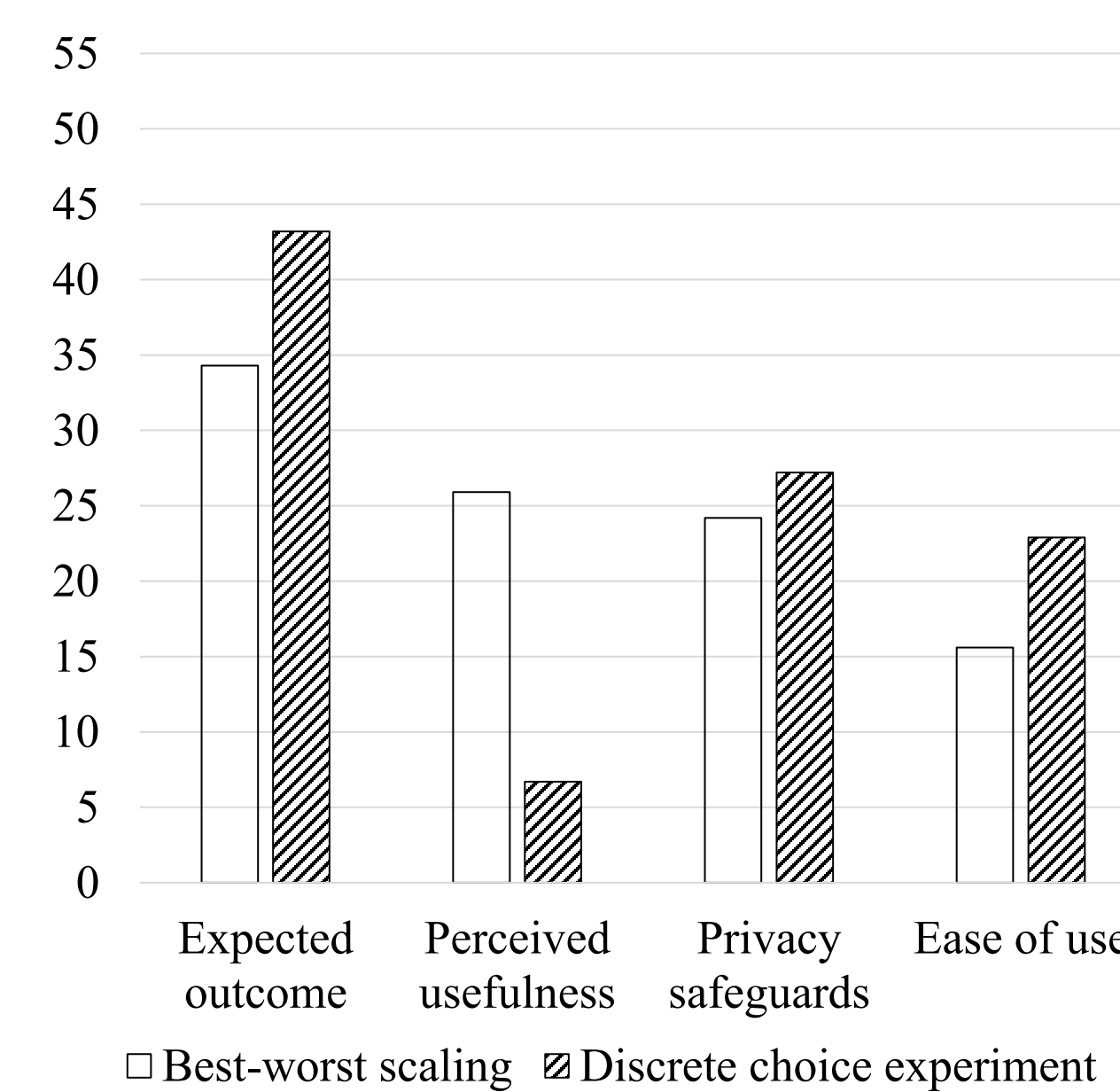
- Using complementary methods (BWS and DCE), this study identified consistent importance of **expected outcome** while revealing differences between stated importance (cognitive salience) and choice-based preferences (behavioral priority).
- A **cognitive-behavioral gap** was observed: attributes identified as important in BWS did not always drive actual choices in DCE, highlighting the value of combining both approaches.
- Across all subgroups, **expected outcome (anticipated health benefits)** was the most influential attribute, reinforcing its central role in MPP app adoption decisions.
- In younger adults, privacy safeguards had greater influence on actual choices than perceived usefulness. However, in older adults, **ease of use** was a stronger behavioral driver despite lower stated importance, indicating usability constraints.

CONCLUSION

- Effective MPP adoption strategies should emphasize tangible health benefits (expected outcomes) across all groups and tailor messaging and design—such as prioritizing usability for older adults and privacy for younger adults—to subgroup-specific drivers.

- Figure 1 shows the relative importance rankings from BWS and DCE results:

(a) Adults aged < 40



(b) Adults aged ≥ 40

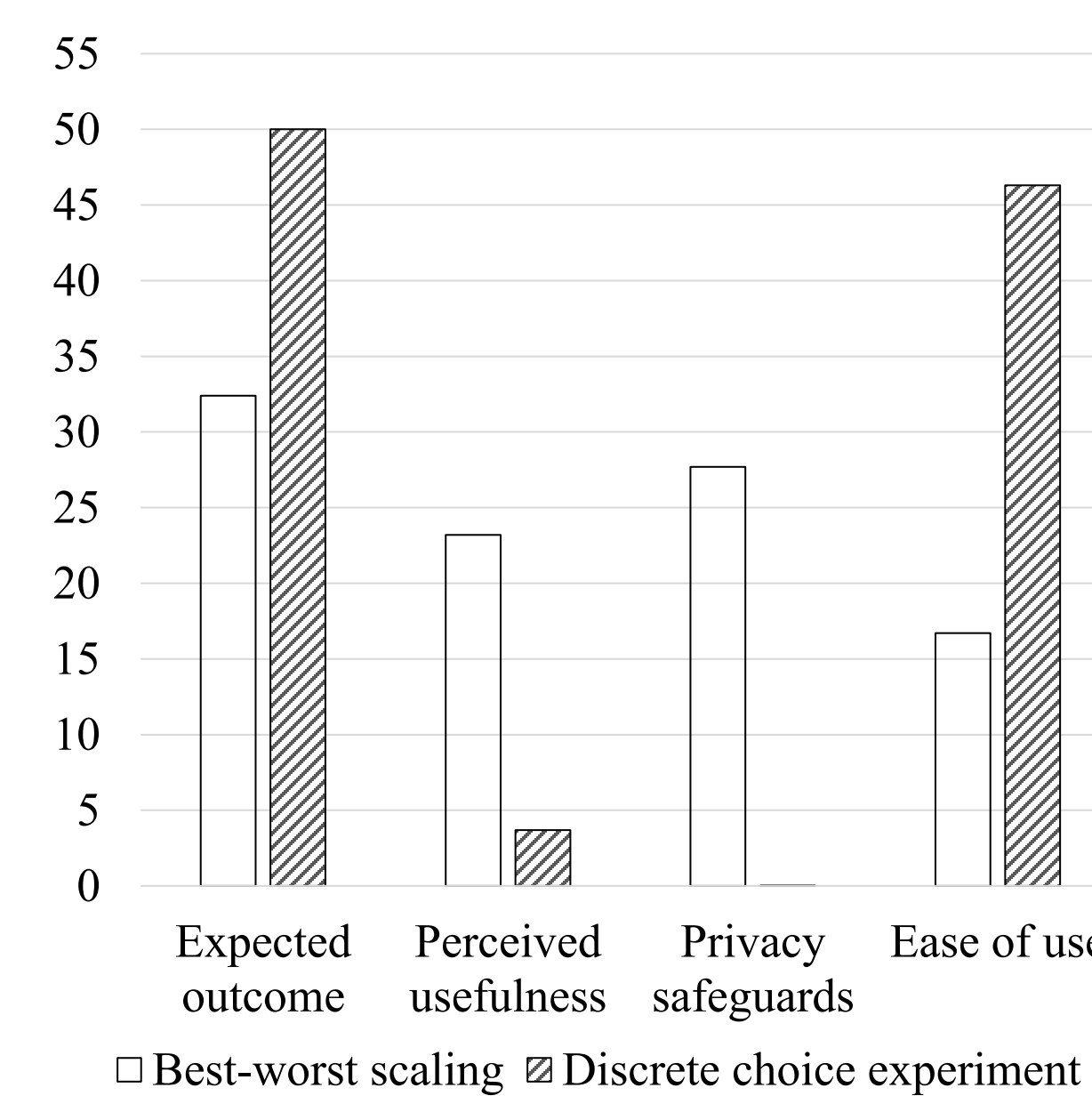


Figure 1. Relative importance of attributes for mobile health app usage

- **Expected outcome** consistently shows the highest importance across most groups, confirming its dominant role in driving choice decisions.
- **Age differences:** ease of use is substantially more important among older adults, whereas privacy safeguards carry greater weight among younger adults.