

Protocol for a Health Preference Study on Digital Health Interventions: Integrating DCE and BWS to Capture Subject, Interaction, System, and Societal Value



Axel Mühlbacher^{1,2}, Ann-Kathrin Fischer^{1,2}, Andrew Sadler²

¹ Health Economics and Health Care Management, University of Applied Sciences Neubrandenburg, Germany

² Gesellschaft für empirische Beratung, Affiliated institute of the University of Applied Sciences Neubrandenburg, Germany

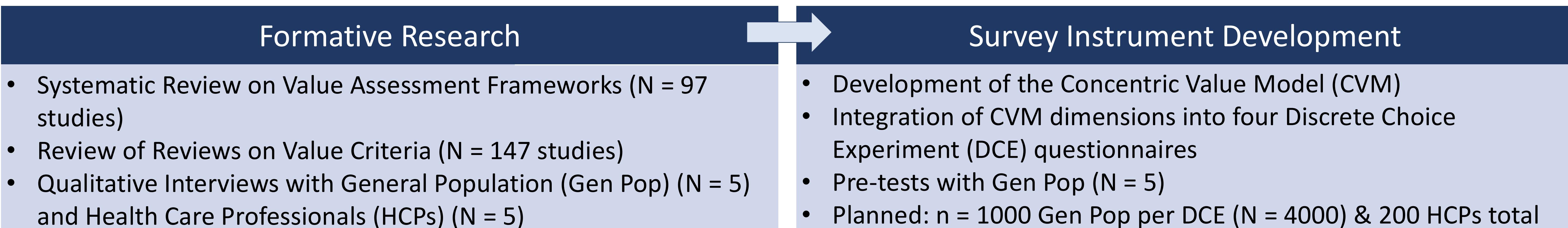
Background: Valuing Digital Health Interventions

- Need for value frameworks for Digital Health Interventions (DHIs)
- Multidimensional value perspective is essential

Research Question: Stakeholder Preferences

How can a Health Preference Research (HPR) study elicit stakeholder preferences within a multidimensional decision context for DHIs?

Method: Developing a Health Preference Research Study



Results: Multidimensional Health Preference Research Study

- **Decision Model:** Based on CVM, attributes were identified across four dimensions:
 - **Impact on Subject:** individual outcomes and experiences: clinical benefit, clinical risk, behavioral change, knowledge development, individual resources, transparency and technical security.
 - **Impact on Interaction:** usability and user experience, determining adoption and sustained engagement: task support, expectation conformity, comprehensibility, learnability, controllability, reliability and error prevention, user engagement, inclusion and accessibility, customizability and personalization, information exchange and communication, support and service.
 - **Impact on System:** integration of DHIs into technical and organizational infrastructures: scalability and expandability, interoperability, organizational compatibility, system efficiency, maintainability, availability, management.
 - **Impact on Society:** broader societal, ethical, and regulatory context: environmental protection and sustainability, social and public perception, social equity and justice, innovation and progress, economic growth, regulatory responsibility, public health.
- **Survey Instrument:** Four DCE modules with nine choice tasks plus one dominance task; best–worst format without opt-out; standardized definitions and pictograms.
- **Continuous Attributes:** Out-of-pocket costs (€0–€50/month) and individual time investment (5–120 min/day) to increase comparability between DCE versions.
- **Partial Profile Design:** 4–5 descriptive and 2 continuous attributes per task; unshown attributes fixed at 75 %; full attribute list visible.
- **Experimental Design:** Multi-step optimization; final efficient design.
- **Integration of BWS1:** Added to handle the large total number of attributes and enable a full ranking across all 31 attributes; supports cross-model comparability and strengthens preference estimation.
- **Combining DCE and BWS1:** Joint likelihood estimation ($L = L_{DCE} + \lambda \times L_{BWS}$); shared scaling factor for comparability; integrated analysis enhances robustness.
- **Survey Framing:** Metadata and eligibility screening; pre-DCE question on real use; level of goal attainment 0–100 %; pictograms and viridis color scale

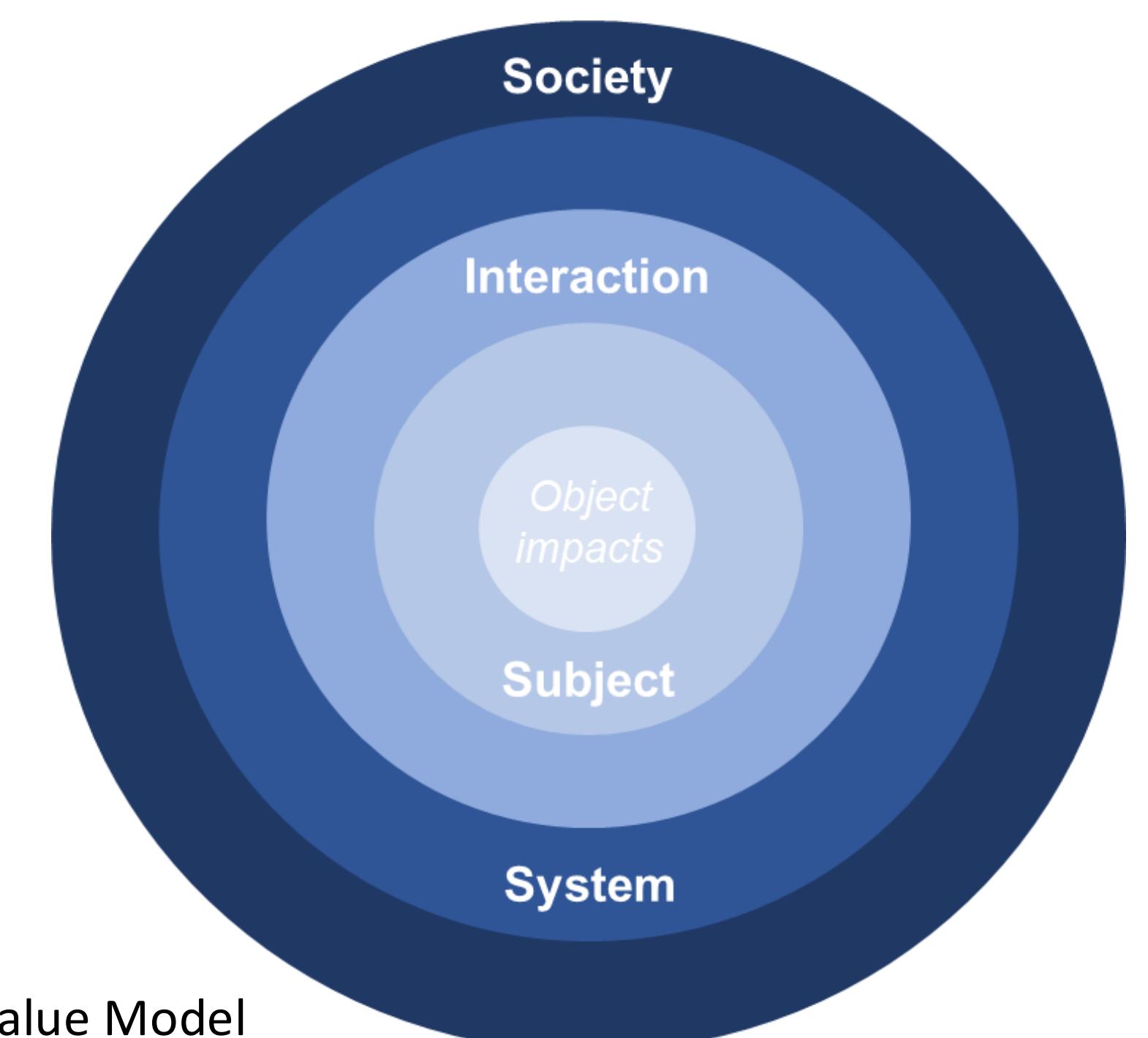


Figure 1: Concentric Value Model

Which of the options do you prefer? Please indicate which option you believe provides the greatest value (best option) and which provides the least value (worst option).

	Option 1	Option 2	Option 3
Klinischer Nutzen (individuelle Gesundheit)	100% Zielerreichung	0% Zielerreichung	50% Zielerreichung
Klinisches Risiko (individuelle Folgen)	75% Zielerreichung	100% Zielerreichung	0% Zielerreichung
Wissensentwicklung	25% Zielerreichung	100% Zielerreichung	75% Zielerreichung
Transparenz und technische Sicherheit	0% Zielerreichung	75% Zielerreichung	25% Zielerreichung
Eigenanteil pro Monat	20€	10€	40€
Individueller Zeiteinsatz pro Tag	10 Minuten	30 Minuten	15 Minuten
Beste Option	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schlechteste Option	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Figure 2: DCE Choice Task Example, Subject Dimension;
Software: Survey Engine

	Wissensentwicklung	Management	Individualisierbarkeit und Personalisierbarkeit	Support und Service	Transparenz und technische Sicherheit
Am wichtigsten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am wenigst wichtig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 3: BWS 1 Choice Task Example, Integration of all Dimensions;
Software: Survey Engine

Discussion: Multidimensional Value in Preference-Based Evaluation

- Study protocol establishes a comprehensive HPR approach to evaluate stakeholder preferences for DHIs across four value dimensions.
- Continuous attributes (WTP, WTV) and systematic attribute development ensure comparability, interpretability, and methodological robustness of the DCE design.
- The study advances preference-based evaluation of digital health by capturing heterogeneity across stakeholder groups and identifying key drivers and barriers to DHI acceptance.
- BWS1 complements DCE, broadening methodological diversity and enabling cross-dimensional assessment of attribute importance.