Patient Acceptance to Valuing Digital Technologies – A Discrete Choice Experiment

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Background

Digital technologies are increasingly used in healthcare to address changing needs, increasing numbers of cases, and decreasing resources. There is an ongoing interest in the development and implementation of digital innovations in the field of neurorehabilitation of cognitively, perceptually, and participatively impaired stroke patients. However, little is known about patients' acceptance toward these innovations.

Figure 1. Digital transformation

Study Rationale

Successful implementation of digital technologies depends on the acceptance of patients. Acceptance refers to the extent to which users are comfortable with or willing to use something, despite bad outcomes. Besides expected clinical success, technical aspects such as ease of use, interaction, or feedback impact consumer acceptance. Therefore, the aim of this study is to investigate the impact of technical aspects of digital technologies on patient acceptance.

Methods

To obtain information on criteria impacting acceptance, a discrete choice experiment was conducted with **seven attributes** identified in literature and formative qualitative research. **6 choice tasks** were defined as forced choices with non-labeled objectives or alternatives. We used **a ranking task in a best-second-best format** to obtain more information from one choice and to reduce cognitive burden. Due to cognitive burden a **partial profile** was selected. **Experimental design** (Software: Sawtooth & Ngene) is a fractional-factorial efficient Bayesian design (D-error). The experimental design is based on the following assumptions: (1) Minimal overlap (2) Level balance (3) Orthogonality. The experiment is blocked (20 blocks; randomized allocation). By combining all possible levels with each other (two-way frequency), enough information is generated to be able to measure interaction effects. **Two populations** were included: (1) stroke patients (experimental group); (2) general population (control group).

Table 1. Descriptive Framework

Attributes	Levels
Explanation and presentation of therapy exercises	Sounds and speech / Descriptive texts / Images / Videos / Spatial movements
Information in therapy	No information / Therapy and rehabilitation process / Diagnosed disease / Patient 's current health status / Change in health status due to therapy
Contact with healthcare professionals	No contact / Contact is indirect (messages) / Contact is direct (telephone or video)
Patients' choice in therapy process	No influence / Selection of therapy exercise with a certain degree of severity / Pace of therapy exercise / Time of therapy (frequency, duration, start) / Place of therapy (e.g., home, clinic, practice)
Data processing	No data processing / Processing of data about the person / Processing of data about the diagnosis / Processing of data about the progress of the therapy
Copayment per month	80€ per month / 60€ per month / 40€ per month / 20€ per month / No copayment
Therapy success within 6 months	60 out of 100 patients / 70 out of 100 patients / 80 out of 100 patients / 90 out of 100 patients / 100 out of 100 patients [achieving their therapy goals]

Figure 2. Example Choice Task

Results

We have a total of 1094 completes in the control group. In experimental group 165 participants completed the questionnaire. We calculated a conditional logit model (validity check) and mixed logit regression model (main analysis). Stata 17 was used for statistical analysis. In total (n = 1259) relative importance of *therapy success* (60%, coef: -1.45; 100%, coef: 1.47) was rated as most important, followed by *copayment* (0€, coef: 0.86; 80€, coef: -0.96) and *contact with professionals* (no contact, coef: -0.81; direct contact, coef: 0.54).

Figure 3. Mixed Logit Regression Model n = 1259 all completes

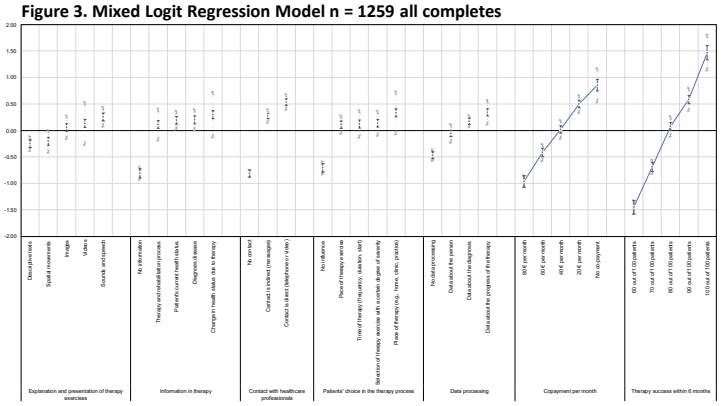
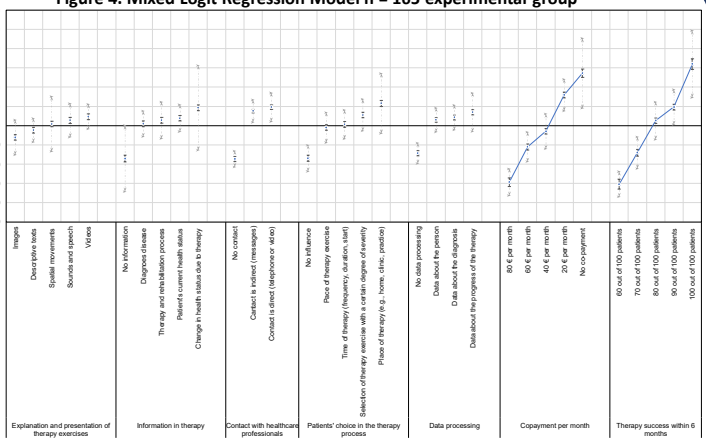


Figure 4. Mixed Logit Regression Model n = 165 experimental group



The arrows in figures 3 and 4 represent the standard deviations from the mixed logit regression model. High variances in standard deviations indicate differences between subgroups. It becomes clear that the preferences of the respondents are heterogeneous in some attributes and attribute levels. In the analysis, the results of both groups were compared. Due to scale effects, the coefficients were not directly compared. The comparison was made considering the influence of the covariate general population.

Discussion

- In the experimental group there are significant differences in standard deviations of attribute levels of *explanation and presentation of the therapy exercises*. Stroke patients in most cases suffer from persistent limitations in their cognition, visual perception, speech, and understanding as well as reading language. This results in a differentiated need.
- Contrary to the current data privacy discussions in Germany, which is a barrier to digitization in healthcare, the *data processing* is not rejected. An advantage in data processing can be seen in the improvement of interfaces, research and evaluation, which in turn has a positive impact on clinical outcomes.
- Flexibility (*patients' choice in therapy process*) is seen as an advantage, especially in terms of location. The use of digital technologies can expand access points and reach limited groups.
- Higher differences in preferences of the experimental group (therapy-experienced) result in *copayment* and *therapy success*. Patients experience clinical outcomes as well as non-clinical characteristics during therapies and evaluate these differently over time, including when therapy goals are largely achieved, and successes are maintained.
- The value of digital technologies in rehabilitation lies in the achievement of goals (activities of daily living), communication (contact, explanations) and flexibility (location).

Using information about patients' preferences and acceptance, we can improve informed decisions, e.g., before new technologies are developed and even when new technologies are developed (design; pricing; allocation). Acceptance is a multidimensional construct and requirements for digital technologies include various dimensions. We have attempted to develop a generic model that generates preference information to provide information about patient acceptance.

References: Available upon request.
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Institutional Review Board Statement: The study was conducted according to the Declaration of Helsinki, the BDSG (Deutsches Bundesdatenschutzgesetz, the German Data Protection Act), the EU privacy policy, Guideline on Good Clinical Practice (CPM/ICH/135/95) regarding the obligation to report serious adverse events (SAEs) and approved by the Ethics Committee at Hochschule Neubrandenburg (HSNB/177/21).