

Voice and Auditory
Interaction

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Potential and Pitfalls of Digital Voice Assistants in Older Adults With and Without Intellectual Disabilities: Relevance of Participatory Design Elements and Ecologically Valid Field Studies

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- ❖ Prevalent use of VAs
- ❖ Older adults are not considered in research → Heterogeneity in cognitive, sensory and functional competences
- ❖ Digital divide between younger and older generations → Benefit from a smaller extent of VAs
- ❖ The risk of digital exclusion for elders with intellectual disabilities
- ❖ Significance of maintaining and enhancing older participation in VAs usage



Analyzes the benefits and challenges of using VAs



Offers a set of recommendations for future research on VAs for older adults

Benefits of VAs

❖ Six clusters of insights

1. Provides technology access for individuals who do not use conventional computing devices → Eliminates usability problems by small fonts or buttons
2. Enables communication with others in social domain or acts as social companion → Older people with limited vision and impaired hand movement
3. Assists with daily well-being activities in health domain → Health tracking, medication management, dietary planning
4. Contributes to enjoyable leisure time experiences → Music, videos, jokes
5. Provides support for independent living → Setting a timer or reminder, access to online information
6. Provides positive effect on a person's agency → Helps older people with intellectual disabilities in better managing their lives

Challenges and barriers of using VAs

- **Problems interacting with VAs** → **User is required to follow a pre-structured form of dialogue** → **Limiting the conversational abilities of VAs**
- **Problems recalling the specific commands necessary to operate the devices**
- **Lack of added value** → **Time consuming and lack of compatibility** → **Preference for devices already used**
- **Fear of losing one's own competences** → **VAs may take care of a number of tasks without considering the competences of the user**
- **Concerns about privacy and data security**

❖ Two major limitations in research on VAs for older adults

1. Limited knowledge on VA use in specific groups of older adults



e.g. older adults with
cognitive impairment and
intellectual disabilities

2. Limitations at the methodological and design level



- Lack of data collection in everyday life
- Lack of user-centered research approaches

Need for participatory design elements

- **Recommends a high level of user involvement in research** → **Should identify the best ways to introduce VA use and address the challenges**
- **Higher need for instruction in elders than youngsters** → **Propose a participatory implementation of user trainings and user manuals**
 - ↳ **Older adults should be involved in different co-designing activities such as co-design workshops to develop and discuss their own ideas**

❖ User trainings

- **Educational programs and training courses** → **Decrease barriers in VA interaction**



Relevant aspects

- Requirements for a successful interaction with VAs (e.g. specific voice commands)
- Possibility to use VAs for different purposes (e.g. social domain, health domain, leisure)
- Possible concerns (e.g. losing competences, privacy issues)



Need for participatory design elements

- ❖ **User manuals** → Providing well-designed guidelines to help them to explore possibilities of VAs according to their needs and in their own pace
- Discuss about different group-specific versions of user manuals to achieve the best possible design
 - ↳ Helpful for elders with specific problems like cognitive impairments and intellectual disabilities
 - ↓
Easy-to-read language
 - ↓
Visualized instructions

❖ After an initial phase of learning and curiosity → Analysis of more routinized interactions with VAs

❖ Main focus of studies

1. Diary studies
- Participants can report experiences, likes and dislikes in open-ended and closed questions using VAs
 - Participants can be reminded of the diary with prompts and questions can be repeated and adapted to the individual
 - Participants can actively provide feedback on experiences of using VAs

2. Analysis of automatically collected data (beyond users' self reports)

- Collecting additional data related to the usage behaviors by external recording of audio, video of VAs usage



Provides information about

- Which VA functions are used by individuals with different expertise and competences
- Used voiced commands
- Changes of use patterns over time



❖ Main focus of studies

3. Emotion analysis → Important for understanding benefits and challenges of using VAs for older adults

- Allows to study user experiences in situations when verbal feedback is scarce due to possible cognitive impairments and intellectual disabilities

➤ Automatic emotion analysis is not always reliable due to challenges like:

- Difference in emotional expression in older adults with different disabilities
- Difference in physical appearance (especially regarding genetic syndromes)
- Difference in cognitive deficits

↳ Automatic emotion analysis validity has not yet been proven → Should be the focus of future research