visuAAL

Privacy-Aware and Acceptable Video-Based Technologies and Services for Active and Assisted Living

(Dis)trust in medical technology and medical support considering severe health decisions

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Research Progress

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Universitat d'Alacant
Universidad de Alicante
Project Coordinator

RWTH AACHEN UNIVERSITY

Stockholm University

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

TU WIEN

ESR2. Overview of Presentation

1. **Overview of the project & the work** 📌
2. (Quick) recap of the literature 🔄
3. Definitions of trust 🎯
4. Trust and acceptance 🤝
5. Trust across contexts 📊
6. Research in progress – Expansion ➡️
7. Future research – Collaborations 🔮
8. Publications 📚

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ESR2. Overview of the Project

- **Why?** Trust in the healthcare system and in technology are key variables embedded in a complex system leading to the adoption of medical technology, i.e. AAL solutions
- **What?** Perceptions, attitudes, (pre)determinants, and decisions influencing trust in the medical system
- **Who?** Various target groups, including old & frail people, handicapped people, and people with chronic illnesses
- **How?** Assessing context- and user-specific influences of trust and decisions about their health, as well as health behaviours

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ESR2. Overview of the Work

- **Goals**
  - Understanding of trust in sensitive user groups
  - Development of trust metrics in AAL technology
  - Holistic framework of user and context requirements

- **Relevance**
  - Trust as the key to successful adoption of AAL technologies
  - Trust as compass for protection of autonomy and agency
  - Implementation in all sectors of society

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ESR2. What is trust?

- Core component of human thinking and consequent behaviour – key factor in interactions between humans, situations, and institutions

  ⇢ most common conceptualisation as *belief* and *expectancy* (McKnight & Chervany, 2001)

- Trust in technology has been investigated in multiple contexts, e.g., mobility & e-commerce (McKnight et al., 2002; Lee & See, 2004)

  ⇢ no unified theory of trust across contexts

- Individual and institutional variables are relevant in the understanding of trust in the healthcare system (Zhao et al., 2018)

- Trust influences (subjective) health behaviours (Birkhäuer et al., 2017)

  ⇢ important for therapy outcomes and the improvement of the healthcare system

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ESR2. How is trust relevant?

- Trust in medical technology depends on several other context-specific variables, such as trust in their primary care physician, etc. (Qiao et al., 2015)

  ⇢ suggests predictive relationship of trust in the healthcare context and trust in medical technology

- Broader context outlines technology, user, and context factors as relevant for trust in medical technology (Xu et al., 2014; Bova et al., 2006)
- Barriers and benefits evaluated by the users determine the adoption of AAL technologies (Ziefle & Calero Valdez, 2017; Schomakers et al., 2021)

  ⇢ privacy and trust issues

  ⇢ data handling and management issues

  ⇢ usability issues

- Sustained adoption of these innovative technologies in home environments have failed (Wichert et al., 2012)

  ⇢ missing trust requirements in intimate and sensitive context?

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ESR2. Definitions of Trust – Research Questions

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What does trust in healthcare mean?

What are requirements of trust?

How are severe health decisions defined?

Otten, S., Offermann, J., & Ziefle, M. (2023). Paving the way: Trust in healthcare systems as a pre-requisite for technology usage. In *Proceedings of the 25th International Conference on Human-Computer Interaction*.

ESR2. Definitions of Trust – Methods and Materials

- Two focus groups (N=5 each)
- Logic of the interview
  1. Conditions and pre-requisites of trust in the healthcare system
  2. Definition of severe health decisions

- Sample characteristics
  - Data collection in September 2022 on German individuals using convenience sampling
  - M_{age}=30.2 (*SD=12.39*) with a range of 22 to 55 years
  - 50% female participants
  - 30% reported to have one or more chronic illness, a. o. ulcerative colitis, chronic pain, and Hashimoto's
  - 50% healthcare workers

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ESR2. Definitions of Trust – Results

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"I believe that you shouldn't get into a process where you have to arrange some- thing yourself, that all costs are covered [by the insurance company]." [male, 24 years]

"For me, fairness is relatively easy to define, and that is that everyone should have access to the treatment options or the doctor they need for their condition." [male, 26 years]

"Empathy [...] and that I am also taken seriously, so, also during the initial anamnesis, that the doctors do not dismiss me and take time to consider my concerns." [female, 24 years]

"I would have no confidence in the system at all if I went to the doctor five times and five times I was given the wrong diagnosis and five times I was given the wrong treatment." [male, 26 years]

"It may be transparent what they are allowed to charge, but where a large part of the money disappears is not transparent at all." [male, 55 years]

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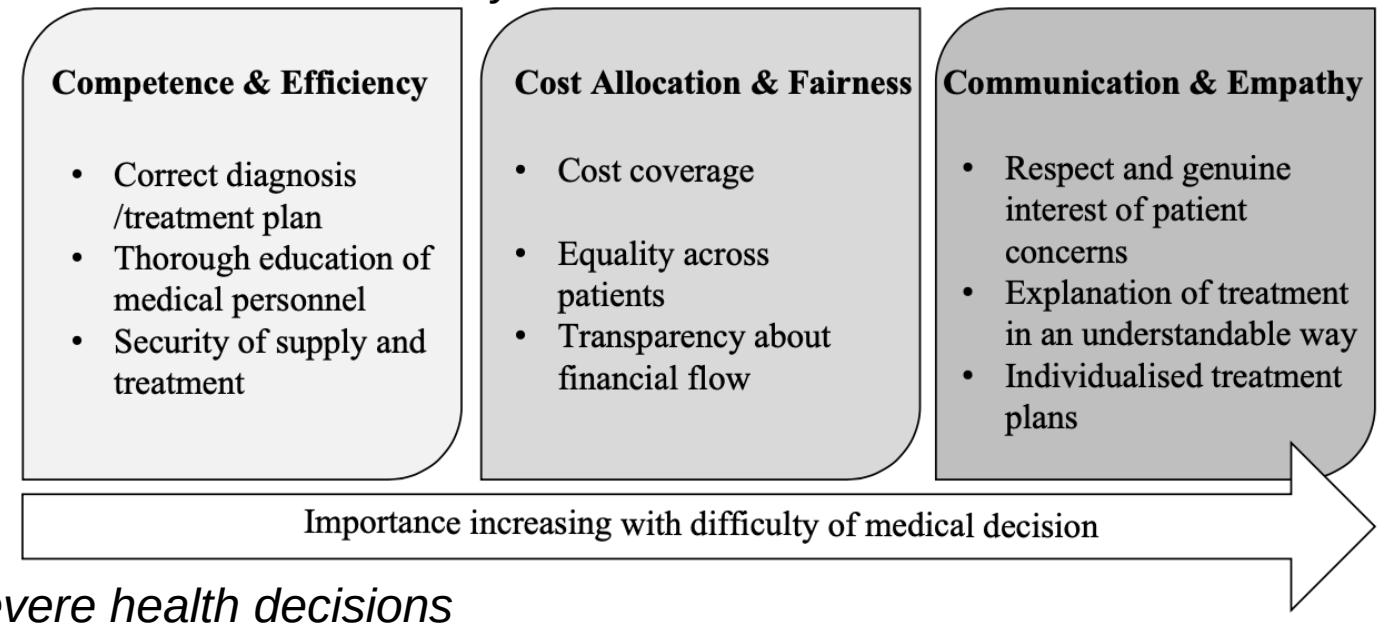
ESR2. Definitions of Trust – Results

- Categories of Trust in the Healthcare System



- Definitions of *severe health decisions*
  - ⇢ life-altering procedure / treatment (e.g., cancer diagnosis)
  - ⇢ risk of not ”getting back to normal”

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ESR2. Definitions of Trust – Research Questions

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How do people evaluate trust in AAL technology?

What role does trust play for the acceptance of AAL technology?

How is trust related to perceived benefits and barriers?

Otten, S. Wilkowska, W., Offermann, J., & Ziefle, M. (2023). Trust in and acceptance of video-based AAL technologies. In *Proceedings of* the 9th *International Conference on Information and Communication Technologies for Ageing Well and e-Health*, ISBN 978-989-758-645-3, ISSN 2184-4984, pages 126-134.

ESR2. Trust & Acceptance – Methods and Materials

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- Online survey with a scenario-based approach (N=101)
- Logic of the questionnaire

  1. Demographic information
  2. Health information and use of health-related digital technologies
  3. Acceptance of VAAL technologies and benefits / barriers
  4. Trust in VAAL technologies in four categories
     a. Data protection (5 items)
     b. Information and communication flow (7 items)
     c. Associated trust criteria (7 items)

- Sample characteristics
  - Data collection in Summer 2022 on German individuals using convenience sampling
  - M_{age}=35.7 (*SD=10*) with a range of 18 to 83 years
  - 64% female participants
  - 42% reported to have one or more chronic illness, a. o. hypertension, depression, and arthritis
  - 53% are actively using health-assisting technologies, e.g., monitoring of physical activities

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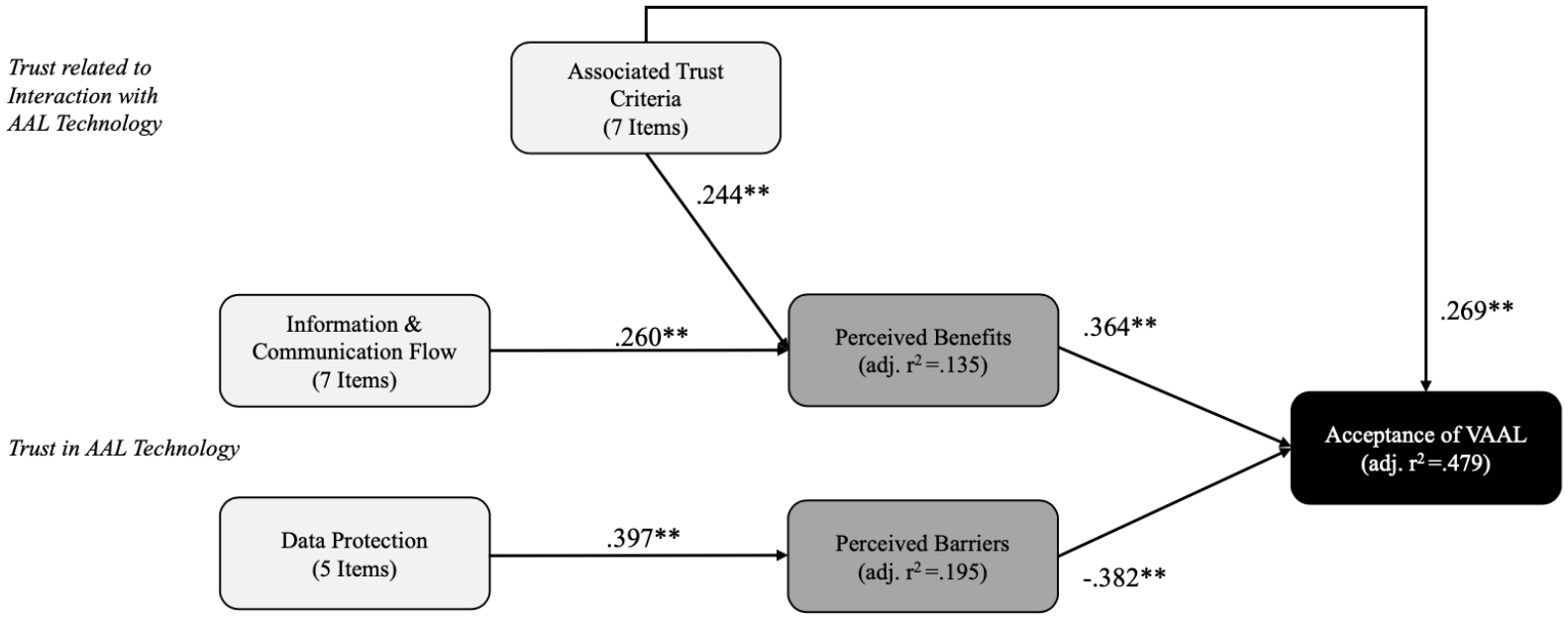
ESR2. Trust & Acceptance – Results

- Trust evaluations predict acceptance evaluations
- Data Protection crucial in the evaluation of perceived barriers
- Associated trust criteria (in)directly associated with acceptance evaluations
- Information and communication flow indirectly predict acceptance evaluations



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ESR2. Trust across Contexts – Research Questions

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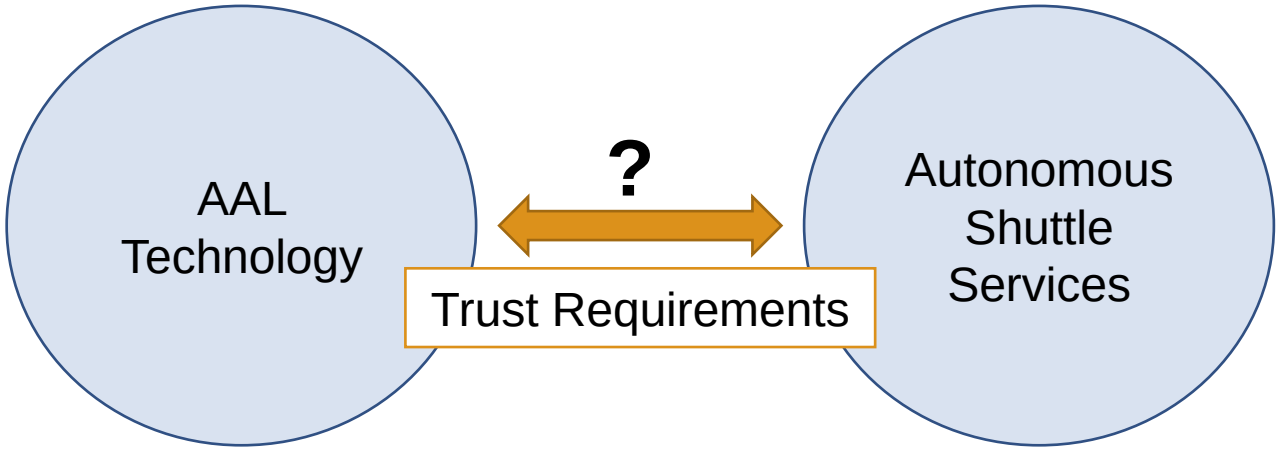
- How do trust evaluations differ across contexts?
- What is the role of trust in the acceptance of different technologies?



Otten., S., Biermann, H., & Ziefle, M. (Submitted). Requirements of trust across contexts: Mobility and medicine. *Humanities and Social Science Communications.*

ESR2. Trust across Contexts – Methods and Materials

- Online survey with two scenarios pertaining to autonomous mobility and AAL technology (N=143)
- Logic of the questionnaire

1. Demographic information and personality-related variables (e.g., dispositional trust)
2. Acceptance of each scenario
3. Trust Requirements in each scenario *"I would only trust the technology if …"*

- Sample
  - Data Collection in December 2022 on German individuals using convenience sampling
  - M_{age}=37.4 (*SD=13.64*) with with a range of 19 to 81 years
  - 54.5% female participants, .7% identified as diverse
  - 50% of participants holding a postgraduate degree

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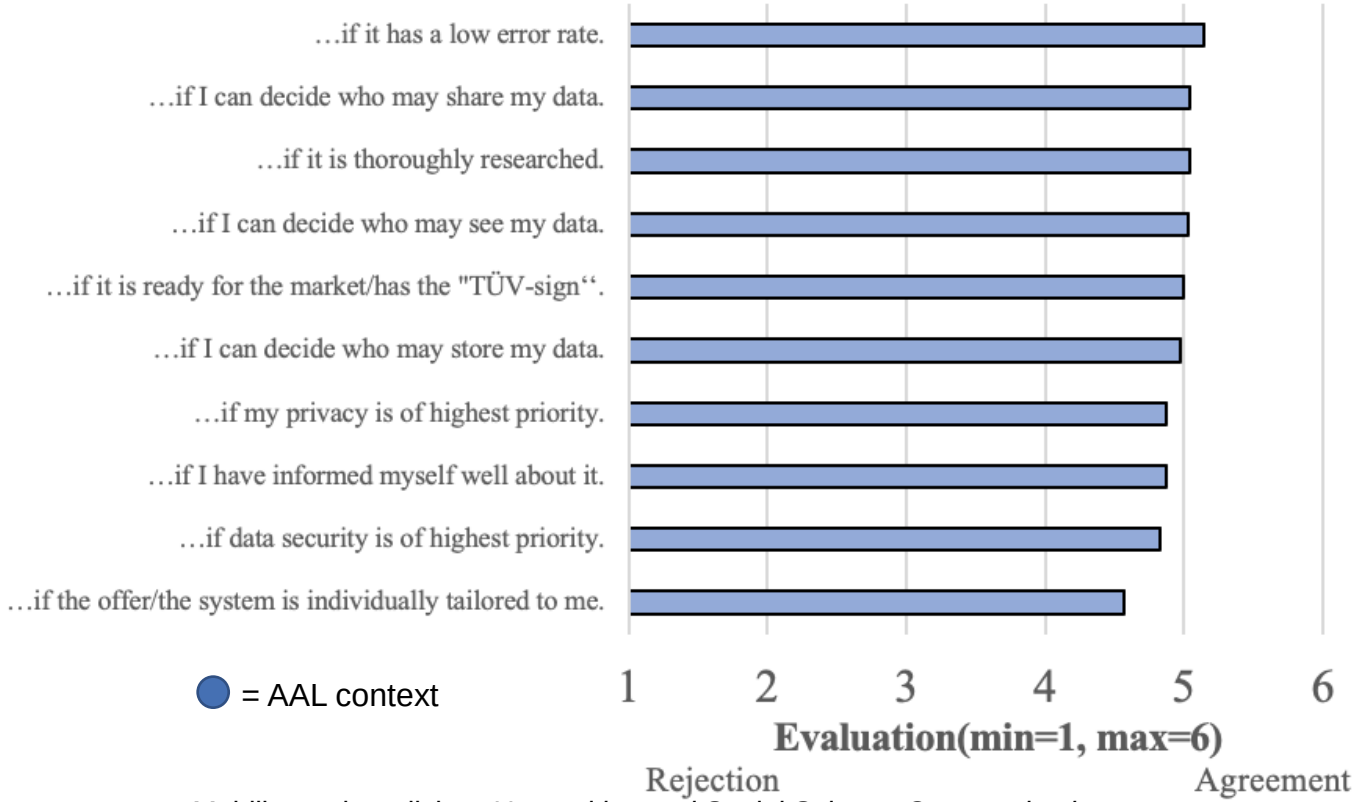
ESR2. Trust across Contexts – Results

- All items rated as relatively accepting

  ⇢ each requirement important for evaluating trust in AAL technology

- Low error rate rated as most accepting



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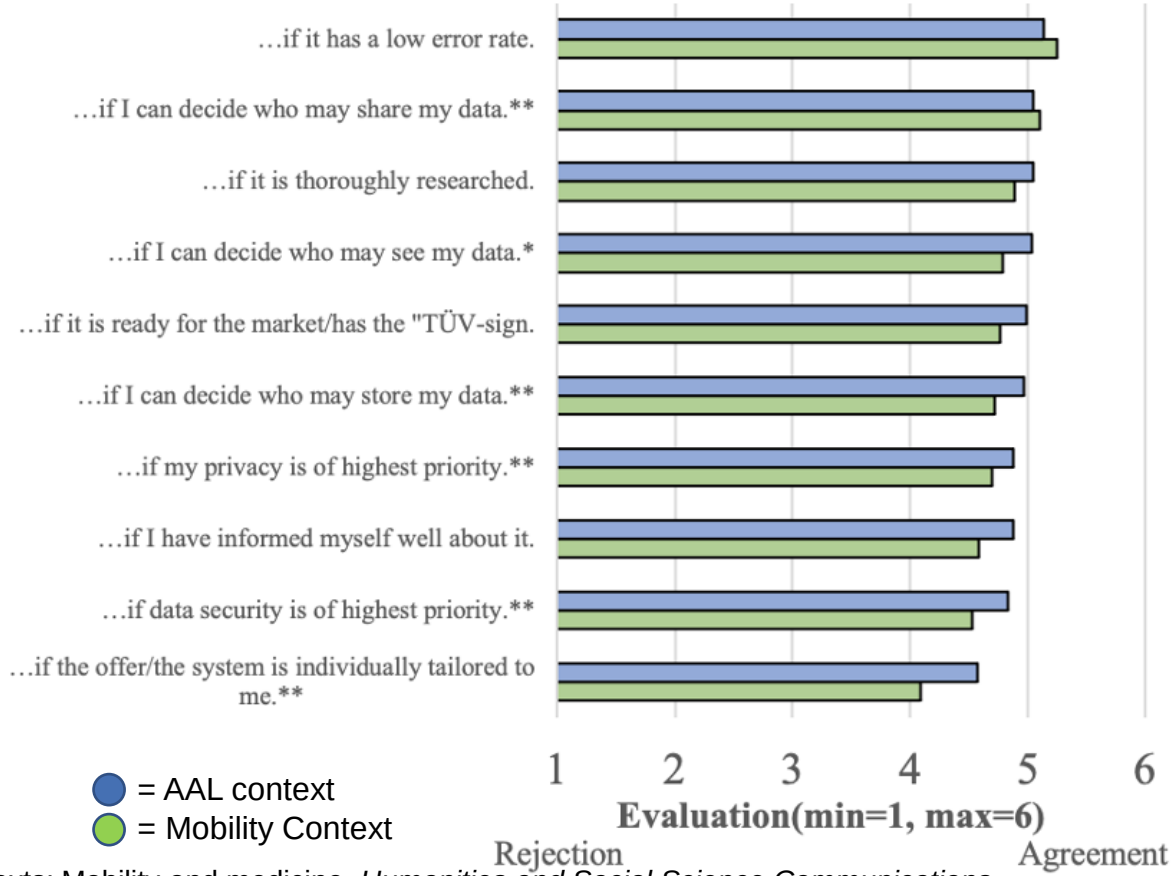
ESR2. Trust across Contexts – Results

- Trust requirements differ for the two contexts
- AAL contexts rated as more accepting than mobility

  ⇢ except for data sharing control
- Significant differences for data protection items and individual tailoring of service



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ESR2. Trust across Contexts – Results

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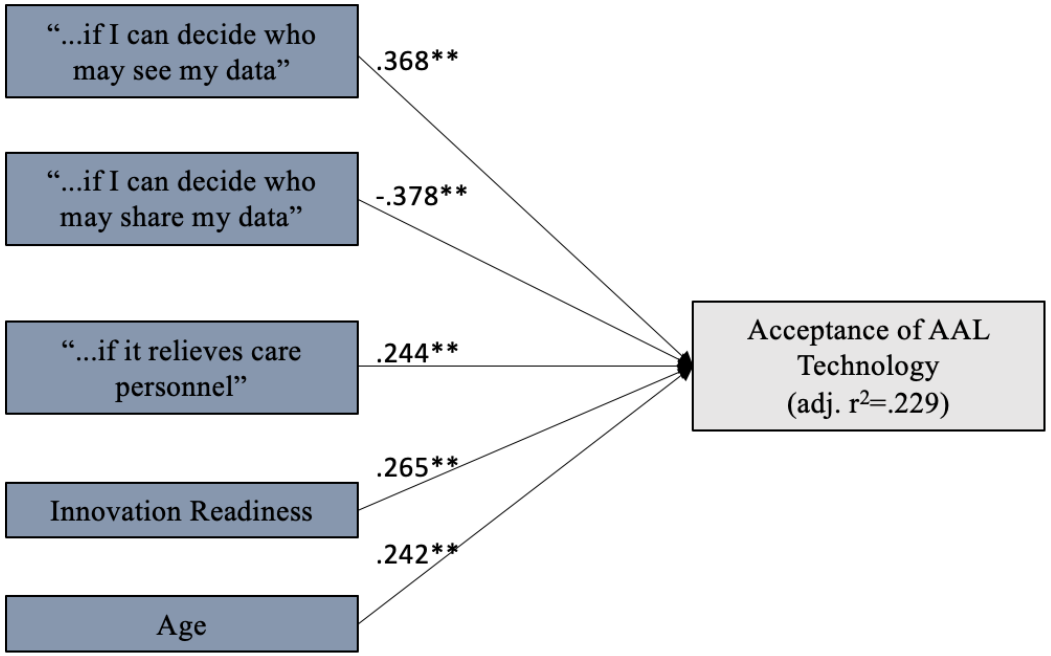
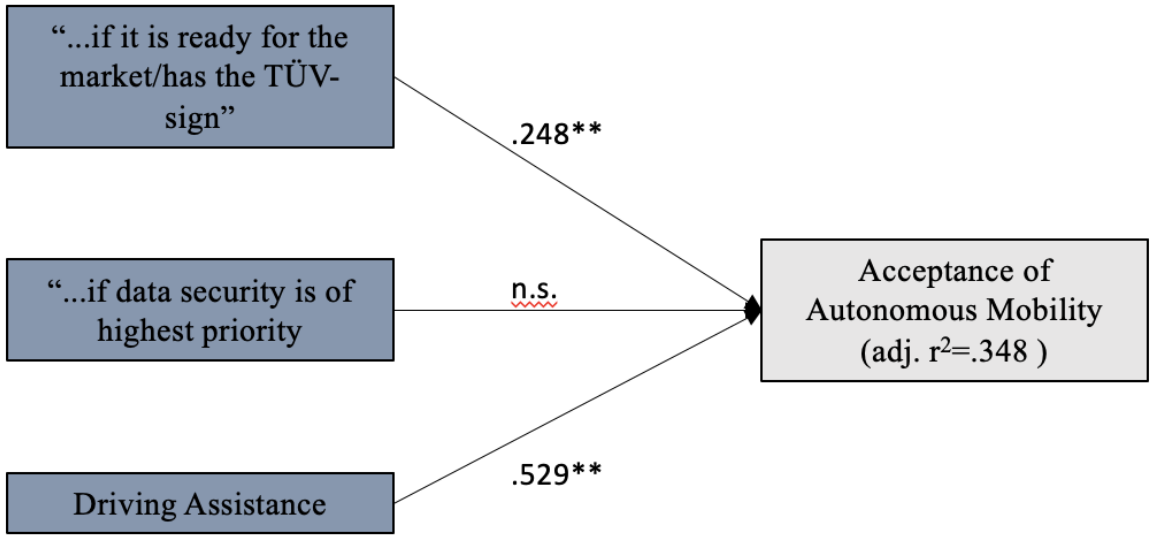
- Data access / control and relief of care predictive of acceptance
- Age predictive of acceptance

  ⇢ the older the participants, the more accepting of AAL technology



- Market readiness and willingness to use assisted driving technologies predictive for acceptance
- Data Protection does not play a role in the acceptance of autonomous cars



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ESR2. Research in Progress – Expansion of Findings

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Technology Comparison of (non)technological care offers and health situations

⇢ video-based AAL technology, tactile AAL technology, emergency bracelet and human care scenario

⇢ preventive measure, response to acute incident, and response to chronic progression of disease

⇢ exploration of personality-related influences

ESR2. Research in Progress – Expansion of Findings

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⇢ video-based AAL technology, tactile AAL technology, emergency bracelet and human care scenario

⇢ preventive measure, response to acute incident, and response to chronic progression of disease

⇢ exploration of personality-related influences

Identification of decision patterns in the evaluation of trust requirements in VAAL systems

⇢ Data Protection (operationalised as data access of chosen others)

⇢ Reliability (operationalised as success and error rate)

⇢ Integrity (operationalised as the amount and transparency of information)

⇢ Relief of Care

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ESR2. Future Research – Collaborations

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- Secondment at the Lebenshilfe
  - ⇢ Qualitative interviews from the caretaker perspective
  - ⇢ “Participant from within” research design
  - ⇢ Validation and expansion of earlier findings

- Network of trust, privacy, and acceptance in automated health-technologies (to be completed by Autumn ‘23)
  - ⇢ scenario-based approach with experimental design
  - ⇢ different types of technologies (non AI vs. AI; camera types)

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ESR2. Publications

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Journal | **Conference/Book Proceeding**

2022

Otten, S., & Ziefle, M., (2022). Exploring Trust Perceptions in the Medical Context: A Qualitative Approach to Outlining Determinants of Trust in AAL Technology. In ***ICT4AWE 2022*** (pp. 244-253). DOI: 10.5220/0011058300003188

2023 - accepted

Biermann, H., **Otten., S.,** & Ziefle, M. (2023). Understanding trust in automation: A consideration of human factors and context. In **AFHE 2023 Conference.**

Otten, S., Offermann, J., & Ziefle; M. (2023). Paving the way: Trust in healthcare systems as a pre-requisite for technology usage. In **HCI International 2023 Conference**.

Otten, S., Wilkowska, W., Offermann, J., & Ziefle; M. (2023). Paving the way: Trust in and acceptance of video-based AAL technologies. In ***ICT4AWE 2023.***

submitted/under review

Wilkowska, W., **Otten, S.,** Maidhof, C., & Ziefle, M. Trust conditions and privacy perceptions in the use of accepted ambient technologies for health-related purposes. *(submitted to **Journal of Human-Computer Interaction**)*

Otten, S., Biermann, H., & Ziefle; M. Requirements of trust across contexts: Mobility and medicine. *(submitted to **Humanities and Social Science Communications**)*

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Thank you!

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