THE EFFECTS OF AGE-RELATED INDIVIDUAL CHARACTERISTICS ON TECHNOLOGY ADOPTION AND USE

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THE AGING OF THE POPULATION

- A global trend

**TECHNOLOGY AS A SOLUTION**

- **Potential issues**
  - Challenging the present and future of social, technological and political systems across the globe (KPMG, 2014)
  - Bringing new demands, opportunities and challenges to various areas

- **Goals**
  - Addressing problems that arise due to complexities and uncertainties in the system structure, social context, and characteristics of older adults
  - Enabling older adults to stay healthy, independent, safe and socially connected

- **Limitations**
  - Low adoption & usage rate (Lau, 2006)
  - Stereotyped views (Rogers & Fish, 2010; Mynatt & Rogers, 2001; Niemelä-Nyrhinen, 2007)
  - Experiential and cultural gaps between users and designers (Elima et al., 2004)
  - Limited understanding of older users’ perceptions and decision behaviors

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**RESEARCH QUESTION & METHODS**

**Part 1: Literature review & preliminary user interviews**

- Factor identification: what factors affect and determine how older adults adopt and use technology?
- Factor definition & description: what do the factors mean?

**Part 2: User survey**

- Overall validity: do older adults perceive the factors to be important in their adoption and use of technology?
- Relative importance: are some factors more important than others?
- Factor associations: what are the relationships between the factors?
- Comparison between users of different characteristics
  - Age, gender, income, employment status, level of education
  - Living arrangements
  - Life events
ADOPTION FACTORS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence</td>
<td>No visual stigmatization of aging and frailty</td>
</tr>
<tr>
<td>Usability</td>
<td>Physical and cognitive ease of learning and use</td>
</tr>
<tr>
<td>Affordability</td>
<td>Price and perceived affordability</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Knowledge of existence and availability in market</td>
</tr>
<tr>
<td>Technical support</td>
<td>Professional support from installation and learning to maintenance</td>
</tr>
<tr>
<td>Social support</td>
<td>Support from peers or social circle, having “technology champions”</td>
</tr>
<tr>
<td>Emotion</td>
<td>Emotional benefits (e.g. social connectivity and presence) from use</td>
</tr>
<tr>
<td>Value</td>
<td>Perceived usefulness and potential benefit</td>
</tr>
<tr>
<td>Experience</td>
<td>Prior experience with relevant technology and benefits gained from it</td>
</tr>
<tr>
<td>Confidence</td>
<td>Ability to let users feel confident without anxiety or intimidation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>System-level Ability to work without failures or interruptions</td>
</tr>
<tr>
<td>Service trust</td>
<td>Dependability of service structures and orgs</td>
</tr>
<tr>
<td>Compatibility</td>
<td>System interoperability Ability to seamlessly work with other systems</td>
</tr>
<tr>
<td>Lifestyle fit</td>
<td>Fit with life patterns and various use cases</td>
</tr>
<tr>
<td>Conceptual / semantic</td>
<td>Match between system and mental models</td>
</tr>
</tbody>
</table>

QUESTIONNAIRE

- Part 1: Knowledge & experience
  - How much they know about or have experience with various technologies
  - 10 technology groups (mobile, work, SNS, entertainment, etc.)
- Part 2: Adoption experience description
  - Open-ended: talking about a specific technology they have interacted with
  - Recent acquisition and/or disposal of technology product or service
- Part 3: Adoption factors
  - Closed questions: perceived importance of the adoption factors
  - Rating scale: 1 (strongly disagree) to 7 (strongly agree)
- Part 4: Life events & living arrangements
- Part 5: demographics
• Sample size: 609
  - Open responses: fully answered by 573 respondents (94.1%)
  - Age range: 20~82
• Evenly distributed in terms of age, gender, geographic regions, income range, and employment

<table>
<thead>
<tr>
<th>Income range</th>
<th>Sample proportion</th>
<th>US Census (2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤$14999</td>
<td>13.0%</td>
<td>13.5%</td>
</tr>
<tr>
<td>$15000~24999</td>
<td>13.8%</td>
<td>11.5%</td>
</tr>
<tr>
<td>$25000~49999</td>
<td>29.7%</td>
<td>24.9%</td>
</tr>
<tr>
<td>$50000~74999</td>
<td>20.7%</td>
<td>17.6%</td>
</tr>
<tr>
<td>$75000~99999</td>
<td>10.3%</td>
<td>11.5%</td>
</tr>
<tr>
<td>$100000~149999</td>
<td>7.4%</td>
<td>11.9%</td>
</tr>
<tr>
<td>≥$150000</td>
<td>4.4%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regional division</th>
<th>Sample proportion</th>
<th>US Census (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>3.8%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>14.6%</td>
<td>14.5%</td>
</tr>
<tr>
<td>East North Central</td>
<td>14.9%</td>
<td>16.5%</td>
</tr>
<tr>
<td>West North Central</td>
<td>7.1%</td>
<td>7.3%</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>20.5%</td>
<td>21.3%</td>
</tr>
<tr>
<td>East South Central</td>
<td>5.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>West South Central</td>
<td>7.7%</td>
<td>12.9%</td>
</tr>
<tr>
<td>Mountain</td>
<td>7.1%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Pacific</td>
<td>17.1%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

• Technology experience by age
  - For all types of technology, the youngest group had the most experience/knowledge
  - The oldest group had the lowest scores
  - Biggest differences in social networking, entertainment and Internet-based communications services
Technology experience by age

- Frequency analysis based on open-ended responses
- What technology did people choose to talk about?

SAMPLE PROFILE

DATA ANALYSIS & RESULTS

- Overall & relative importance of adoption factors (closed-ended)
  - Most factors found to be perceived important
  - Value, usability, affordability, service trust and system reliability perceived as more important
  - No significant age differences, except for independence and social support
  - Independence and social support found to be perceived as unimportant by 60+ group
DATA ANALYSIS & RESULTS

• Overall & relative importance of adoption factors (open-ended)
  - Social support found as one of the most frequently mentioned factors
  - Experience and emotion are more important among the 60+ group, while affordability and usability are more important among the middle-aged group
  - Larger differences between factors compared to closed responses

DATA ANALYSIS & RESULTS

• Factor associations from closed-ended responses (factor analysis)
  - (Interoperability, technical support and system reliability)
  - (Affordability, usability and value): accessibility tied with this group for respondents of ages 40~59 and 60+
  - (Independence and social support): emotion tied with this group for older respondents (60+)

• Results from open-ended responses (association rules)
  - Value was more closely tied with lifestyle fit across ages
  - In the older group, value was also tightly associated with emotion and social support
  - More rules generated by responses from the older group
DATA ANALYSIS & RESULTS

- Comparison between respondents of different characteristics
  - Only small differences between age groups
  - Lifestyle and technology experience more closely associated with differences in results
  
<table>
<thead>
<tr>
<th>Related to higher importance scores</th>
<th>Related to lower importance scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>More experienced with technology</td>
<td>Less experienced with technology</td>
</tr>
<tr>
<td>Having recently bought or started using a technology</td>
<td>Not having recently bought or started using a technology</td>
</tr>
<tr>
<td>Living with young children</td>
<td>Living alone</td>
</tr>
<tr>
<td>Being employed</td>
<td>Living with parents 65+</td>
</tr>
<tr>
<td>Having a regular source of income</td>
<td>Being older (not for usability, affordability, accessibility and service trust)</td>
</tr>
<tr>
<td>Having a family member in school</td>
<td></td>
</tr>
<tr>
<td>Planning to move in the near future</td>
<td></td>
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</tbody>
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- The age-related characteristics had stronger correlations with importance scores compared to age itself

SUMMARY

- Identification of multi-dimensional factors that influence older adults’ decisions around technology adoption and use
- Description of the relative importance and associations between factors to inform practitioners
- The need for considering various characteristics and contexts rather than making assumptions based on observable traits

  - Not age itself, but characteristics related to age affect perceptions and decision behaviors
  - The present 60+ group do not fit into existing stereotypes, and their needs and decision criteria are not as different as people may think
DISCUSSION

• Limitations
  - Differences between open vs. closed responses may suggest issues with measurement accuracy & question wording
  - Possible sources of bias
    - Self-selection: administered online using Qualtrics Panels
    - Prior knowledge and experiences

• Directions for future research
  - Cross-cultural research
    - Social environments and cultural characteristics can affect individuals’ perceptions, attitudes and behaviors around systems
    - Replication of research with respondents and cases from different cultures
  - Cross-domain research
    - Comparison between technologies of different types and application domains
    - Replication of survey with respondents with different domain expertise

THANK YOU :)}