EXPERIENCES OF INDIVIDUALS WITH HIGH SPINAL CORD INJURY USING SMART HOME TECHNOLOGY: AN INTERVIEW STUDY

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Pre-Dissertation Project Defense

Smart Home Technology (SHT) could impact quality of life for individuals with disabilities (Robers & Kim, 2010)

Home Automation literature focuses on Assistive technology (AT), specifically on access and environmental controls (Hammel, et al., 2015; Callaway, et al., 2016)

Limited studies on SHT as a form of AT with individuals who have severe physical disabilities

Purpose:

• Experiences and perceptions of Super Users of Smart Home Technology
  – Deeper story of how Smart Home Technology has impacted their lives
  – Gain an understanding of interaction with Smart Home Technology

Acknowledgements

Thank you!

• Dr. John McCarthy
• Dr. Diana Schwerha
• Dr. Jim Montgomery
• Dr. Francois – Xavier Brajot
Smart Home Technology: 

Smart Home Technology – the integration of home automation systems and services (Robies & Kim, 2010)
- Thermostats
- Smoke alarms
- Wireless speakers
- Security systems
- Lighting

Theoretical Background:

- Participation Model (Beukelman & Mirenda, 2013)
  - Systematic guideline for participation in society
  - Assistive technology and environmental adaptations
    - Found under the Access strand

Theoretical Background:

- Human Activity Assistive Technology (HAAT) Model (Cook & Hussey, 1995)
  - Overlaps with the Participation model

Research Questions

- What skills and abilities are required of individuals with severe physical disabilities to use Smart Home Technology?
- What are the experiences of individuals with severe physical disabilities resulting from a high spinal cord injury, who use Smart Home Technology (SHT)?
- What are their perceptions on the impact of SHT on quality of life and increased independence?
- How has SHT improved self-care, productivity and leisure activities for individuals with severe physical disabilities?
- How is SHT impacting the physical, social, cultural and institutional contexts in which individuals with severe physical disabilities interact?
**Method: Participants**

- 9 Participants
  - All male
  - 1 withdrew from study
- 3 in person interviews, 5 online interviews

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Spinal Cord Injury level</th>
<th>Year of Injury</th>
<th>Length of Injury (years)</th>
<th>Location</th>
<th>Mini Mental Severity*</th>
<th>Use of Smart Home Technology (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jorden</td>
<td>26</td>
<td>C3/C4 Incomplete</td>
<td>2016</td>
<td>2</td>
<td>Grindstone, PA</td>
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<td>30</td>
<td>C4</td>
<td>2008</td>
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<td>&gt; 12 months</td>
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<tr>
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<td>C4</td>
<td>2014</td>
<td>4</td>
<td>Orlando, FL</td>
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<td>&gt; 12 months</td>
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<td>Ryan</td>
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<td>C4</td>
<td>1995</td>
<td>23</td>
<td>Coral Springs, FL</td>
<td>No Cognitive Impairment</td>
<td>&gt; 12 months</td>
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<tr>
<td>Dave</td>
<td>40</td>
<td>C6</td>
<td>2011</td>
<td>7</td>
<td>Beaverton, OR</td>
<td>No Cognitive Impairment</td>
<td>&gt; 12 months</td>
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<tr>
<td>Patrick</td>
<td>51</td>
<td>T1 w/weak right hand</td>
<td>1988</td>
<td>30</td>
<td>Dallas, GA</td>
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<td>&gt; 12 months</td>
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<tr>
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<td>C5-C6 Incomplete</td>
<td>1984</td>
<td>34</td>
<td>Apollo, PA</td>
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<td>&gt; 12 months</td>
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<td>Joe</td>
<td>62</td>
<td>C4</td>
<td>2010</td>
<td>8</td>
<td>Powell, OH</td>
<td>Mild Cognitive Impairment</td>
<td>&gt; 12 months</td>
</tr>
<tr>
<td>Scott</td>
<td></td>
<td>Withdrew from Study</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Method: Procedure**

- Demographics & Screening Questionnaire
  - Used to collect information to determine whether individuals meet participant criteria
  - Information about individuals acquired disabilities
  - What Smart Home Technology they are using
  - How long they have used Smart Home Technology
Method: Instruments

Level of Independence Scale
- Formal measure of participants level of independence
- Compared eight different activities of daily living for three levels of assistance

Adapted from the FIM measure (Keith, 1987) and the Katz Index of Independence (Brorsson, 1984)

Comfort of Technology Use Scale/Questionnaire
- Created to obtain rating of a participants comfort with three technology skills
- Used a 6-scale rating system
  - Extremely comfortable (EC)
  - Moderately comfortable (MC)
  - Neutral comfort level (NCL)
  - Not applicable (NA)
  - Moderately uncomfortable (MUC)
  - Extremely uncomfortable (EUC)


Mini Mental State Examination
- Cognitive assessment
  - Given to provide more perspective of participants profile
  - Three items were not administered and given an automatic score of zero due to physical requirements
    - “Take the paper in your right hand, fold it in half, and put it on the floor”
  - Participant scores
    - No cognitive impairment (n = 6)
    - Mild cognitive impairment (n = 2)

(Folstein, Folstein, McHugh, 1975)

Semi-Structured Interview
- All interviews were done in participants homes
- Video and audio recorded for data collection purposes
- An overview of how the interview would be conducted was provided

(Rubin & Rubin, 2012; Boeke, 1990; Patton, 1990; Polstein, Polstein, McHugh, 1975)
Interview Script:

- Same script/flow of questions were used for both the online and in-person interviews
  - Questions to describe the participant
  - Questions to address the four components of the HAAT model
    - Human Component
    - Activity Component
    - Assistive Technology Component
    - Context Component
  - Participants were given $25.00 as compensation for their participation in the study

Methods: Procedure

Methods: Qualitative Data Analysis

- Phase I: Examining Data and Separating Transcripts into Thought Units
- Phase II: Coding
Quantitative Results:

- **The Level of Independence Scale**
  - **Pre-Injury**
    - 8/8 participants reported complete independent with no assistance from a helper for all 8 activities of daily living
  - **Post injury**
    - 4/8 participants reported complete independence with no assistance for 4 activities of daily living

### Level of Independence Results

<table>
<thead>
<tr>
<th>Activity of Daily Living</th>
<th>PRIOR: Total Assistance with Helper</th>
<th>PRIOR: Modified Independence with NO helper</th>
<th>PRIOR: Complete Independence with NO helper</th>
<th>AFTER: Total Assistance with Helper</th>
<th>AFTER: Modified Independence with NO helper</th>
<th>AFTER: Complete Independence with NO helper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning on the Lights</td>
<td>0%</td>
<td>12.5%</td>
<td>0%</td>
<td>12.5%</td>
<td>37.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Adjusting the Temperature</td>
<td>0%</td>
<td>25.0%</td>
<td>0%</td>
<td>25.0%</td>
<td>100.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Turning on the Television</td>
<td>0%</td>
<td>25.0%</td>
<td>0%</td>
<td>25.0%</td>
<td>100.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Listening to Music</td>
<td>0%</td>
<td>12.5%</td>
<td>0%</td>
<td>12.5%</td>
<td>25.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Opening the Door</td>
<td>0%</td>
<td>25.0%</td>
<td>0%</td>
<td>25.0%</td>
<td>100.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Running the Vacuum</td>
<td>0%</td>
<td>50.0%</td>
<td>0%</td>
<td>25.0%</td>
<td>100.0%</td>
<td>0%</td>
</tr>
<tr>
<td>Running the Washing Machine</td>
<td>0%</td>
<td>62.5%</td>
<td>0%</td>
<td>62.5%</td>
<td>100.0%</td>
<td>0%</td>
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<tr>
<td>Turning the Oven</td>
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<td>62.5%</td>
<td>0%</td>
<td>62.5%</td>
<td>100.0%</td>
<td>35.0%</td>
</tr>
</tbody>
</table>

*Adapted from the FIM measure (Keith, 1987) and the Katz Index of Independence (Brorsson, 1984).
5/19/19

Comfort Level of Technology
Scale: Updating

<table>
<thead>
<tr>
<th>Participant</th>
<th>PRIOR: Updating software for computer systems</th>
<th>AFTER: Updating software for computer systems</th>
<th>PRIOR: Updating software for mobile technology (i.e., cell phones, tablets, etc.)</th>
<th>AFTER: Updating software in voice-controlled speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph</td>
<td>NA EC</td>
<td>EC NA EC</td>
<td>NA EC</td>
<td>MC</td>
</tr>
<tr>
<td>Mark</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
</tr>
<tr>
<td>Jordan</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
</tr>
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<td>Ryan</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
</tr>
<tr>
<td>Spencer</td>
<td>EC EC</td>
<td>EC EC</td>
<td>EC EC</td>
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</tr>
<tr>
<td>Christopher</td>
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<td>EC EC</td>
<td>EC EC</td>
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</tr>
<tr>
<td>Patrick</td>
<td>EC NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
<td>NA EC</td>
</tr>
<tr>
<td>Dave</td>
<td>EC EC</td>
<td>EC EC</td>
<td>N EC</td>
<td>N EC</td>
</tr>
</tbody>
</table>

**EC = Extremely Comfortable; MC = Moderately Comfortable; N = Neutral NA = Not Applicable; MUC = Moderately uncomfortable; EU = Extremely Uncomfortable;***


Comfort Level of Technology
Scale: Backing Up & Troubleshooting

<table>
<thead>
<tr>
<th>Participant</th>
<th>PRIOR: Backing up Devices</th>
<th>AFTER: Backing up Devices</th>
<th>PRIOR: Trouble-shooting software issues</th>
<th>AFTER: Trouble-shooting software issues</th>
<th>PRIOR: Trouble-shooting hardware issues</th>
<th>AFTER: Trouble-shooting hardware issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph</td>
<td>EC EC EC EC EC</td>
<td>EC EC EC EC EC</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
</tr>
<tr>
<td>Mark</td>
<td>NA NA EC EC NA EC</td>
<td>NA NA EC EC EC</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Jordan</td>
<td>MC MC MUC MUC MC</td>
<td>MC MUC MUC MUC</td>
<td>MC</td>
<td>MC</td>
<td>MC</td>
<td>MC</td>
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<tr>
<td>Ryan</td>
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<td>NA NA EC NA EC</td>
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<td>NA</td>
<td>NA</td>
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<td>EC</td>
<td>EC</td>
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<td>EC</td>
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<tr>
<td>Christopher</td>
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<td>EC EUC EUC EUC</td>
<td>EC</td>
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<td>EC</td>
<td>EC</td>
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<tr>
<td>Patrick</td>
<td>MC EC EC MC EC</td>
<td>MC EC MC EC EC</td>
<td>MC</td>
<td>MC</td>
<td>MC</td>
<td>MC</td>
</tr>
<tr>
<td>Dave</td>
<td>EC EC EC EC EC</td>
<td>EC EC EC EC EC</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
</tr>
</tbody>
</table>

*Participant typed in Comfortable.
**EC = Extremely Comfortable; MC = Moderately Comfortable; N = Neutral NA = Not Applicable; MUC = Moderately uncomfortable; EU = Extremely Uncomfortable;***


Qualitative Results:

- Main themes:
  - Participant History (570 thought units)
  - Benefits of Smart Home Technology (158 thought units)
  - Challenges of Smart Home Technology (185 thought units)
  - Future Directions and Products (85 thought units)
  - Social Support (136 thought units)
  - Other Thoughts (153 thought units)

Participants self-rating of their level of technology
*One participant indicated Highly Skilled for modern technology (i.e., computers and mobile technology devices)
Qualitative Results:

- Four major themes related to the 4 components of the HAAT model
  - Benefits of Smart Home
  - Challenges of Smart Home Technology
  - Future Directions and Products
  - Social Support.

Counts and Percentages

<table>
<thead>
<tr>
<th>Major Theme</th>
<th>Human Component</th>
<th>Activity Component</th>
<th>Assistive Technology Component</th>
<th>Context Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits of Smart Home Technology</td>
<td>Count</td>
<td>50/158</td>
<td>30/158</td>
<td>62/158</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>37.34%</td>
<td>18.99%</td>
<td>39.24%</td>
</tr>
<tr>
<td>Challenges of Smart Home Technology</td>
<td>Count</td>
<td>16/185</td>
<td>3/185</td>
<td>12/185</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>8.65%</td>
<td>1.62%</td>
<td>64.86%</td>
</tr>
<tr>
<td>Future Directions and Products</td>
<td>Count</td>
<td>6/85</td>
<td>0/85</td>
<td>67/85</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>7.06%</td>
<td>0%</td>
<td>78.82%</td>
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<tr>
<td>Social Support</td>
<td>Count</td>
<td>15/136</td>
<td>0/136</td>
<td>0/136</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>11.03%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Human Component:

- All 8 Participants mentioned a *Benefits of Smart Home Technology*
- 7 out of 8 participants mentioned the *Challenges of Smart Home Technology*
- 1 participant mentioned the *Future Directions and Products*
- 1 participant mentioned the *Social Support*
Human Component

“I guess uh I just laugh cause when we were kids right you had to call your smart uncle and now you have Google.” -Patrick

“The costs of the switch far exceed of the- of the savings you’ll get.” -Joe

“I’ve always been kinda a techie so I kind of well actually I had it before my accident at our oth- at our previous house.” -Joe

“Yeah the only thing I do not have now um actually my house got flooded like 4 years ago so all the...we had a flood over here and um so all my stuff got destroyed.” -Spencer

Activity Component:

- 7 out of 8 Participants mentioned a *Benefit of Smart Home Technology*
- 2 out of 8 participants mentioned the *Challenges of Smart Home Technology*
- 0 participants mentioned the *Future Directions and Products*
- 0 participant mentioned the *Social Support*

Activity Component:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Benefits of Smart Home Technology</th>
<th>Challenges of Smart Home Technology</th>
<th>Future Directions and Products</th>
<th>Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jorden</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spencer</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Christopher</td>
<td>X</td>
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<tr>
<td>Ryan</td>
<td>X</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Dave</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patrick</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joe</td>
<td>X</td>
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</tr>
</tbody>
</table>

“...but with this, with the Apple Watch on my wrist...uh, get feedback through it. Uh, Same thing with driving, it (Apple Watch) vibrates before every, every turn coming up so I know that um, I don’t have to always have you know the Siri assistant um, you know shouting orders at me, I can kind of leave stuff muted and the music on and still be able to uh navigate, so...” -Dave

“...especially like here living in Florida during the summer I got the ceiling thing [fan] going on and the AC going on and if the AC is off and I turn the ceiling fan off and then I try to get her [Alexa] to turn the ceiling fan on...” -Ryan
Assistive Technology Component:

- 6 out of 8 Participants mentioned a Benefit of Smart Home Technology
- 8 out of 8 participants mentioned the Challenges of Smart Home Technology
- 8 out of 8 participants mentioned the Future Directions and Products
- 0 participant mentioned the Social Support

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<table>
<thead>
<tr>
<th>Participants</th>
<th>Benefits of Smart Home Technology</th>
<th>Challenges of Smart Home Technology</th>
<th>Future Directions and Products</th>
<th>Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jorden</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Spencer</td>
<td>X</td>
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<td>Christopher</td>
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<td>Ryan</td>
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<td>Dave</td>
<td>X</td>
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<td>Patrick</td>
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<tr>
<td>Joe</td>
<td>X</td>
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</tbody>
</table>
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“Yeah, Uh some of it still works off of uh Bluetooth, which is directly uh communicates between your smart phone and your device.” - Mark

“So what do I need to do, if I really was a YouTube person and I wanted to speak to it (YouTube), I’d have to go buy a Google assistant with a screen and watch YouTube. I think that’s a bit ridiculous but then like Amazon won’t sell Google stuff and won’t sell Apple stuff it would be great, but you know it’s all about making dividends. And who can be the number one billionaire every quarter.” - Ryan

“Um I guess you know instead of being able to have to put a google home or Alexa in the room if those could be built right into the TV or something like… I mean they are building everything else in the TV why not that.” - Patrick

Assistive Technology Component:

- 3 out of 8 Participants mentioned a Benefit of Smart Home Technology
- 8 out of 8 participants mentioned the Challenges of Smart Home Technology
- 2 out of 8 participants mentioned the Future Directions and Products
- 8 participant mentioned the Social Support

Context Component:
### Context Component:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Benefits of Smart Home Technology</th>
<th>Challenges of Smart Home Technology</th>
<th>Future Directions and Products</th>
<th>Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jorden</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spencer</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christopher</td>
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<td></td>
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<tr>
<td>Ryan</td>
<td>X</td>
<td>X</td>
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<td></td>
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<tr>
<td>Dave</td>
<td>X</td>
<td>X</td>
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<td></td>
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<tr>
<td>Patrick</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joe</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### Participant Main Theme

- Four areas under Participant History
  - Accessing Smart Home Technology
  - Funding technology
  - Employment
  - Environments participants are using Smart Home Technology

### Participant Main Theme: Access

- Accessing Smart Home Technology
  - All 8 participants are using their voice
  - 6 out of 8 participants are using direct selection

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"...and you know since I work out of the house I don’t drive the truck every day, so if we’re gonna take off and go to my daughter’s home on the other side of Atlanta it’s nice to look in there and go oop how much gas is left in the truck or you know so that part is very cool.”

- Patrick

"Uh, the first time when, when I was in rehab at Children’s Institute. Kate was my Speech therapist and then I had uh, oh gee, um, [Kate brought in Smart Home Technology?] Yeah, she, she did? [Kate] Her and um, she had an intern that worked with her at the time..."

- Jorden
Participant Main Theme: Funding

- Funding technology
  - 7 out of 8 participants are independently funding
  - 1 out of 8 are utilizing State funding

Participant Main Theme: Employment

- Employment
  - Prior to Injury:
    - All 8 were employed
  - After Injury:
    - 4 out of 8 participants are currently employed part-time
    - 5 out of 8 participants volunteer

Participant Main Theme: Employment

"And in fact I just went through an issues with the new job that I just got for an at home call service, where they had all of the accessibility features locked, so I had to go through HR and through there accom, uh accessible accommodation, reasonable accommodation department and I had been back and forth with them, they ended up pulling me from the program and I told them I didn't want to be pulled from the program I wanted to work, I just need to be able to access their systems if they would just let me use my systems (Smart Home Technology and assistive technology adaptations), I'd be fine. I have speech recognition, I have drag (dragon), like I have all of this, but they wouldn't let me use their systems because of their security features, which is understandable. So then after it was all done and said, they switched me to another program where I could bring my own computer, but had I had some of that adapted technology, like uh the adaptive USB mouse that plugs directly in, cause right now what I use is my wheelchair." - Chris

Participant Main Theme: Environment

- Environments participants are using Smart Home Technology
  - All 8 participants are using Smart Home Technology in the Home
  - 2 out of 8 participants indicated they they work out of their home
  - 1 out of 8 participants indicated they work out of an office and a home office
### Discussion: Theory

- Smart Home Technology aligns with the HAAT Model
  - Allows SLPs to feature matching a piece of Smart Home Technology for an individual
  - Benefits and Challenges of Smart Home Technology fell into all 4 components
  - Activities and Assistive technology have the potential to be better represented as technology advances

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### Discussion: Benefits

- Benefits of Smart Home Technology
  - Universal Design
    - Increases an individual's quality of life
    - Provides normalcy back to an individual
**Discussion: Benefits (Activities)**

- Variety of activities completed by Smart Home Technology
  - 1 Participant was responsible for vacuuming, a benefit to his wife
  - 1 participant uses Smart Home Technology to regulate watering his lawn

**Discussion: Challenges**

- Product cycle of Smart Home Technology
  - Short
  - New generations come out and may or may not be compatible with previous models
  - Serious challenge financially
  - Participants expressed the technology was already outdated or didn’t work as intended

**Discussion: Challenges**

- Lack of Manufacturer Connectivity
  - Limitations between products
    - Accessing YouTube via Amazon Products
  - Study revealed that individuals with disabilities want to apply for positions at these companies to advance the accessibility features better

**Discussion: Social**

- Social Connectedness
  - Some participants interact with their artificial intelligent assistant like they would friends
    - 1 participant indicated his AI swore at him
  - Participants are expanding their knowledge base in a conversational way by querying a digital assistant
    - 2 participants provided feedback on the trivia feature and jokes
Discussion: Social

• Social Connectedness
  – Use of Amazon Dot to venture into the community
    • 1 participant discussed putting a Dot on his wheelchair and connecting to neighbors WIFI
    • Allowing individuals to interact more with their neighbors

AAC Implications

• Potential for Individuals with severe communication disorders
  – Social connectedness
    • increase communication opportunities
  – A sense of purpose
  – Allow them to be productive
  – Maximize their leisure skills
  – Empower them

AAC Implications

• Challenges for SLPs
  – Support with setup
  – Troubleshooting when technology doesn’t work
  – Smart Home Technology potentially allows for Returning to work
  – Is this our Role?
  – Billing?
  – Funding?

Limitations

• Majority of Participants were from the east coast
• Funding information is determined by each state of residency
• Limitation of funding for all in-person interviews
• Study was done with Successful Users of Smart Home Technology
• Level of Technology Scale bias
Future Research

- Smart Home Technology & Speech Generating Devices
  - Signal to noise ratio
  - Volume levels
  - Male vs. female synthesized voices
  - English vs. British synthesized voices
- Intervention of Smart Home Technology with individuals who use SGDs
- Interprofessional Practice Study
  - Whose Role is it?
  - Exploring the grey areas

Conclusion:

Smart Home Technology has challenges; however, the benefits, future direction and social support outweigh the challenges when individuals with disabilities gain normalcy and quality of life.

References:

- Callaway, L., Tregloan, K., Williams, G., & Clark, R. (2016). Evaluating Access and Mobility within a New Model of Supported Housing for People with Neurotrauma: A Pilot Study. Brain Impairment, 17(1), 64-76. doi:10.1017/BrImp.2016.7
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