The Development of a User-Centered Digital Memory Notebook

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Introduction

• Prior research has suggested that pen and paper Memory Notebooks can reduce the memory load of individuals with memory impairments
  • Record of past activities aids retrospective memory
  • Schedule of future events aids prospective memory
• Paper Memory Notebooks are limited by how much their user remembers to utilize them
• Study goal: Develop a tablet-based Digital Memory Notebook that will:
  • Increase the frequency of usability and efficacy of the memory notebook
  • Assist in scheduling, completion, and logging of activities of daily living
  • Incorporate smart environment technology to enhance prompting utility
  • Ameliorate declines in cognition

Methods

Participants

• 4 older adults (Age: M=74.25, range: 62-94)
  • 2 with histories of Traumatic Brain Injury (TBI)
  • 1 with Mild Cognitive Impairment (MCI)
  • 1 caregiver of a spouse with dementia
• 3 females, 1 male
• Education: 20 years for all participants

Materials and Procedures

• Following paper mock ups, iteration 1 of a user-friendly DMN was tested with healthy older adults (see Figure 1) and improvements were made from their feedback (see Figure 2)
• Iteration 2 of the DMN was tested in this study with a caregiver or individuals reporting memory difficulties
• Demographic information (i.e., age, education, medical history) was collected
• After a brief tutorial, participants completed several tasks using the DMN (e.g., add new event to do list, fill in profile page)
• Measures:
  • Technology Use and Comfort Questionnaire
  • Administered prior to interacting with the DMN app
  • Scheduling Tool Use Questionnaire
  • Post-Study System Usability Questionnaire (PSSUQ)
  • After Scenario Questionnaire (ASQ)
  • Participants provided satisfaction ratings for ease of use, time to task completion, and available support information following each task scenario
  • Open-ended prompts
  • Feedback on current color scheme, additional changes to future app etc.

Results

• All participants self-reported using technology or a paper and pencil scheduling tool 3-5 days a week
• 50% of participants reported using a touch screen tablet less than once per month; 50% self-reported using a tablet at least 5 days per week

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Satisfied</th>
<th>Strongly Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding Event</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Checking for Event</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Adding to Profile</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Responding to Reminder</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Adding Note</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1. Frequency of responses by number to questions about ease of task completion on a Likert scale from 1 (Strongly Satisfied) to 7 (Strongly Dissatisfied) from the After Scenario Questionnaire (ASQ)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, I am satisfied with how easy it is to use this system</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>It was simple to use this system</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>It was easy to learn to use this system</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Whenever I made a mistake, I could recover easily and quickly</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>I believe I could become productive quickly by using this system</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2. Frequency of responses by number to statements about overall experience with the app on a Likert scale from 1 (Strongly Agree) to 7 (Strongly Disagree) from the Post-Study System Usability Questionnaire (PSSUQ)

• 50% of participants were strongly satisfied with the ease of completing each of the tasks on the app
• 47% of participants mostly to strongly agreed that the app interface was simple, easy to learn and use, and would increase their productivity
  • The participant that disagreed to strongly disagreed with statements about ease of use had no previous experience with a touch screen tablet
• All participants said they would use the app if it was available

Feedback

• Based on open-ended feedback after interactions with the DMN app, the following changes were recommended for the third iteration (see Figure 3):
  • Including an instructional brochure
  • Adding a high priority indication option for tasks
  • Develop a camera upload feature to record pictures on the app (e.g., medication lists, journaling)
  • Incorporate notification when adding tasks for schedule conflicts
  • Create a mobile version of the app
  • Interpolate customizable color schemes
  • Streamline the app interface
  • Integrating options to make tasks automatically re-generate (e.g., medication reminders that occur every day at the same time)
  • Multiple prompts and alarms for tasks
  • Reminders for tasks that were never completed
  • Introduce a modifiable safety checklist
  • Append a weekly meal planning feature with a shopping list

Conclusions

• Overall, participants were satisfied with the DMN
  • Participants with more touch screen tablet experience reported more ease of use with the app interface
  • As participants became more familiar with the app, satisfaction ratings increased
• After interacting with the DMN app, all participants said they would be interested in using the app when it became available
• Feedback from potential users provided valuable insight for improving and creating an optimum user-interface experience
• Future advancements for the DMN include:
  • The integration of instructions to aid in gaining familiarity with tablet interface
  • Integration into smart environments to utilize sensors to track and assist with activities of daily living
  • The development of a mobile version of the app
  • Distribution of the app in iOS and Android stores for the benefit of individuals experiencing cognitive deficits

Acknowledgements

This work was supported by the National Institute of Aging grant R25AG046114