A Computer Assistant Support of Diabetes Self-Care and Improvement of Health Literacy

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Diabetes

246 million people worldwide
20 million in the United States
Cost in the US: $132 billion

Other countries are equally impacted
• China: 41m diabetics
• India: 39m diabetics
• Russia: 10m diabetics

American Diabetes Association, 2002
Older Adults

Older adults more prone to diabetes type II
- Organ functioning decline
- Physical activities become challenging

20% of individuals over 60 have diabetes

Diabetes by age group
Diabetes Type II

Lydia (aged 62) experiences increased thirst, frequent urination at night, fatigue, and blurred vision.

She visits her physician who sends her to the clinic. Test results indicate that she suffers from diabetes type II.

The physician prescribes her a treatment, which exists of a number of complex tasks including: performing exercise, maintaining a healthy diet, and taking medication.

Key issues for Lydia are learning self-care tasks and combining them with her daily routines while maintaining a good quality of life.
Computer Assistants for Supervision of Older Diabetics’ Self-Care

Computer assistant
  - Monitors self-care
  - Provides feedback

Goals to improve
  - Health literacy
  - Medical adherence
### Computer Assistant Feedback Styles

#### Assistant and User Characteristics

<table>
<thead>
<tr>
<th>Assistant</th>
<th>Cooperative Feedback Style</th>
<th>Directive Feedback Style</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coaching</td>
<td>Directing</td>
</tr>
<tr>
<td></td>
<td>Educating</td>
<td>Reporting</td>
</tr>
<tr>
<td></td>
<td>Advising</td>
<td>Dictating</td>
</tr>
<tr>
<td></td>
<td>Oriented towards satisfaction and long-term development</td>
<td>Oriented towards quick problem solving</td>
</tr>
<tr>
<td>User</td>
<td>High participation level</td>
<td>Low participation level</td>
</tr>
<tr>
<td></td>
<td>Committing</td>
<td>Complying</td>
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## Computer Assistant Feedback Styles

### Advantages and Disadvantages

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<td><strong>Advantages</strong></td>
<td>Learn new competencies and develop understanding</td>
<td>User needs few competencies</td>
</tr>
<tr>
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<td>Better performance in long-term</td>
<td>Better performance in short-term</td>
</tr>
<tr>
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<td>User-assistant complementing</td>
<td>Vigorous acting due to expert assistant</td>
</tr>
<tr>
<td><strong>Disadvantages</strong></td>
<td>Assistant support can become tedious and patronizing</td>
<td>Vulnerable to mistakes when participation is required</td>
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<td>User loses idea of control</td>
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Computer Assistants for Improvement of Health Literacy

Computer assistant feedback

• Different situations
• Different feedback styles

Adaptive computer assistant

Does an adaptive computer assistant contribute to health literacy of older diabetics?
# Computer Assistant for supervision of older diabetics’ self-care

**Adaptive computer assistant**

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Smart Home Laboratory
Georgia Tech AwareHome

Home like atmosphere for easy assessment of natural behavior

Addresses independent living fundamentals
• Technical
• Design
• Social challenges
Method
Design

28 older adults

8 Scenarios
  • Within design
  • 4 Fixed, 4 Adaptive
  • Patient situation varies from normal to health-critical

Dependent variables
  • Preference for assistant type
  • Diabetes knowledge
Method
Adaptive computer assistant
Method
Adaptive computer assistant
Results
Satisfaction measured by Preferences for a Fixed or Adaptive Assistant

Majority prefers the adaptive computer assistant
Questions diabetes questionnaire

Survey to assess diabetes knowledge

Halfway (Q1) and at the end (Q2) of experiment
  • Q1 and Q2 were identical
  • 8 multiple-choice questions

Examples:

*If your glucose level is too low, which symptoms will you experience?*

*The best way to prevent hyper- and hypoglycemic attacks is by?*
Results
Educational Value Measured by Increases in Diabetes Knowledge

The assistant types did not influence the growth of diabetes knowledge.

Growth of diabetes knowledge with the use of computer assistant.
Discussion

Preference for adaptive assistant

General increase in knowledge of diabetes, regardless of assistant type

Future directions

• Actual diabetes patient
• Field study
Acknowledgments

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•  www.hfaging.org

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•  www.mmi.tudelft.nl

Intelligent Interfaces group at TNO
•  www.tno.nl

AwareHome
•  www.awarehome.gatech.edu

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Questions?

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