Personal Health Systems for Health and Wellness Management


Elina Mattila*, Ilkka Korhonen*, Antti Vääätänen*, Aino Ahtinen**, Timo Leino***, Leila Hopsu***

*VTT Technical Research Centre of Finland
** Nokia Research Center
***Finnish Institute of Occupational Health
Lifestyles and health

• 77% of Europe’s disease burden related to lifestyles:
  • Sedentary lifestyle: obesity, type II diabetes, CVD
  • Overweight: type II diabetes, CVD, high blood pressure and cholesterol, cancer, arthritis, ..
  • Work-related stress: sleep problems, depression

• Costs:
  • Obesity: 2-6 % of healthcare costs in Europe
  • Physical inactivity: €3-12 billion in the UK
  • Sleep problems: 5 billion euros in Finland
  • Cardiovascular diseases: 17% direct healthcare costs in Finland
  • Mental health problems: 3-4% of GNP in Europe
Behaviour change

• Behaviour change is the key to health and disease management:
  • 70% of stroke and colon cancer, 80% of coronary heart disease, and 90% of type II diabetes could be prevented by maintaining healthy lifestyles
  • Healthy lifestyles can add 14 years to life

• Same methods applicable for wellbeing management, disease prevention and chronic disease management

• Permanent lifestyle changes required
  • Long-term process: time & practice
  • Success rate in long-term weight loss maintenance ~20%

McGinnis et al., Health Affairs 21(2), 2002
Citizen empowerment vs. healthcare in wellbeing management

Expertise on:
- Everyday life
- Her choices
- Her motivation

Expertise on:
- Health
- Effects of behaviours
Research scope

• Target group:
  • Working-age (30-55-year-old) citizens
  • Healthy => At risk
  • “Average Joe”

• Personal Health Systems: Integrated wellness technologies
  • Web, mobile, monitoring

• Research questions:
  • Technology preferences
  • Usage patterns
  • Motivational factors and barriers
  • User profiles
  • Effect of use of technologies on health & behaviours
Example study 1: Nuadu
Multifactor health management support for employees

- Goal:
  - To support employee health management intervention on multiple health risks
  - To provide continuity to intervention

- Subjects, N = 3x118
  - 35/82 male/female, 44 years (30-55 y)

- Personal health system:
  - Web portal including integrated wellness services (self-monitoring, nutrition)
  - Mobile applications (self-observation diary, training coach, relaxation application)
  - Pedometer and scales
  - Heart rate variability monitoring & wellbeing analysis
Example study 2: P4Well
Psychophysiological wellbeing management

• Goal:
  • To support psychological and physiological wellbeing management of working-age citizens with emphasis on stress, recovery, sleep and exercise

• Subjects:
  • Entrepreneurs: 10/12 male/female, 54 years (37-62)
  • Technology group: 12 male, 48 years (42-59)

• Personal Health System:
  • Web portal including psychological tools and integrated services (self-monitoring, training coach)
  • Mobile applications (self-monitoring, training coach, relaxation)
  • Pedometer and heart rate monitor
  • Heart rate variability and movement monitoring & wellbeing and sleep analysis
Technology preferences

- Different combinations of technologies perceived the most useful in different studies:
  - Study 1: Scales and diary
  - Study 2:
    - Tech group: Heart rate meter and training coach
    - Entrepreneurs: Pedometer and relaxation application
  - No single winning technology
    - Depends on users and context
Technology usage

• Early usage:
  • One fourth used web portal
  • Simple devices were used the most
    • Especially actively in Study I
  • Mobile applications were used more than web portal

• Long-term usage:
  • One fourth were still using some technology after 1 year
  • Most popular: scales, pedometer, simple mobile diary

• Technology adopters: 30-50 %

<table>
<thead>
<tr>
<th>ACTIVE USERS [%]</th>
<th>Study I</th>
<th>Study II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 month</td>
<td>12 month</td>
</tr>
<tr>
<td>Web portal</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Mobile app</td>
<td>12-53</td>
<td>4-23</td>
</tr>
<tr>
<td>Devices</td>
<td>71, 77</td>
<td>39, 71</td>
</tr>
<tr>
<td>Average</td>
<td>43 %</td>
<td>25 %</td>
</tr>
<tr>
<td>Nonusers</td>
<td>-</td>
<td>25 %</td>
</tr>
</tbody>
</table>
Motivational factors and barriers

- Observations on motivational factors:
  - Feedback on long-term progress rewarding
  - Concrete feedback, understandable goals, e.g., step count, weight
  - Interactive, adaptable technologies keep interest high
  - Always at hand and ready to use, e.g., pedometer, mobile phone
  - Physical device acts as a reminder
  - Easy-to-use, intuitive and simple!

- Barriers:
  - Effort, e.g., manual input
  - Monotony – nothing new happening in the application
  - Forgetting to use
  - Abstract concepts in input and feedback
Summary

• A significant subgroup used technologies:
  • 33-82 % used personal devices (scales, pedometer, heart rate monitor)
  • About 30 % used some other technology (Web or mobile)
  • All technologies gained a faithful user group
  • In Study 1, usage continued for 12 months

• Mobile applications were better accepted and more actively used than Web portals

• Most popular applications differed between studies and user groups, although the groups were similar
  • Intervention program and subject training may have had a significant effect
    => Predicting acceptance is difficult
Conclusion

• One technology does not fit all
  => Offer options!
  => User profiling one of the major research questions

• Simple, ready-to-use technologies
  • Unobtrusive and integrated into everyday life
  • Always available and ready to use
  • Physical devices as reminders
  • Concrete feedback and understandable goals
  => Mobile applications and simple personal devices!
  => Opt for simplicity!
VTT creates business from technology

Elina Mattila
elina.m.mattila@vtt.fi