

# INCREASING AUTONOMY OF OLDER ADULTS THROUGH THE USE OF COMPUTERS AND THE INTERNET

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## ABSTRACT

This paper describes a research project that addresses the potential beneficial effects of newly acquired computer and Internet skills on the cognitive ability and quality of life in older individuals. This project is a randomized controlled study with healthy older participants between 65 and 75 years of age. In this paper, the design of this study, as well as some preliminary results on an everyday competence measure, the Technological Transfer Test (TTT), will be discussed. This test was designed to measure problem solving with respect to everyday technological devices, such as a cash machine. The ability to use such devices is very important for autonomy in later life, as society becomes more and more technology driven.

## Keywords

Cognitive aging, intervention study, Internet, technology.

## 1. INTRODUCTION

Individual differences in the rate of age-related cognitive decline appear to be mediated by age-extrinsic factors, such as socio-demographic factors. A possible mechanism through which these factors moderate the development of cognitive aging is the concept of 'Reserve Capacity', for example, the model of 'Cognitive Reserve' (CR) [2]. Proxies of CR usually are measures like education, occupational activity, or participation in cognitively challenging activities (e.g. reading, playing games) [4].

This is in accordance with the 'Use-it-or-lose-it hypothesis' [3], which states from a neurobiological perspective that stimulation of brain cells prevents these cells from decay. With 'Use-it-or-lose-it' in mind, the present study aims to stimulate older adults to use their cognitive abilities to prevent these abilities from decline. Here, the use of Internet facilities is used as a cognitively challenging intervention. 'Surfing' the Internet involves many cognitive skills (e.g. executive functions, visual search, attention). Therefore, we argue that stimulating older adults to use the Internet may be a suitable method to promote the usage and development of cognitive skills and thereby increase CR.

## 2. DESIGN

The randomized controlled intervention study introduced in short here, called the 'Internet for the Elderly Project' (in Dutch: PIVO), is the first study of this kind to test the possibility to increase CR in later life. The intervention in this study is the use of a computer and the Internet at home for 12 months. At this moment, the intervention study is still in progress. Data collection will be completed in October 2004.

Participants of this study are 240 healthy individuals, aged 65 to 75 years, with no prior computer or Internet experience. These participants were randomly assigned to one of four conditions: training/intervention, training/no-intervention, no-training/no-intervention and a group with people who are not interested in the intervention. The individuals in both the training/intervention group as in the training/no-intervention group received a brief training in the use of computer and Internet facilities (e.g. Web-surfing and e-mail). After this training, participants in the intervention group were provided with a computer and a fast Internet connection at their homes for a period of 12 months.

It is hypothesized that participants in the intervention group will benefit from using the computer and Internet facilities by showing a relative improvement in several

domains of function. Main outcome measures include general cognitive functioning (e.g. memory, attention, executive functions), functional status and independence, social network and transfer to everyday performance.

### **3. EVERYDAY TECHNOLOGICAL PERFORMANCE**

One of the nested questions in PIVO is whether newly acquired computer skills transfer to the use of everyday technological devices. The ability to use these modern devices is very important for autonomy of older adults. Today's society is relying more and more on technology and many activities of daily living are only possible by using technology (e.g. withdrawing money from a bank account). Moreover, many technological devices are designed to increase autonomous living (e.g. microwave ovens to prepare ready-made meals). To measure this transfer of skills, we designed the Technological Transfer Test (TTT).

#### **3.1 Methods**

The TTT is administered twice during the study, once at baseline and once after the intervention at 12 months. At each administration, four technological problems are presented. In this paper, we present some preliminary data of the baseline administration of 123 PIVO-participants.

##### **3.1.1 Baseline devices**

At the baseline administration, the four technological devices of the TTT were a telephone and a portable CD player (both real-time devices), as well as a cash machine and a train ticket vending machine (both simulated and operated through a touch screen).

##### **3.1.2 Procedure**

Participants received an instruction leaflet with the problem that had to be solved (e.g. "Play song four of this CD"). Also, for the real-time devices, short instructions were provided. Participants were instructed to act as quickly and correctly as possible. The instructor was not allowed to assist the participants.

##### **3.1.3 Analyses**

We conducted linear regression analyses to determine which demographical (age, sex and education) and cognitive (memory, measured with a word learning test, and general cognitive speed, measured with a letter digit substitution test) variables could predict technological performance time of the four TTT-devices as well as a total-score (sum of Z-scores).

### **3.2 Results**

It was found that level of education as well as general cognitive speed significantly predicted technological performance (with one exception: cognitive speed did not predict performance on the cash machine). Age predicted the two simulated devices and sex predicted performance on the CD player.

### **4. DISCUSSION**

Level of education and general cognitive speed were the most important predictors of technological performance. Education is found to be a significant predictor of many cognitive tasks, so its role in technological tasks was expected. Also, the role of general cognitive speed was anticipated, because a reduction in basic processing speed provides the basis for cognitive change in a host of cognitive domains. Furthermore, the dependent variable was a speed measure as well. This does indicate, however, that technological performance draws on cognitive skills. Age only predicted performance on the two simulated technological devices. This is in accordance with the literature on the use of modern computer-based devices by elderly people. The older people get, the less likely they are to adopt or use new, unfamiliar technology [1].

The results of this study provide preliminary evidence of a relation between cognitive skills and the use of daily technological devices. When developing technological devices, designers should consider age-related cognitive limitations. This is especially important for older adults because autonomy in daily functioning is increasingly dependent on the ability to use technological applications.

### **5. REFERENCES**

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