

## IMPACT OF TELEWORK ON THE PERCEIVED WORK ENVIRONMENT OF OLDER WORKERS

René ARVOLA\*, Piia TINT\*\*, Ülo KRISTJUHAN\*\*\*, Virve SIIRAK<sup>§</sup>

---

### Abstract

Telework has become a natural part of regular work life of employees who use the information communication technology (ICT). Telework has a potential to support postponing retirement for mental workers. The objective of this research was to find out interaction between senior employees' teleworking and well-being. The main research question was – can telework improve elderly employees' well-being? Over 100 respondents from different areas in mental work were involved in a quantitative survey. The results of a conducted survey showed that telework is exaggerated to some extent as teleworkers' well-being ( $M = 7.79$ ;  $SD = 1.28$ ) does not diverge from non-teleworkers' well-being ( $M = 7.75$ ;  $SD = 1.40$ ). However, telework can be neither underestimated nor taken as interchangeable with traditional work. Therefore, it is necessary to pay attention to telework as a different way of working with its specialties. Systematic approach to telework enables companies to employ elderly by providing diversity of work forms.

**Keywords:** telework, senior work force, ICT, education in ICT, well-being, employer's support

**JEL classification:** J14, J26, J28

---

### 1. INTRODUCTION

Skilled labour shortage in Estonia was stated already at the beginning of the 21st century (European Commission, 2001). From this time on, the diversity of information communication technology (hereinafter ICT) -equipment has significantly increased. To contribute to the improvement of the shortage of Estonian labour force, it is necessary to support postponing retirement of people (Arvola and Kristjuhan, 2015, p. 741; Ilmarinen,

---

\* Institute of Business Administration, Faculty of Economics, Tallinn University of Technology, Estonia;  
e-mail: [rene.arvola@ttu.ee](mailto:rene.arvola@ttu.ee).

\*\* Institute of Business Administration, Faculty of Economics, Tallinn University of Technology, Estonia;  
e-mail: [piia.tint@ttu.ee](mailto:piia.tint@ttu.ee) (corresponding author).

\*\*\* Institute of Business Administration, Faculty of Economics, Tallinn University of Technology, Estonia;  
e-mail: [ulo.kristjuhan@ttu.ee](mailto:ulo.kristjuhan@ttu.ee).

§ Institute of Business Administration, Faculty of Economics, Tallinn University of Technology, Estonia;  
e-mail: [virve.siirak@ttu.ee](mailto:virve.siirak@ttu.ee).

2002, p. 17; Sharit *et al.*, 2009). The use of ICT-equipment sometimes causes psychological stress on ageing people and degrading their well-being.

Work-related well-being is often seen as inseparable from work stress. Work stress is a substantial factor to impact work-related well-being (Birdie *et al.*, 2015; Burke, 2002; Chou *et al.*, 2014). There are studies that consider work stress as indicator of a work-related well-being (Moeller and Chung-Yan, 2013).

Originally, stress has referred to as the external pressure of a physical force that a person is exposed to. 'By analogy with physical force, it refers to external pressure that is exerted on a person, which in turn results in tension or 'strain'' (Kahn and Byosiere, 1992). A common approach to stress distinguishes three different meanings: stress as a stimulus; stress as a response; and stress as a mediational process between the stressor (stimulus) and the reaction (response) (Chmiel, 2008, p. 121). Work stress is considered here as work-related stress.

Psychosocial stress can be defined as the result of a cognitive appraisal of what is at stake and what can be done about it (Scott, 2014). To simplify, psychosocial stress results from a perceived threat in our lives (real or even imagined), and discern that it may require resources we do not have. Examples of psychosocial stress include things like a threat to our social status, social esteem, respect, and/or acceptance within a group; threat to our self-worth; or a threat that we feel we have no control over.

Psychological stress and its influence on the health is developing by stages (Reinhold *et al.*, 2014, p. 225). The list of psychosocial stressors for ageing managers is more extensive than that for young ones (Teichmann *et al.*, 2004). As the amount of ICT-equipment is large and increasing and diverse options are offered, from the side of the manager, a good management system is required in the course of telework. An employer (a manager) of over 50 years old needs an ability to assess his (her) own psychological health possibilities not to be over-loaded.

At the same time, a strategy addressing population aging should take advantage of the potential of older people (Ministry of Labour and Social Affairs of the Czech Republic, 2008).

Technology is becoming a larger part of everyone's life, making it easier for any person to do the following: gain access to information about activities and services that meet their interests and needs, learn, engage in paid work and volunteering, find the best prices for products and services. The marketing of technology is generally aimed at the young ("Older people, technology and community," 2012), promoting gimmicky aspects of products that do not interest older people. Digital equipment is designed to attract young buyers who have grown up using technology. Small buttons, fiddly controls and unnecessarily complicated interfaces can all be barriers to older or less adept users. Only half of people aged 60-69 have access to the Internet at home, but this often falls to 17 % among people over 70; the use of ICT-technology by older people is connected with the necessity to have contact with family members or with the obligation if they are engaged in the work process. Our aim is to help the older workers to stay longer in the work process ("Digital Lifestyles: Adults aged 60 and over," 2009).

To what ends the digital participation? Has there been sufficient thought given to digital participation: can it be addressed as the approach developing one of the strongest threats to the people's health and wellbeing, a lack of meaningful social contact and social engagement.

Currently, video is the most descriptive and liberate area of technological development. Using Skype, older people feel close to the family and friends. The e-mail and the voice over Internet calls can enable quick and cheap contact with friends and relatives

across the globe. At the Conference of International Federation on Ageing in Melbourne that focused on the topic of social inclusion and technology, a video was highlighted as a means to help improve people's quality of life ("[Older people, technology and community](#)," 2012).

In the Angus Gold project ("[Older people, technology and community](#)," 2012) 50+ (2004-2007), 700 participants acquired IT- knowledge, 70% reported using IT for e-mail, 64% for accessing the Internet, and 45% for information acquisition. 44% of the participants were living alone, 40% with chronic illnesses or disabling condition. The group had less than 10% drop-out rate.

Concerning the group aged 55-64, there was a lack of understanding and confidence, combined with security and fears about doing something wrong. Advertising and product development are running against the use of novel IT applications.

It seems that the most of technology is being designed by and for 24-year-old males. Minor part of technology is sensitive to the needs and wants of older people.

A major problem is education, i.e. making sure that there are ways for people to access technology that makes it attractive. Capital purchases like hardware or infrastructure are expensive, but what people want and need is on-going training and support.

Mobile phones are promising tools to improve the quality of life for the elderly. The population of the European Union (EU) is ageing, and indeed, EU is already the world's oldest region. In 2000, there were 61 million people aged 65 and over, composing 16% of the total population ([Walter, 2004](#)).

Older people have much higher adoption rate to mobile phones than to Internet usage. Many older people use mobile phones in both leisure and work contexts ([Kurniawan, 2007, p. 25](#)). In 2002, about 70 % of Finns aged between 60 and 70 owned a mobile phone ([Oksman, 2006, p. 11](#)). Elderly feel themselves safe and secure having a mobile phone: they can live healthier independent life.

Mobile phone is the most radioactive domestic appliance ever invented ([Coghill, 2001; Chen and Katz, 2009, p. 179](#)). Therefore, it is necessary to pay special attention to the cases when a person is exposed to the phone for a longer time period.

Most of the world's developed nations are experiencing an increase in the average age of their population ([OECD, 2006](#)). Older adults now make up the fastest growing consumer segment of Internet users ([Hart et al., 2008, p. 191](#)). The term older worker has been defined in a variety of ways. It could be 'over 40' and also 'over 75' ([Wagner et al., 2010, p. 870](#)). In a workplace context, older typically refers to workers over the age of 50 or 55 ([Kooij et al., 2008, p. 365](#)).

## 2. WORK LIFE AND TELEWORK

Three major reasons have been found ([Plaza et al., 2011, p. 1983](#)), why the employers do not show higher commitment to retain their mature employees: 1) the consequence of the negative view on mature workers from the side of the employers; 2) indistinctness about the employment practices that would encourage them to remain in the labour force; 3) lack of knowledge about the development and implementation of specific human resources practices relevant to mature workers ([Armstrong-Stassen, 2008, p. 336](#)). Many people report in surveys that they wish to continue working after traditional retirement age, their health status at older ages is generally better than in the past and many jobs are less physically demanding ([Eyster et al., 2008, p. 1](#), [Munnell et al., 2006, p. 1](#); [Tishman et al., 2012, p. 3](#)).

The drop-out from working life may cause severe social problems (Gaßner and Conrad, 2010, p. 18).

The solutions feasible for elderly people are: telework arrangements, training opportunities for elderly, education of employers on the value of older workers; helping older workers find employment: job and career centres; employment web sites, job fairs, job counselling and changing legislation.

Deferred old-age pension is a type of state old-age pension. Although it is not common anywhere else in Europe, Estonian Social Insurance Board has set the following regulations for motivating retirement postponing (Social Insurance Board, 2015):

- A person has the right to receive a deferred old-age pension at any time after his or her right to receive an old-age pension arises.
- Deferred old-age pension is granted at a later age than the pensionable age.
- The following persons have the right to receive deferred old-age pension:
  - permanent residents of Estonia;
  - aliens residing in Estonia based on temporary residence permits or temporary right of residence.
- Deferred old-age pension shall be calculated pursuant to the procedure for calculation of old-age pensions by increasing the pension by 0.9 per cent for every month, which has passed after the person has attained the pensionable age.
- Deferred old-age pension shall not be granted to a person to whom a state pension has been granted (except a survivor's pension or a national pension upon loss of a provider) pursuant to the State Pension Insurance Act or any other Act.
- Deferred old-age pension is granted for life.
- Upon calculating deferred old-age pension, the pension shall be increased by 0.9 % for every month that exceeds the attained pensionable age.

It is difficult to find one single definition for telework. Multiple terminology is used to indicate telework (e.g. telecommuting, distance work, flexi-work, mobile work, network work). Although Nilles *et al.* (1976), who introduced telework concept, described it as 'telecommuting', stakeholders have adopted 'telework' as a term. And therefore authors of the current paper prefer 'telework' to alternative terms that are sometimes used to denote the similar concept. In this paper, telework is defined as a work carried out outside the central office, involving new technology that permits communication (Arvola, 2006, p. 35). Telework is often applied by working part of the work time remotely, usually from home. Telework is one of the most commonly mentioned strategies to enable older workers to work from home. It saves a great deal of time and stress (Patrickson, 2002, p. 713). From employers' perspective, telework provides strategy for coping with work overload and liberating from fixed temporal work schedules, which have positive impact on company's performance (Sanchez *et al.*, 2007, p. 57).

Competent older individuals have the potential to become teleworkers, but they may need to complete specialized training. The social, medical and psychological aspects have to be taken into account, as elderly may suffer from a loss of earlier mental and psychological capabilities. Nowadays smartphones are available. Smartphones for elderly have to meet their specific needs: there has to be only a small number of functions available and if the smartphone is needed in the work activities, then the employer has to give the possibility to the older people to be trained for the use of smartphones (Selwyn, 2004, p. 382).

There is a tendency to view the elderly as a homogeneous group, but the concept of 'older people' refers to a diverse group: native people and immigrants, individuals with a

university degree and those who have no specific training, and healthy people and frail individuals (Plaza *et al.*, 2011, p. 1985). The elderly think that mobile phones are more accessible than personal computers (PC) and the Internet. Mostly, the mobile phones are considered to improve elderly persons' quality of life. Current trends suggest the society of the future will have more active and healthier older adults who will be physically able to work. The use of mobile phones by elderly will increase in the future, as the younger elderly who have had experience with mobiles in the earlier phases of their lives will continue to use mobile applications as they become retired.

Telework study in six countries that was investigated by Haddon and Brynin (2005, p. 44) who have shown that the net homeworkers are likely to be male, professional and relatively highly paid. PCs homeworkers are of significantly lower social status. Female homework is associated with relatively high-status work and not predominantly with routine, low-paid work.

Some papers have reported health risks from the use of mobile phones (Repacholi, 2001, p. 326; Patrick *et al.*, 2008, p. 3). The health defects are not finally certain, but it is recommended to use the mobile phone not longer than 2 minutes successively.

The computer use by adults is a multi-disciplinary topic by nature; the use of social cognitive theory as a lens was very effective and the investigation showed how the older group has to be inspired (Wagner *et al.*, 2010, p. 870).

Social Cognitive Theory (SCT) is a widely accepted model of individual behaviour (Chan and Lu, 2004, p. 312). The roots of SCT lie in the domain of social learning theory (Bandura, 1986). SCT is based on the premise that environmental influences such as social pressures or unique situational characteristics, cognitive and other personal factors, including personality as well as demographic characteristics, and behaviour are reciprocally determined (Compeau and Higgins, 1995, p. 190). Individual behaviour is influenced by personal factors, which in turn are influenced by behaviours; and behaviour may be influenced by environmental factors while having their own impact on the environment.

A person refers to the older adult, including all of the physical, cognitive, and emotional attributes that make up this individual. It seems that as age increases, the attitude to the computers changes. A study that examined the relationship between experience and attitudes found that individuals with positive attitudes had more experience (Wagner *et al.*, 2010, p. 872). Quantitative studies on the interaction between behaviour and a person are contradictory. Qualitative descriptions about the impact of computer use on the lives of older adults are generally positive (Dickinson and Gregor, 2006, p. 744). The use of computers leads to increased social support. Environment-person interaction: the environment impacts positively on older adults; the support and training provided for the system is also important, training leading to higher levels of self-efficacy, confidence, attitudes, and reduced anxiety (Wagner *et al.*, 2010, pp. 877-878).

The developers of the training systems for ICT for older adults should bear in mind that older adults perceive barriers to their computer use, in particular lack of benefit and lack of motivation. Training courses should create motivation for use. Support personnel should be trained to highlight these points, since older users tend to rely heavily on this service.

Computer-workers are under pressure, as increasing amounts of work have to be done within limited time. Stress is not only a feeling that shapes well-being. It changes functions in the body: release of a variety of hormones, increased breathing, quickened pulse, and the production of more stomach acid. Computer work causes social problems: it distracts an individual from the normal social or family relations and this in turn may lead to depression

(Eltayeb *et al.*, 2007). The interaction between the body and the work environment is complicated and four important systems (central nervous, automatic nervous, endocrine and immune) are involved in this network (Raja *et al.*, 1996).

The question: is it possible to reduce the physical and psychosocial risk at workplaces by speaking with people, training them and solving the problems regarding the issues of their complaints. Kiva questionnaire was used in order to investigate psychosocial and physical working conditions at computer-equipped workplaces for 295 workers (Tint *et al.*, 2014, p. 231). The results showed that in constant workplaces (where workers were divided into two groups: under 40 years and  $\geq 40$  years, the scores in the questionnaire were from 6.5 to 8.95, the lowest scores were obtained for the question 'does the workers enjoy the job?' (6.5), 'the superiors are good' (6.8) and 'the possibility to influence their own job content' (6.8).

The high-performance liquid chromatography method (HPLC Water Alliance with UV detection) was used to determine cortisol in saliva (Kalman and Grahn, 2004, p. A43). The cortisol content in saliva is one of the indicators of psychological stress. Saliva samples were collected three times during the day: in the morning (8-9), at noon (12-13) and in the afternoon (16-17). Each participant was asked to hold special sampling tubes 'Salivette' in their mouth for three minutes. The samples were analysed by the Laboratory of Hygiene and Occupational Diseases in Riga Stradins University (Tint *et al.*, 2014, p. 233). The results of the measurements of cortisol in saliva of Estonian computer-workers showed that the level of cortisol is decreasing during the day. The changes in the cortisol levels in the three investigated offices were between 10.3 to 4.1 nmol/l, from which one is situated in the countryside. The workers in the last one were more stressed at the beginning of the workday and the stress level decreased intensively during the day compared with the capital computer-equipped offices. The reason could be that the knowledge of ergonomics is poorer in the countryside than in the capital.

In addition to the main objective authors of the current research were also interested in finding out which ICT devices over 60-year workers use and do they consider the information acquired through these devices useful or have they developed an attitude to quit some of the devices because of the great flood of useless information.

Older individuals' (workers') life can be improved if they are engaged in the telework.

### 3. MATERIALS AND METHODS

Kiva (Näsman, 2011, p. 34) questionnaire composed of seven questions and a self-validated questionnaire to investigate telework possibilities (based on the questionnaires available in the scientific literature) was used to measure well-being and investigate stress factors arising from the relationship between the employees and employers at the workplace.

The Kiva questionnaire characterizes the well-being of workers at work. The ratings were given in a 10-point scale (1- not at all, 10- very much so, certain or well). The Kiva questionnaire is composed of seven questions:

1. Have you enjoyed coming to work in the last weeks?
2. I regard my job meaningful
3. I feel in control of my work
4. I get on with my fellow-workers
5. My immediate superior performs as superior
6. How certain are you that you will keep the job with this employer?
7. How much can you influence factors concerning your job?

Telework and ICT usage was also measured in a 10-point scale (1- not at all, 10- very much so, certain or well). For measuring telework, the following questions were selected:

1. How much of your work time do you work outside the employer's workplace?
2. To what extent do you want to work outside of the employer's workplace?
3. To what extent do you perceive stress when working in the office compared to working outside the employer's workplace?
4. If it is totally up to you, to what extent do you want to work only in the employer's workplace?
5. To what extent have the following factors influenced you to work outside the office? Factors: better technology; better opportunity to concentrate; saving in time; saving in money; difficulties to move; flexibility to work whenever desired.
6. In case, if it is totally up to you, to what extent would the following factors influence you to work outside the office? The same factors that were listed in the previous question.

The following questions were asked to measure ICT usage (in 10-point Likert scale):

1. In your own opinion, how skilled are you in computer use?
2. To what extent do you perceive a need for learning anything regarding computer?
3. To what extent do you like to work with a computer?
4. How much do you use computer for working?
5. To what extent is computer necessary in your work?
6. How much do you use computer for activities unrelated to your work?
7. To what extent do you use the following ICT devices and applications for your work? Devices and applications that were listed: PC, laptop, tablet PC, smart phone, MS Outlook, MS Office, social networks.

In addition to that, respondents were also asked about their demographic profile (incl. age, gender, education, size of household and presence of children and disabled persons in household)

The research questions were:

1. Can telework improve elderly employees' well-being?
2. Does ICT usage diverge at different ages?

Based on these research questions, five hypotheses were postulated:

**H1:** *Telework users have higher well-being compared to non-users.*

**H2:** *Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old.*

**H3:** *ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age.*

**H4:** *ICT devices' usage of employees younger than 50 years is similar to the ICT devices' usage of employees over 50 years of age.*

**H5:** *Presence of underage, pre-school age or disabled persons influences telework usage.*

IBM SPSS statistics 22.0 and T-test were used to verify the hypothesis.

Telework is a form for workers with ICT and only for these people, telework can be considered as an alternative to the traditional office work. Nonprobability sampling and convenience sampling were chosen. The purpose was to collect answers from respondents who work with computers most of the time and whose work tasks enable them to work outside of the traditional office. Therefore, authors of the current paper asked people who



met the predetermined criteria to participate with filling the questionnaire. Our survey involved wide-scale ICT users. However, among respondents those who do not use telework were also found. Though a convenience sample has no controls to ensure precision, it may still be a useful procedure and often one will take such a sample to test ideas or even to gain ideas about a subject of interest (Cooper and Schindler, 2006, p. 424).

Employees that do mainly mental work from different business areas were selected as the target group for the survey. Sample size was aimed at least 100 respondents. Nonprobability judgment sampling technique was used to collect responses from wide variety of areas. Respondents were selected from different organisations, including companies, non-profit organisation, government institutions, educational sector and self-employed. Sample size was 107 respondents and the data was collected during two weeks on January 11-22, 2016. Majority of the respondents received a paper copy questionnaire, but in a few cases, the questionnaire was sent and returned by e-mail if the respondent asked for this option. Questionnaire was available in Estonian and all the respondents were from Estonia. There were no people who refused to participate.

There were more women (62.6%) represented than men (37.4%) in the sample. About half of all the respondents (55 respondents) were older than 50 years and 35 of them were at least 60 years old. Sample structure by age is described in the following table (Table no. 1).

**Table no. 1 – Age structure of sample**

Respondent's age	Frequency	Percent	Cumulative Percent
<30	9	8.4	8.4
30-39	18	16.8	25.2
40-49	23	21.5	46.7
50-59	20	18.7	65.4
60-69	20	18.7	84.1
>69	15	14.0	98.1
Not available	2	1.9	
<b>Total</b>	<b>107</b>	<b>100.0</b>	

Regarding education of the respondents, a great majority of respondents had higher education (77.6%) or secondary education (19.6%). Only one respondent had basic education (0.9%). This kind of educational background can be justified with common education of an office employee who is the main potential for teleworking.

Senior employee according to the current study is a person who is at least 50 years old. Setting border to 50 years is quite common in other studies regarding ageing work force (Ilmarinen, 2001).

For distinguishing teleworkers from non-teleworkers question 'How much of your work time do you work outside the employer's work- place?' with 10-point scale was used, where '1' indicated 'not at all' and '10' indicated 'whole work time'. Respondents that answered '3' to '10' were considered as teleworkers, because partial telework form is far more common nowadays compared to full time telework. Working mainly with computers was required for qualifying into the research sample. As a result, all respondents were using computer for work related tasks and the vast majority of the respondents (90%) used computer for most of their work time.



#### 4. RESULTS AND DISCUSSION

Current research results reveal that respondents perceived slightly more work stress when working outside employers' workplace but there was no strong correlation found between work stress and teleworking.

Work stress level that was measured by using Kiva method had no significant correlation with teleworking time nor intention to telework. Therefore, according to the study, work stress level of teleworkers is not different from non-teleworkers.

Our hypotheses were tested by using correlation and 2-tailed T-test. Independent Samples T-test was used to verify the hypothesis.

##### Hypothesis 1 (H1)

It was not supported that telework users have higher well-being compared to non-users. Tested hypothesis was H1: Telework users have different well-being level compared to non-teleworkers. Results of Kiva questionnaire pointed out: it cannot be concluded that teleworkers' well-being is significantly different compared to non-teleworkers ( $p$ -value = 0.868;  $t$  = -0.167).

Respondents' self-evaluation on work stress according to question 'To what extent do you perceive stress when working in the office compared to working outside the employer's workplace?' showed little difference. When working in the office teleworkers perceived less stress (average score 6.3) compared to non-teleworkers (average score 6.1). According to Kiva method average scores in majority of questions showed higher well-being for teleworkers compared to non-teleworkers (Table no. 2).

**Table no. 2 – Comparison of well-being evaluation of teleworkers and non-teleworkers**

Factor	Teleworkers	Non-teleworkers
Enjoyment of coming to work	7.8	7.8
Importance of job	8.4	8.1
Control over work	8.0	7.5
Getting on with fellow-workers	8.8	8.8
Immediate superior's performance as a superior	7.4	7.7
Certainty to keep the job	7.0	7.6
Ability to influence factors concerning job	7.2	6.6
<b>Total</b>	<b>7.79</b>	<b>7.74</b>
<i>N</i>	<b>72</b>	<b>28</b>

*Note:* Kiva method, mean value in 10-point scale where greater value refers to greater well-being and less stress.

However, teleworkers' average score showed higher stress concerning certainty to keep the job and immediate superior's performance as superior. Nevertheless, it cannot be concluded that telework improves well-being, because differences between teleworkers' and non-teleworkers' answers regarding well-being were insignificant.

##### Hypothesis 2 (H2)

Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old. Tested hypothesis was H2: Telework usage of employees younger than 50 years of age is different from telework usage of employees over

50 years old. Results cannot confirm statistically significant ( $\alpha = 0.05$ ) difference between telework usage of employees that younger and older than 50 years (p-value = 0.093;  $t = 1.695$ ). Therefore, hypothesis was supported: the conclusion is that telework usage of respondents over 50 years and respondents under 50 years do not diverge.

However, significant differences (p-value = 0.009;  $t = 2.647$ ) were found in willingness to work outside of the employer's workplace. Younger employees (mean value 5.9) were more willing to telework compared to over 50 years old employees (mean value 4.5).

The result support findings from an earlier study among academic staff, indicating the absence of correlation between telework usage and age (Arvola and Kristjuhan, 2015).

### Hypothesis 3 (H3)

It was partially supported. Tested hypothesis was H3: ICT usage of employees younger than 50 years is different from ICT usage of employees over 50 years of age. ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age regarding how much respondents use (p-value = 0.111) and how important is (p-value = 0.523) the computer for their work tasks. It was also revealed that attractiveness of working with computers (p-value = 0.803) did not vary significantly between mentioned age groups.

On the other hand, difference of respondents' self-evaluation on their skills regarding ICT was statistically significant (p-value = 0.003;  $t = 3.098$ ). Younger employees' self-evaluation (mean value 8.0) outstripped self-evaluation of 50+ employees (mean value 7.0). In addition to self-evaluation, results (p-value = 0.002;  $t = 3,161$ ) showed statistically significant difference regarding usage of ICT for activities that are not related to work. Younger employees (mean value 7.0) use computer more often for activities that are not related to work compared to older employees (mean value 5.6). Altogether, results cannot confirm significant difference between ICT usage of employees younger and older than 50 years.

For many years, ICT is considered to be something where young people have advantage, but as current results relied on respondents' self-evaluation, it needs further research to find out if self-evaluation is objective method to assess ICT skills. Even more, as ICT has become a natural part of life, we may expect that acquired ICT experience of older people could give them an advantage compared to young people.

### Hypothesis 4 (H4)

ICT devices' usage of employees younger than 50 years is similar to the ICT devices' usage of employees over 50 years of age. Hypothesis was rejected partially. Regarding desktop computers (p-value = 0.005;  $t = -2.863$ ), laptops (p-value = 0.004;  $t = 2.961$ ) and smartphones (p-value = 0.024;  $t = 2.293$ ), there were statistically significant differences in usage between the age groups younger than 50 and 50+. However, surprisingly this was not found regarding to the tablet PC (p-value = 0.521;  $t = 0.644$ ), MS Outlook (p-value = 0.793;  $t = 0.263$ ), MS Office (p-value = 0.082;  $t = 1.754$ ), and social networks (p-value = 0.461;  $t = 0.740$ ).

### Hypothesis 5 (H5)

Presence of underage, pre-school age or disabled persons in the family influences telework usage. Hypothesis was not supported. Results cannot confirm statistically significant difference between teleworkers and non-teleworkers regarding presence of underage (p-value = 0.369;  $t = -0.969$ ), pre-school age (p-value = 0.468;  $t = -0.800$ ) or disabled persons (p-value = 0.547;  $t = 4.303$ ).

Presence of underage, pre-school age or disabled persons did not affect telework usage. Further research is necessary, as there were only 10 respondents who had disabled persons in their household. Four of them did not use telework.

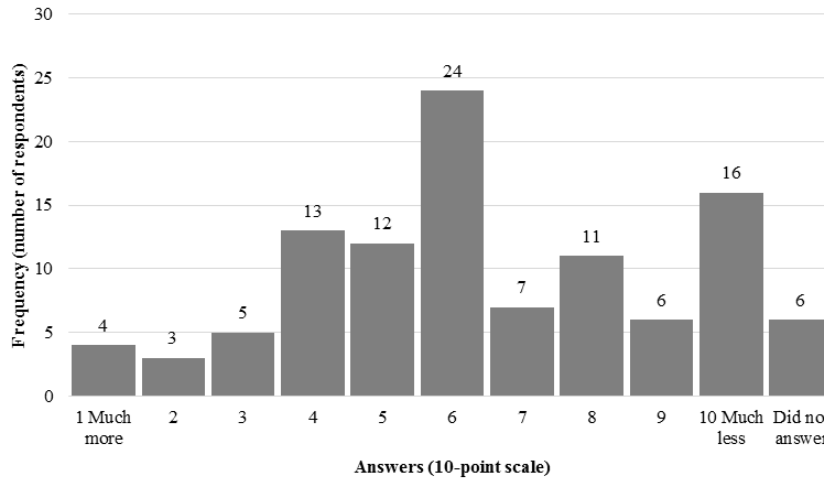


Figure no. 1 – Perceived work stress when working at workplace compared to teleworking

Respondents perceived slightly more stress when working outside an employer’s workplace (mean = 6.26) (Figure no. 1). These results differed from the results of a study conducted among academic staff in Tallinn University of Technology in 2006 (Arvola and Kristjuhan, 2015). According to the study among academic staff, majority of the academic staff members perceive less stress when working outside the office.

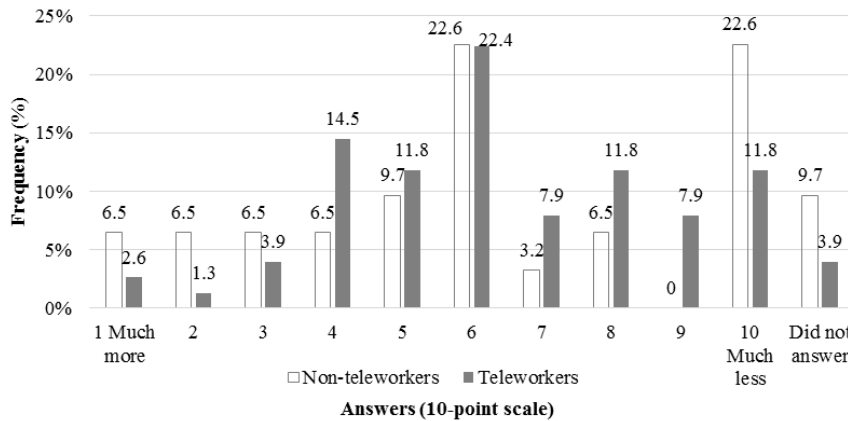


Figure no. 2 – Perceived work stress when working at workplace compared to teleworking, a comparison of teleworkers and non-teleworkers

For defining the extent of telework, the following question was asked: ‘How much of your work time do you work outside the employer’s workplace?’ Respondents were provided with answers on a 10-point scale, where ‘1’ indicated ‘Not at all’ and ‘10’ as ‘Whole work

time'. In the analysis, as teleworkers were considered the respondents who answered 3 to 10 to the question. Non-teleworkers were defined as respondents who answered 1 or 2. Teleworkers' and non-teleworkers' perceptions on work stress depending on workplace (in or outside the employer's office) did not vary significantly (Figure no. 2), which may be considered as a surprising result. Nevertheless, it can also lead to the assumption that one's decision to telework may not be a free choice, but to some extent, a situation forced.

At the same time, there was a correlation ( $R = 0.577$ ) between a 'want to do telework' and a 'want to do telework in case if it is up to the employee to decide'. The results also pointed out correlation ( $R = 0.508$ ) between 'time that was spent on telework' and a 'want to work from outside of the employer's office'.

**Table no. 3 – Well-being by age**

<b>Factor</b>	<b>Younger than 50 years</b>	<b>50 years or older</b>
Enjoyment of coming to work	8.0	7.7
Importance of job	8.5	8.2
Control over work	7.6	8.0
Getting on with fellow-workers	8.8	8.8
Immediate superior's performance as a superior	7.0	7.8
Certainty to keep the job	7.8	7.0
Ability to influence factors concerning job	7.4	6.8
<b>Total</b>	<b>7.85</b>	<b>7.75</b>
<b>n</b>	<b>50</b>	<b>49</b>

*Note:* Kiva method, mean value in 10-point scale where greater value refers to greater well-being and less stress.

There was also a correlation ( $R = 0.258$ ) found between the perception of the work stress at employer's workplace compared to teleworking and intention to work only in employer's workplace. Employees who perceived less stress when working outside the employer's office agree easily to work outside the employer's workplace only.

Well-being according to age was also analysed (Table no. 3). Greatest difference was about certainty to keep the job. Younger employees were more certain that they would keep the job with this employer. But younger employees' judgement on their immediate superior's performance as superior was lower than the older employees' judgement. This immediate superior's performance received lowest score from the younger employees.

Older employees in comparison, felt more stress regarding the ability to influence the factors concerning their job. Ability to influence factors concerning job received lowest score in 50+ age group.

## 5. CONCLUSIONS

Although ICT is a rapidly developing area, office workers have long-term experience in ICT use. In the early years of ICT vast growth, a common belief prevailed that young people are more successful working with computers. Our survey has challenged that kind of beliefs. It can be explained by the consideration that current senior office staff has worked with ICT for about a quarter of a century. Older workers cannot be considered as persons with special needs or challenges regarding working with ICT. All users expect ICT to be designed for and around humans despite their age.

One of the strategies to reduce work stress for employees and improve their well-being is to reduce factors that act as a source of work stress situations. Regarding telework, these are not always the same factors for every person. The results show that people perceive working from home in different ways. Some people feel more stress when working from home and therefore telework should be considered as a voluntary option instead of work style that is stated by the employer. From the stress avoidance perspective, the decision to telework should be discussed with the employer, but the final decision should be made by the employee.

Regarding the older staff, telework can usually be discussed if an employee has substantial work experience with ICT. With remarkable experience, the place of work becomes less important. Unlike younger colleagues, experienced employees need less support from others, but risk for social alienation remains. From the knowledge transfer perspective it is still important to maintain the option for employees with different experiences to meet each other from face to face. However, the final decision for teleworking should be made by the employee again. The employer can provide the information regarding telework and favour the decision by enabling teleworking, which in turn helps to prolong the employment of senior specialists.

The results of the current study reveal that the former belief that ICT involvement of old and younger office employees differs, is untrue. This finding might encourage stakeholders of ageing workforce to consider telework as one of the measures for increasing employment among ageing workforce.

To hold ageing persons longer in the working activities needs multifunctional advanced ICT learning programs. Particular projects for entrepreneurship for persons over 50, for example, across Estonia are needed. It is required to publicize the project all around Estonia, to organize training schools (in summer) for people over 50 who do not have computer skills.

Mobile phone use does not depend on the age of the users, which is supported by the other authors as well (Plaza *et al.*, 2011, p. 1979). In contrast, the use of a computer is not so frequent. Only a small part of people over 63 (in the retired age) can afford the use of smart-phones and tablets. In addition, it is not only because of lack of the resources. The tablets are used by people who have used them earlier or who have been advised to use them by their family members.

Future research should emphasize the profiles of a telework user, as there is still lack of knowledge regarding the total workload of a teleworker compared to a non-teleworker. Results of these studies may show is telework popular for those employees whose workload is relatively high.

It is also necessary to have more qualitative information about the reasons why people choose telework as their mode of work. It is important to find out how telework can be used as a tool to facilitate more people to choose the possibility to postpone their retirement, which is necessary for avoiding ageing catastrophe.

## References

- Armstrong-Stassen, M., 2008. Human resource practices for mature workers — And why aren't employers using them? *Asia Pacific Journal of Human Resources*, 46(3), 334-352. doi: <http://dx.doi.org/10.1177/1038411108091755>

- Arvola, R., 2006. Telework as a Solution for Senior Workforce: Research in Tallinn University of Technology. *Tallinn University of Technology Working Papers in Economics*, 142, 35-49.
- Arvola, R., and Kristjuhan, U., 2015. Workload and health of older academic personnel using telework. *Agronomy Research (Tartu)*, 13(3), 741-749.
- Bandura, A., 1986. *Social foundations of thought and action: a social cognitive theory*. Englewood Cliffs, N.J.: Prentice-Hall.
- Birdie, A. K., Jain, M., and Kulhari, S., 2015. Work stress, general well-being and coping strategies: A comparative study on medico couples. *Indian Journal of Positive Psychology*, 6(3), 288-290.
- Burke, R. J., 2002. Organizational values, job experiences and satisfactions among managerial and professional women and men: Advantage men? *Women in Management Review*, 17(5), 228-236. doi: <http://dx.doi.org/10.1108/09649420210433184>
- Chan, S. C., and Lu, M. T., 2004. Understanding internet banking adoption and use behaviour: A Hong Kong perspective. *Journal of Global Information Management*, 12(3), 21-43. doi: <http://dx.doi.org/10.4018/jgim.2004070102>
- Chen, Y. F., and Katz, J. E., 2009. Extending family to school life: College students' use of the mobile phone. *International Journal of Human-Computer Studies*, 67(2), 179-191. doi: <http://dx.doi.org/10.1016/j.ijhes.2008.09.002>
- Chmiel, N., 2008. *An Introduction to Work and Organizational Psychology: A European Perspective*: Wiley.
- Chou, L. F., Chu, C. C., Yeh, H. C., and Chen, J., 2014. Work stress and employee well-being: The critical role of Zhong-Yong. *Asian Journal of Social Psychology*, 17(2), 115-127. doi: <http://dx.doi.org/10.1111/ajsp.12055>
- Coghill, R., 2001. Inappropriate measures. *The Ecologist*, 31(8), 28-29.
- Compeau, D. R., and Higgins, S., 1995. Computer self-efficacy: Development of a measure and initial test. *Management Information Systems Quarterly*, 19(2), 189-211. doi: <http://dx.doi.org/10.2307/249688>
- Cooper, D. R., and Schindler, P. S., 2006. *Business Research Methods*. New York: McGraw-Hill.
- Dickinson, A., and Gregor, P., 2006. Computer use has no demonstrated impact on the well-being of older adults. *International Journal of Human-Computer Studies*, 64(8), 744-753. doi: <http://dx.doi.org/10.1016/j.ijhcs.2006.03.001>
- Digital Lifestyles: Adults aged 60 and over. 2009. from <https://www.ofcom.org.uk/research-and-data/media-literacy-research/adults/digital-lifestyles-60>
- Eltayeb, S., Staal, J. B., Kennes, J., Lamberts, H. G. P., and A de Bie, R., 2007. Prevalence of complains of arm, neck and shoulder among computer office workers and psychometric evaluation of a risk factor questionnaire. *BMC Musculoskeletal Disorders*, 8(68), 1-11. doi: <http://dx.doi.org/10.1186/1471-2474-8-68>
- European Commission, 2001. Innovation policy in six candidate countries: the Challenges. In European Commission (Ed.).
- Eyster, L., Johnson, R. W., and Toder, E., 2008. Current strategies to employ and retain older workers. *Urban Institute*, 1-38. <http://www.urban.org/sites/default/files/publication/31531/411626-Current-Strategies-to-Employ-and-Retain-Older-Workers.PDF>.
- Gaßner, K., and Conrad, M., 2010. *ICT Enabled Independent Living for Elderly* M. Conrad (Ed.) *A status-quo analysis on products and the research landscape in the field of Ambient Assisted Living (AAL) in EU-27*
- Haddon, L., and Brynin, M., 2005. The character of telework and the characteristics of teleworkers. *New Technology, Work and Employment*, 20(1), 34-46. doi: <http://dx.doi.org/10.1111/j.1468-005X.2005.00142.X>
- Hart, T., Chaparro, B., and Halcomb, C., 2008. Evaluating websites for older adults: Adherence to senior-friendly guidelines and end-user performance. *Behaviour & Information Technology*, 27(3), 191-199. doi: <http://dx.doi.org/10.1080/01449290600802031>
- Ilmarinen, J., 2001. Aging workers. *Occupational and Environmental Medicine*, 58(8), 546-552. doi: <http://dx.doi.org/10.1136/oem.58.8.546>

- Ilmarinen, J., 2002. *Promotion of work ability during aging. Avoiding aging catastrophe.*
- Kahn, R., and Byosiere, P., 1992. Stress in organizations. In M. D. Dunette and L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology 3* (pp. 571-650). Palo Alto, USA: Consulting Psychologists Press.
- Kalman, B. A., and Grahn, R. E., 2004. Measuring salivary cortisol in the behavioural neuroscience laboratory. *Journal of Undergraduate Neuroscience Education*, 2, A41-49.
- Kooij, D., de Lange, A., Jansen, P., and Dikkers, J., 2008. Older workers' motivation to continue to work: Five meanings of age, a conceptual review. *Journal of Managerial Psychology*, 23(4), 364-394. doi: <http://dx.doi.org/10.1108/02683940810869015>
- Kurniawan, S., 2007. Mobile phone design for older persons. *interactions*, 14(4), 24-25. doi: <http://dx.doi.org/10.1145/1273961.1273979>
- Ministry of Labour and Social Affairs of the Czech Republic, 2008. *Quality of life in old age. National programme of preparation for ageing for 1008-2012.* Prague: MLSA.
- Moeller, C., and Chung-Yan, G. A., 2013. Effects of social support on professors' work stress. *International Journal of Educational Management*, 27(3), 188-202. doi: <http://dx.doi.org/10.1108/09513541311306431>
- Munnell, A., Sass, S. A., and Soto, M., 2006. Employer attitudes towards older workers: Survey results. *Center Retirement Research*, 3(jun.), 1-14.
- Näsman, O., 2011. *Metal Age and Kiva-questionnaire. Assist in navigation towards well-being at work:* Mediona OyAb.
- Nilles, J. M., Carlson, F. R., Gray, P., and Hanneman, G. J., 1976. *The telecommunications-transportation tradeoff: options for tomorrow.* New York.
- OECD, 2006. Ageing and Employment Policies. In OECD (Ed.), *Live Longer, Work Longer* (pp. 146). The Netherlands: OECD.
- Oksman, V., 2006. Young people and seniors in Finnish mobile information society. *Journal of Interactive Media in Education*, 2, 1-21. doi: <http://dx.doi.org/10.5334/2006-3>
- Older people, technology and community. 2012. *Independent Age. Supporting older people at home.* from <http://www.independentage.org.uk>
- Patrick, K., Griswold, W. G., Raab, F., and Intille, S. S., 2008. Health and the mobile phone. *American Journal of Preventive Medicine*, 35(2), 177-181. doi: <http://dx.doi.org/10.1016/j.amepre.2008.05.001>
- Patrickson, M., 2002. Teleworking potential employment opportunities for older workers? *International Journal of Manpower*, 23(8), 704-715. doi: <http://dx.doi.org/10.1108/01437720210453902>
- Plaza, I., Martin, L., Martin, S., and Medrano, C., 2011. Mobile applications in an aging society: Status and trends. *Journal of Systems and Software*, 84(11), 1977-1988. doi: <http://dx.doi.org/10.1016/j.jss.2011.05.035>
- Raja, A., Tuulik, V., Lossmann, E., and Meister, A., 1996. Neural network approach to classify the functional state CNS in case of neurotoxic diseases. *Medical & Biological Engineering & Computing*, 34, 241-242.
- Reinhold, K., Pille, V., Tuulik, V. R., Tuulik, V., and Tint, P., 2014. Prevention of MSDs and Psychological stress at computer-equipped workplaces. *Revista de la Universidad Industrial de Santander. Salud*, 46(3), 221-226.
- Repacholi, M. H., 2001. Health risks from the use of mobile phones. *Toxicology Letters*, 120(1-3), 323-331. doi: [http://dx.doi.org/10.1016/S0378-4274\(01\)00285-5](http://dx.doi.org/10.1016/S0378-4274(01)00285-5)
- Sanchez, A. M., Perez, M. P., Carnicer, P. L., and Jimenez, M. J. V., 2007. Teleworking and workplace flexibility: A study of impact on firm performance. *Personnel Review*, 36(1), 42-64. doi: <http://dx.doi.org/10.1108/00483480710716713>
- Scott, E., 2014. What is Psychosocial Stress? . *Stress Management.* from <http://stress.about.com/od/stressmanagementglossary/g/What-Is-Psychosocial-Stress.htm>



- Selwyn, N., 2004. The information aged: A qualitative study of older adults' use of information and communications technology. *Journal of Aging Studies*, 18(4), 369-384. doi: <http://dx.doi.org/10.1016/j.jaging.2004.06.008>
- Sharit, J., Czaja, S. J., Hernandez, M. A., and Sankaran, N. N., 2009. The employability of older workers as teleworkers: An appraisal of issues and an empirical study. *Human Factors and Ergonomics in Manufacturing*, 19(5), 457-477. doi: <http://dx.doi.org/10.1002/hfm.20138>
- Social Insurance Board, 2015. official webpage. from <http://www.sotsiaalkindlustusamet.ee/deferred-old-age-pension-2/>
- Teichmann, M., Spector, P. E., Cooper, C. L., and Sparks, K., 2004. Managerial stress in Estonia. *International Journal of Psychology*, 39(5-6), 308.
- Tint, P., Meigas, K., Tuulik, V., Pille, V., Oha, K., Reinhold, K., . . . Lauri, M., 2014. *Prevention of physiological and psychological stress at computer-equipped workplaces*. Paper presented at the Human Factors and Ergonomics Society Europe Chapter 2013 Annual Conference [www.hfes-europe.org/wp-content/uploads/2014/06/Tint.pdf](http://www.hfes-europe.org/wp-content/uploads/2014/06/Tint.pdf).
- Tishman, F. M., Looy, S. V., and Bruyère, S. M., 2012. Employer strategies for responding to an aging workforce. from [www.ntarcenter.org](http://www.ntarcenter.org)
- Wagner, N., Hassanein, K., and Head, M., 2010. Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior*, 20(5), 870-882. doi: <http://dx.doi.org/10.1016/j.chb.2010.03.029>
- Walter, A., 2004. *Quality of life in old age in Europe*. *Growing older in Europe* Retrieved from <http://era-age.group.shef.ac.uk/professor-alan-walker.html>

### Copyright



This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).