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TECHNOSTRESS AMONG NURSES

Master Thesis

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I hereby declare that this thesis is entirely the result of my own work and submitted for the Degree of Master of Science at Tallinn University of Technology. For the present thesis no degree has been conferred on me at either TUT or any other university

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The work meets the stated requirements for a Master’s thesis

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LÜHIKOKKUVÕTE

Iga inimene ja töötaja on igapäevaselt tehnoloogiaga kontaktis. Tehnoloogia, mis kunagi lihtsustas informatsiooni saamist, ujutab meid sellega üle ja suhtlemise lihtsustamise asemel laseb tööalasel suhtlusel meile koju järgneda. Tehnoloogiast maksimumi võtmiseks on vaja koolitust ja oskuseid ning kuna informatsiooni-kommunikatsioonitehnoloogiad (IKT) arenevad pidevalt, peavad seda tegema ka meie oskused. Nii informatsiooni üleküllus, üleliigne ühenduvus kui ka pidevad muutused tekitavad meis stressi. Sellist stressi kutsutakse tehnostressiks. Üks meie võimalikke päästjaid on meie produktiivsus ning usk tehnoloogiasse.

Tehnostressi ja produktiivsuse vahelise seose uurimiseks tehti uurimus. Valim koosnes 121 õest, kes töötasid Põhja-Eesti Regionaalhaiglas ning kes said kutse e-maili teel ja neil oli kaks nädalat uurimuses osalemiseks.

Uurimisküsimused olid:

1. Kas tehnostress on seotud subjektiivse produktiivsuse tasemega?
2. Kas tehnostress on seotud sooga?

Tulemused kinnitasid, et subjektiivne hinnang produktiivsusele on negatiivselt seotud tehnostressi tasemega. Võrreldes Eesti ja Poola keskmistega pilootuuringust, oli näha, et õdedel oli keskmisest madalam tehnostressi, tunnetasid vähem stressoreid. Kuna enamus valimist koosnes naistest, ei olnud soolisi erinevusi võimalik uurida.

Saadud tulemusi võib kasutada koolituskavade koostamisel ja igapäeva suhtluses. Vähendades tehnostressi taset võib suurendada subjektiivset ja loodetavasti ka objektiivset produktiivsuse taset.

Võtmesõnad: tehnostress, produktiivsus, õed, tehnoloogia

ABSTRACT

Every person and employee is in contact with technology daily. Technology that used to make getting information easier, is now flooding us with it and ease of contact is following as to home. Getting most out of technology also need training and skills and because technology and information-communication technology (ICT) is constantly being upgraded, so have to be our skills. All these information overload, overwhelming connectivity and constant changes makes us stressed. This stress is called technostress. One of our possible saviors is our productivity and belief in it.

To research the idea that productivity and technostress are connected a research was done. The sample consisted of 121 nurses from North Estonia Medical Centre who got the invite by e-mail and had two weeks to participate.

Research questions were:

1. Is technostress connected to level of subjective productivity?
2. Is technostress related to gender?

The results confirmed that subjective feeling of productivity is in fact negatively connected to the level of technostress. Compared to Estonian and Polish average from pilot study, it was found that nurses who participated were having lower levels of technostress, feeling less stressors. Because big part of the sample consisted of women, no analysis on gender differences was made.

These results can be used in doing training plans for employees and in everyday communications. Decreasing the level of technostress might increase the subjective level of productivity and hopefully therefore the objective level of productivity.

Keywords: technostress, productivity, nurses, technology

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1. INTRODUCTION

This paper is about technostress and how it is connected with subjective self-appraised productivity. The subject of technostress is becoming a bigger part of our lives since the introduction of computers and information and communication technologies.

Technology has become a big part of our lives. Technology has made our work more efficient and increased productivity a lot in the past decades. Among other areas it has helped in terms of reduced operational costs, greater process efficiencies, new strategic alternatives and possibilities for innovation (Brynjolfsson & Hitt, 1996) (Don Santos & Sussmann, 2000) (Kudyba & Diwan, 2002). In recent years' technology has invaded every moment of our existence. We are not connected to technology just at work but also at home and everywhere else. Constant need to be connected has not been this big ever before and technology has not controlled such big parts of our lives before. We need technology from buying food to making it, we use it for being connected to friends and for tracking our sleep. But technology at home is mostly invited to our lives by ourselves but at work its use is demanded by others.

Since introduction of computers to the world they have been implemented to work-life more and more. Development of computers and information Technologies has been very rapid and people have not had much time for adaptation. We went from invention of telephones to being connected every second of every moment with the whole world in (1876-1993) 117 years. Humankind had to adapt a lot and fast in the recent century and adaptation can cause a lot of stress. People are experiencing negative emotions in actual or anticipated interactions with computers (Korunka, 1997) (Heinssen, Glass, & Knight, 1987). Another fear regarding technology is the fear that technology and ICTs will be replacing people at the workplace (Garland & Noyes, 2008). Shu, Tu & Wang (2011) proposed that human cognitive limitation and the inability to adapt to the rapid changes in technology may generate a negative impact on effective information technology use and individual productivity.

Main goal of this paper is to find out if technostress and subjective level of productivity are connected. In general stress has been found to affect productivity and one of the aims of this study was to see if the same connections were held with technostress.

For the research a questionnaire was compiled and nurses from North Estonia Medical Centre got the invite to participate which was accepted by 121 of them. The questionnaire is introduced and explained in the chapter about methodology.

This paper is made of three main parts. First part contains description of theoretical background to technostress, techno stressors and relations between technostress and productivity. Second part describes the background, the research, technostress test, the sample, data analysis and results. Third part summarizes the results and connects them with theory and proposes future research goals.

2. LITERATURE REVIEW

2.1 Technostress

Computers are nowadays a big part of our everyday life, especially work life (Hoffman, Novak, & Venkatesh, 2004). Computers and related information technology is being used in all areas of life. Companies are trying to increase productivity using information and communication Technologies (ICTs). Computers are not anymore just fancier typewriters, they are now scheduling our days, providing us useful information and connecting to others. Thanks to ICTs we can work anywhere and anytime. ICTs brake down the barriers of time and geographic location and facilitate work in many ways (Sellberg & Susi, 2013). This is helpful in implementing home-offices but can also be a burden when we want our home to be just a home. Because being online socially is becoming a norm, our employers also hope the same from us. But going from 40 hours a week to 24/7 is a big strain on our bodies and our minds. People feel that they are "on call" because they are always connected (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007). This can lead them to feel stressed out because they believe that they have lost control over their time and space (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007).

ICTs are responsible for increased levels of stress at work and for blurring divide between work and other aspects of life (Millard, 1999). Stress is a cognitive response that individuals experience when they anticipate their inability to respond adequately to the perceived demands of a given situation, accompanied by an anticipation of substantial negative consequences due to inadequate response (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007). It is a response to an imbalance between a person and the demands of the environment (Cooper, Dewe, & O'Driscoll, 2001), and is created in situations that are perceived by an individual as presenting requirements that threaten to exceed his or her capabilities and resources (McGrath, 1976). The consequences of stress include low productivity, dissatisfaction at work, lack of job involvement and poor job performance (Jackson & Schuler, 1985) (Jex & Beehr, 1991) (Kahn R. , Wolfe, Quinn, Snoek, & Rosenthal, 1964).

On the other hand, there is a growing consensus that stress results from a transaction between the individual and the environment (Lazarus, 1990), from the transactional view, no one

component (i.e., stimulus or response) can be attributed as stress, because each must be understood within the context of the process (Ayyagari, 2007). Research on stress suggests that technology is one of the factors that cause stress (Cooper, Dewe, & O'Driscoll, 2001) (McGrath, 1976).

Computerization of office work environment is shown to have higher levels of stress among employees (Agervold, 1987) (Kinman & Jones, 2005) (Korunka & Vitouch, 1999) (Wittbecker, 1986). Some have argued that this increase is due to increased workloads (Aborg & Billing, 2003) (Sandblad, et al., 2003) (Wittbecker, 1986). Employees need to continuously work on their computer skills to work with new systems because technology is developing rapidly and companies want to use the best and newest that is available (Wang, Shu, & Tu, 2008). More and more people are reporting being overwhelmed by work and being burnt out. Although humans biologically are not used to technology yet, expectations from employers are rising on efficiency and productivity of the employees and they are also expected to be reachable all hours (Sellberg & Susi, 2013). One of the outcomes of these demands can be technostress and ensuing illnesses (Wang, Shu, & Tu, 2008). Brillhart (2004) stated that stress-related costs are in the billions and they continue to rise. One of the reasons can be technostress. This sounds as a new word but was actually first mentioned in 1984.

There are several definitions to the term technostress. Word technostress was first used by Brod (1984) whose description to it was „modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner“ (Brod, 1984). Weil and Rosen (1997) defined technostress as „any negative impact on attitudes, thoughts, behaviors, or body physiology that is caused either directly or indirectly by technology“. The word stress is in its right place because technostress is said to cause the same kinds of psychosomatic symptoms as psychological stress: memory disorders, sleep problems, headaches, mood swings, high blood pressure and heart diseases. Employees who work in the IT sector are affected more by clinical depression and burnout (Brillhart, 2004) (Korac-Kakabadse, Kouzmin, & Korac-Kakabadse, 2001) (Wang, Shu, & Tu, 2008). Symptoms of technostress are reportedly among others: inability to concentrate on a single issue, increased irritability and the feeling of loss of control (Ibrahim, Bakar, & Nor, 2007). And at the same time it may also inhibit persons further learning or using computer and information

technology (Wang, Shu, & Tu, 2008). Au contrary to employer's expectation to raise productivity and efficiency with technology, it can reduce them. It is found that technostress has a negative effect on employee productivity and can be psychological (tiredness, lethargy, anxiety) as well as behavioral (a reduced involvement in work, lower labor rates, poorly performed tasks) (Tarafdar, Ragu-Nathan, Ragu-Nathan, & Tu, 2005).

In addition to the physical characteristics, task requirements of job that are found to be stressful are work hours, work overload, exposure to risks and hazards. In terms of the Person-Environment fit model, these stressors can be viewed along the abilities-demands and values-supplies dimensions. (Ayyagari, 2007)

Most of the existing literature on technostress is descriptive (Brod, 1984) (Sami & Pangannaiah, 2006) (Weil & Rosen, 1997). From that we can see that more research is needed on this very important field that affects a lot of people in the developed world.

In conclusion, stress has been an important topic in studies for many years and now a new type of stress has been found – technostress. The development of technology has been a lot faster than the adaptability of humans who are using technology, this dissonance between these paces can be the creator of technostress. It means that our bodies and minds take more time to adapt than it takes time for technology to develop. The place where most demands are set on us, is our workplace, where demands for increasing productivity and our physical and mental capabilities clash the most.

2.2 Technostressors

The pressure to keep using the latest technology for fear of getting left behind has increased, so that organizations often go from one cycle of ICT upgrades to the next, with little time in between (Fisher & Wesolkowski, 1999). Because of that employees have to regularly learn how to work with new applications, as their existing knowledge becomes obsolete (Weil & Rosen, 1997). Although employees may initially be enthusiastic about learning how to use new applications and technologies, constant requirements for refreshing and updating can eventually lead to frustration and stress (Johansson & Aronsson, 1984) (Nelson, 1990). According to Cartwright and Cooper (1997), stressors are events, demands, stimuli, or

conditions encountered by individuals in the work/organizational environment as factors that create stress.

In addition to connecting us to the world constantly, technology also provides us access to a lot of information. In a positive way we have the opportunity to get a lot of knowledge really fast but in a negative way this information does not only reach us when we want to but we are overloaded with new information. We get e-mails with new information, social media is full of new constant flow of information, we get notifications from different news channels etc. But faced with too much information, we become confused and irritable (O'Connor, 1999).

Weil and Rosen (1997) argue that (un)reliability and 'space invasion' are sources of technology-enabled stress. But Ayyagari (2007) says that reliability issues are directly related to the predictability characteristic of technology and technological systems, the concept of 'space invasion' is not a characteristic of technology. 'Space invasion' relates to how technology enables individuals to be accessible and thereby invades on their space/time. The relevant technology characteristic of 'space invasion' seems to be the connectivity of technology. If technologies provide constant connectivity, the expectations to be available always could then create space invasion. As the example depicts, rather than treating technology as a surrogate for factors existing at various levels and unit of analysis.

Roles refer to the behaviors and demands that are associated with the job an individual performs. Role-related stressors include role ambiguity, role conflict (Kahn R. , Wolfe, Quinn, & Snoek, 1981) (Rizzo, House, & Lirtzman, 1970), and role overload (Icancevich & Matteson, 1980). Kahn et al. (1964) proposed that individuals' roles in an organization could be a source of strain. The basic argument behind role variables (role ambiguity, role conflict, and role overload) being stressful is that role variables create situations of uncertainty. Therefore, in situations of uncertainty in an individual's work environment are stressful if the individuals perceive it is beyond their ability to cope with uncertainty (misfit). The two primary ways in which strain can occur are through role ambiguity and role conflict.

Organizational climate and structure are potential sources of strain. These factors have roots in the organization's culture and management style (Cooper & Cartwright, 1994). In terms of Person-Environment fit model, these stressors could be viewed along the abilities-

demands and values-supplies dimensions. Task-related stressors (McGrath, 1976) describe task characteristics that potentially create stress, such as task difficulty and ambiguity. Situational factors are organizational mechanisms that can buffer or reduce the impact of stressors. These mechanisms include job redesign, role restructuring (Burke, Organizational-level interventions to reduce occupational stressors, 1993), stress management training, information sharing, social support, wellness programs, and counseling and assistance (Davis & Gibson, 1994).

Work-home conflict has assumed growing prominence in the job stress literature. The participation of women in the workforce and advances in technologies (especially, the telework phenomenon) are the major causes for recent interest in work-family conflict (Ayyagari, 2007). Research on this topic examines an individuals' ability to manage the interface between responsibilities on and off the job, and is shown to be a source of strain (Frone, Russell, & Cooper, 1992) (O'Driscoll, Ilgen, & Hildreth, 1992) (O'Driscoll, 1996). Accordingly, the concept of 'invasion of privacy' enabled by the ability to use technology to monitor employees is gaining importance as a potential stressor (George, 1996). Invasion of privacy refers to the idea that individuals have the right to be left alone. It is well known that the behaviors of individuals' change when under supervision. The degree to which the individuals value their privacy, the perceptions of 'invasion of privacy' in the work environment leads to a misfit with individuals' values. It is shown that individuals' experience strain and their well-being is affected when they feel that they do not have privacy in their actions (Smith, Carayon, Sanders, & LeGrande, 1992) (DeTienne, 1993) (Frey, 1993) (Jenero & Mapes-Riordan, 1992) (Parenti, 2001).

In conclusion we can see that there are many potential stressors in the workplace. They can be small like change in computer program or there are not enough office supplies available or they can be big like management structure or work-home conflict. All the stressors mentioned in this chapter and the ones that could have been left out are more and more connected to technology and the development of technology. These stressors can affect potential technostress or technostress can increase other stress related to these stressors. We can conclude that workplace is a very complex situation where people spend at least 1/3 of their day and everything that happens there also affects life out of workplace.

2.3 Technostress and productivity

The use of ICTs enables input from multiple channels, such as internal company sources, the Internet, and other external sources (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007). Individuals are therefore exposed to more information that they can efficiently handle and effectively use (Brod, 1984) (Weil & Rosen, 1999). They feel inundated with information and are forced to work faster to cope with increased processing requirements and also they feel compelled to acquire and process the information simply because its available (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007). This could impair performance and lead to stress and it has been referred to as "information fatigue" (Weil & Rosen, 1997) and "data smog" (Brillhart, 2004). Fear and anxiety are common reactions to increasing complexity of ICTs (DeMaagd, 1983) (Yaverbaum, 1988).

ICTs help in multitasking and hence help accomplish more tasks at the same time. It is common, for example, to have several applications running simultaneously and to carry out many different information-processing tasks at the same time. However, there are limits to which individuals can effectively engage in multitasking, and the use of ICTs can lead individuals to exceed these limits, resulting in exhaustion. Prolonged multitasking, aided by the use of ICTs, often leads to burnout and adversely affects productivity. Based on the above discussions, it can be hypothesized that there is an inverse relationship between technostress and productivity. Hence, technostress would exhibit lower productivity. This raises interesting issues related to the "productivity paradox" and reinforces the belief that failure to manage the effects of ICT-induced stress can offset expected increases in productivity. This also has implications for future research on possible demographic factors and organizational actions that may moderate the relationship between technostress and productivity. (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007)

The Person-Environment fit model of stress is the one of the widely used models in the literature (Edwards J. , 1991) (Edwards & Cooper, 1988) (Cooper, Dewe, & O'Driscoll, 2001). This model is based on the premise that there is equilibrium between a person and their environment. It proposes that when the relationship between the person and the environment is out of equilibrium, it results in strain. The lack of fit between the characteristics of the person and the environment could lead to unmet individual needs or

unmet job demands. These unmet needs or demands result in strain (Cooper, Dewe, & O'Driscoll, 2001).

Edwards (1996) reports that this misfit could occur in two ways. First, a misfit could occur between the values of a person, and the environmental supplies available to fulfill those values (Edwards J. , 1996). Typically, values represent conscious desires held by the person and encompass preferences and interests (Edwards & Cooper, 1990) (Edwards J. , 1996) (French, Caplan, & Harrison, 1982). Given the individuals preferences, a misfit in terms of subjective evaluation of supplies provided by the environment leads to strain. A typical application of this fit approach is used to assess the perceived discrepancy between what the individual wants and what the job provides (Cable & DeRue, 2002) or how well the needs of individuals are met by their jobs (Brkich, Jeffs, & Carless, 2002) (Cable & DeRue, 2002). A second type of misfit could occur between the abilities of the person, and the demands placed by the environment. Abilities could include the skills, knowledge, time and energy.

Demands typically refer to the individuals' subjective evaluation of the requirements placed on the person. This implies that same requirements might be interpreted as different demands by different individuals. A typical application of this fit approach is used to assess the extent to which the demands of the job exceed individual's capabilities (Beehr, Walsh, & Taber, 1976) (Chisholm, Kasl, & Eskenazl, 1983) or to assess if individuals' capabilities are insufficient for the job demands (Schaubroeck, Cotton, & and Jennings, 1989) (Sutton & Rafaeli, 1987). It should be noted that values-supplies and demands-abilities fit form two complementary approaches (Kristof, 1996) and capture the degree to which the person and the environment each provide what the other requires (Edwards J. , 1991) (Edwards, Cable, Williamson, Lambert, & Shipp, 2006).

Role overload has been consistently found to influence job-related strain (Cooper C. , 1987) (Narayanan, Menon, & Spector, 1999). Role overload refers to the number of different roles a person has to fulfill. Considerable similarities exist between role overload and work overload at conceptual and measurement levels.

There is a growing consensus that stress results from a transaction between the individual and the environment (Lazarus, 1990), from the transactional view, no one component (i.e.,

stimulus or response) can be attributed as stress, because each must be understood within the context of the process (Ayyagari, 2007).

Shu et al. (2011) found that employees with higher computer self-efficacy may perceive lower technostress and therefore computer self-efficacy can reduce technostress to some extent. From this research it is also demonstrated that computer self-efficacy negatively impacts technostress and technology dependence positively impacts technostress (Shu, Tu, & Wang, 2011). There is empirical evidence which suggests that stress and job performance are negatively related (Burke, 1976) (Chilton, Hardgrave, & Armstrong, 2005) (Jex, 1998) (Welford, 1973).

One of the biggest demands on our workplace is productivity. We are expected to have high productivity and every training or innovation is hoped to increase employees' productivity and therefore the result of work. In recent years one topic has risen regarding productivity – multitasking. Multitasking is aided by development of technology where we can do many things at the same time and also be in many places at the same time. Usually we are not actually doing these thing at the same time but just rapidly switching between tasks which blocks us to actually put our mind into these tasks. This constant switching uses a lot of energy which can lead to strain which can lower productivity and create stress.

In conclusion of this chapter we can see that technology is a big part of our lives nowadays and all the benefits that technology has been promised to give us, also have darker sides. These darker sides are connected to stress, strain, information overload, work-family conflict and many more. All these factors could be part of technostress.

3. METHODOLOGY

3.1 Background

There are not many tests to measure technostress.

3.2 The sample

The sample consisted of 121 people participated and filled out the questionnaire. 97,7% (111) were women and 5,8% (7) were men, 2,5% (3) did not provide information about gender.

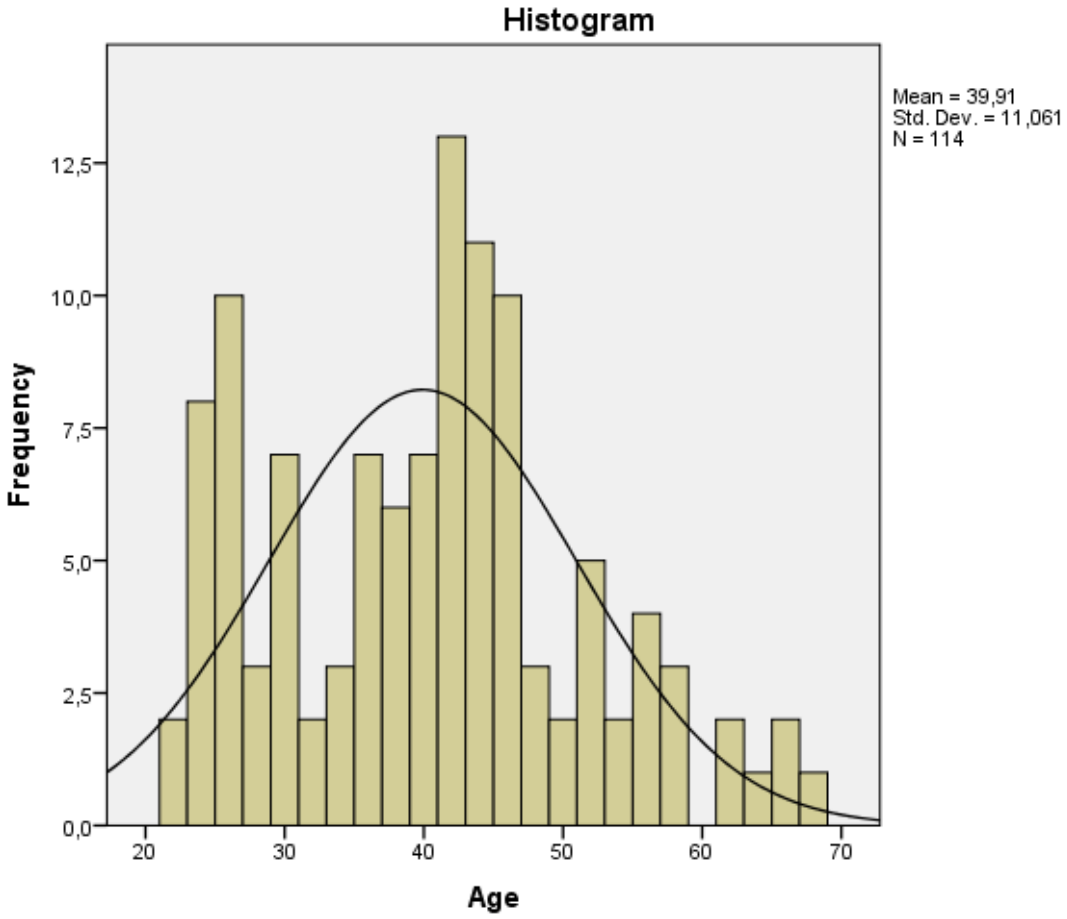

Figure 1. Histogram of participants age.

Graph 1 illustrates distribution of age in respondents. Mean age of respondents was 39. 90,9% (n=110) of respondents had higher education and 7,4% (n=9) secondary education, 1,7% (2) did not provide information about education. 23 respondents (19%) were single, 82

(67,8%) married or in civil partnership, 10 (8,3%) divorced, 4 (3,3%) widowed and 2 (1,7%) did not reply to that question.

3.3 Data collection

Research was held at North Estonia Medical Center. The sample consisted of all the nurses. Head nurses got the invitation to the test and forwarded this information to the nurses. The invite was sent on 18th of March 2016 and they had two weeks to fulfil the questionnaire. Participants had to go to website http://www.pekonsult.ee/testid/tehnostressi.php to fill the test. Participants were informed that taking part and results are anonymous and information how to participate was included in the invite e-mail. After finishing the test all participants had opportunity to enter their e-mail address to a field and to get automatic feedback. After the questionnaire was filled, the results were sent to a server that is located in Tallinn University of Technology and is not located in the internet. E-mail robot sent the feedback to participants. In the feedback they got information about their result reliability and in scale of 1-10 index of problems with new technology, problems with information management, techno-hassles related to hard- or software, user related techno-hassles, emotional reactions, psychological reactions, behavioral reactions, techno-overload, techno-invasion, techno-uncertainty, techno-insecurity and productivity.

3.4 Technostress test

The questionnaire consisted of two main parts. The first questionnaire was Technostress questionnaire that was developed and tested in Estonia in 2016. Test's validity and reliability was tested in study conducted in Estonia and Poland. During validation 285 employees from Estonia and 218 employees from Poland were tested. After validation one potential factor -techno-complexity- questions were removed because this factor had a low Cronbach's alpha and did not work.

After factor analysis and removal of one potential factor, test's Cronbach's alpha was 0,964 in Estonian population and 0,962 in Polish population. According to Nunnaly (1978) as a rule of thumb, minimum is 0,7.

Technostress test is made of 5 parts. First part contains demographic information about participants age, education, marital status, profession and work experience.

Second part is about sources of pressure in person's job. It has 16 statements and participant has to mark on a scale from 1-6 does these items create any pressure for them at their work.

Third part is about computer hassles. It contains of 17 possible computer hassles and participant needs to mark on scale to 1-6 how often they feel these items are creating pressure for them.

Fourth part is about emotional, psychological and behavioral aspects of technostress. Altogether it has 25 statements of these aspects and participant has to mark on scale 1-6 to what extent they feel them about workplace technology.

Fifth part is about creators of technostress and is based on study by Trafadar et al (2011). It contains six sub-categories, altogether 27 statements about techno-overload, techno-invasion, techno-complexity, techno-insecurity, techno-uncertainty and productivity. Participants had to mark on scale 1-6 on what degree they feel these statements are the creators of technostress.

For this study another main part was added to measure subjective self-reported productivity. This part consisted of 16 questions regarding several aspects of productivity that a person is feeling. This questionnaire was created by PE Konsult OÜ?

3.5 Data analysis

For data analysis IBM SPSS Statistics 21 and Microsoft Excel 2016 were used.

4. RESULTS OF TECHNOSTRESS RESEARCH

4.1 Techno Pressure

Techno pressure was measured using 11 questions. In most statements respondents did not see a big source of pressure: keeping up with new technologies (mean=2,83; Mode=2; Skewness=0,52), technology changes too much and too fast (mean=2,60; Mode=2; Skewness=0,63), problems with technical systems (i.e. with Internet connection) (mean=2,71; Mode=2; Skewness=0,52), poor user manuals (mean=2,88; Mode=2; Skewness=0,38), changes in a way you work (mean=2,85; Mode=2; Skewness=0,60), an increased workload (mean=2,47; Mode=2; Skewness=0,64), simultaneously handle different streams of information from internet and external sources (mean=2,88; Mode=2; Skewness=0,56) and spam vie e-mails (mean=2,60; Mode=2; Skewness=0,68)

Bigger sources of pressure were: contacted anywhere and anytime (mean=3,22; Mode=2; Skewness=0,33), communication overload (mean=3,13; Mode=3; Skewness=0,30) and information overload (mean=3,17; Mode=3; Skewness=0,24).

Cronbach's α of this module was 0,93, which show high internal consistency.

As seen on Graph 2, compared to pilot research in Estonia and Poland, nurses reported less sources of pressure.

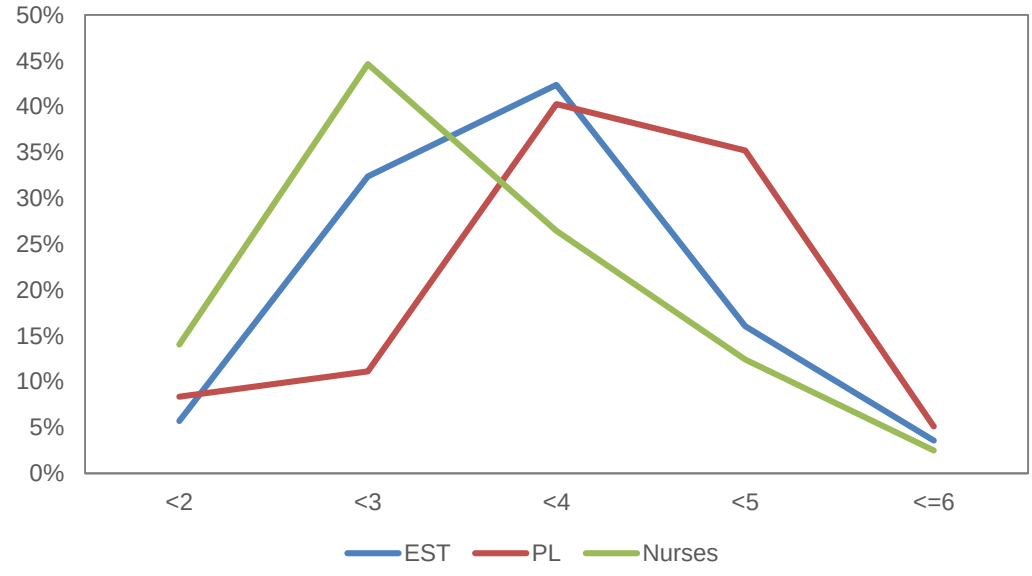

Figure 2. Techno pressure. Estonian and Polish average and nurses.

Participants reported lower levels of techno-pressure than average Estonian. Bigger sources of pressure were connected with being contacted anytime, and communication and information overload.

4.2 Computer hassles

Computer hassles were measured using 16 questions about different possible computer hassles. Most of statements were not seen as big computer hassles by respondents: internet is down (mean=2,82; Mode=2; Skewness=0,70), lost some information or file in the computer (mean=2,92; Mode=2; Skewness=0,26), poorly documented manuals (mean=2,78; Mode=2; Skewness=0,45), poorly designed software (mean=2,79; Mode=2; Skewness=0,61), programming errors (mean=2,46; Mode=2; Skewness=1,02), poor user-computer interface (mean=2,41; Mode=2; Skewness=0,95), slow internet speed (mean=2,98; Mode=2; Skewness=0,31), lack of computer expertise (mean=2,60; Mode=2; Skewness=0,52), keyboard typing mistakes (mean=2,48; Mode=2; Skewness=0,92), need to learn new software (mean=2,82; Mode=2; Skewness=0,51), lack of help with computer problems (mean=2,33; Mode=2; Skewness=0,96) and increased computer use expectation (mean=2,20; Mode=2; Skewness=1,20)

Some of the statements were seen as bigger computer hassles: slow program speed (mean=3,10; Mode=3; Skewness=0,15), slow computer speed (mean=3,25; Mode=4; Skewness=0,08), increased time demands (mean=3,16; Mode=3; Skewness=0,25) and need to update your skills (mean=3,09; Mode=3; Skewness=0,18).

Cronbach's α of this module was 0,91, which show high internal consistency.

As seen on Graph 3 nurses reported less computer hassles in comparison to polish and Estonian average.

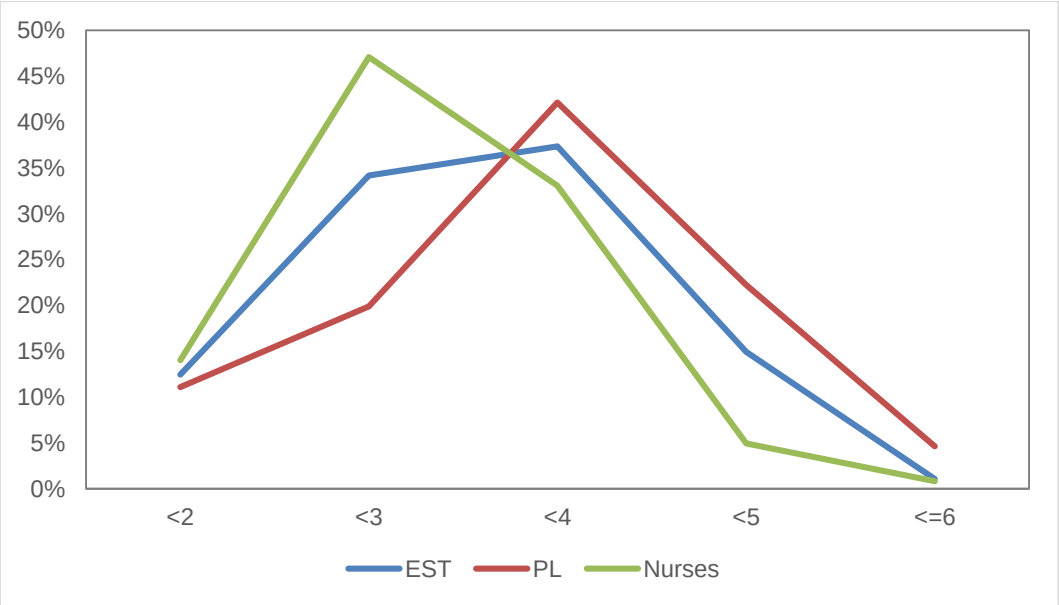

Figure 3. Computer hassles. Estonian and Polish average and nurses

Participants reported lower levels of computer hassles than average Estonian. Bigger computer hassles were connected to slow program and computer speeds, increased time demands and need to Update skills.

4.3 Emotional aspects

Respondents had low amount of negative emotions towards technology: having high state of anxiety (mean=2,51; Mode=2; Skewness=0,91), depressive feelings (mean=1,72; Mode=1; Skewness=2.06), guilt (mean=1,79; Mode=1; Skewness=1,57), feeling fearful (mean=1,64; Mode=1; Skewness=1,82) and negative attitude (mean=1,94; Mode=1; Skewness=1,28).

Cronbach's α of this module was 0,87, which show high internal consistency.

As seen on Graph 4. these results show that nurses are in accordance with Estonian average from pilot study and are little bit less negative than Polish average.

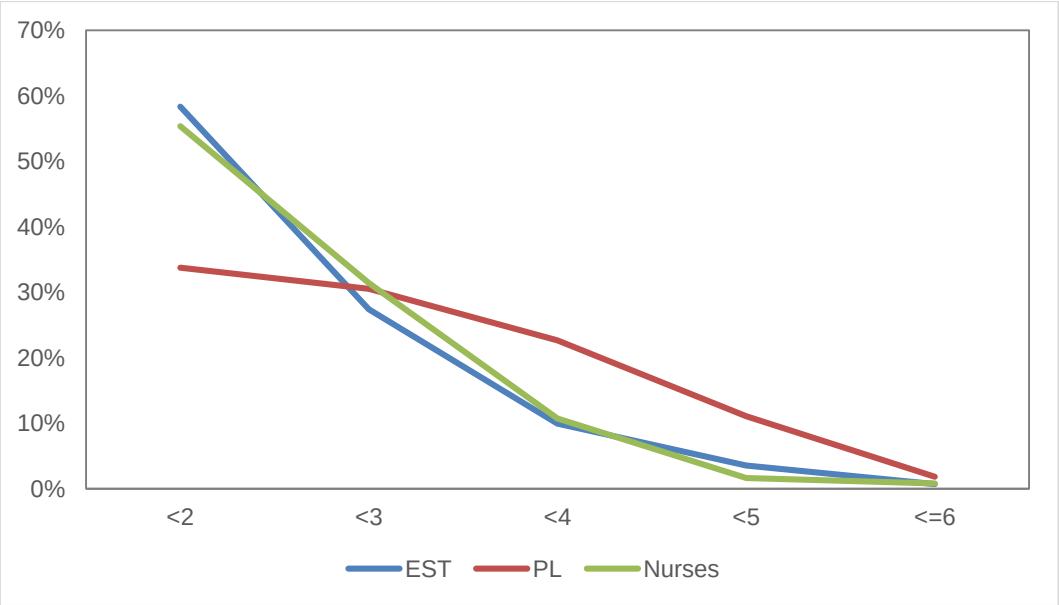

Figure 4. Emotional aspects. Estonian and Polish average and nurses.

Participants reported lower levels of emotional aspects regarding technology than average Estonian respondent. Respondents had in all categories low levels of negative emotional aspects regarding technology.

4.4 Psychological aspects

Respondents reported rarely feeling negative psychological aspects towards technology: Information overload to find, analyze, evaluate, and apply necessary information (mean=1,94; Mode=1; Skewness=1,28), job insecurity (mean=1,74; Mode=1; Skewness=1,65), professional jealousy (mean=1,68; Mode=1; Skewness=1,72), demotivation due to prolonged of any technological activity (mean=1,74; Mode=1; Skewness=1,54), fear of not keeping up (mean=1,84; Mode=1; Skewness=2,14) and helplessness, when you are unable to make it clear what a machine must to do (mean=2,11; Mode=2; Skewness=1,09).

Cronbach's α of this module was 0,84, which show high internal consistency.

As seen on Graph 5, compared to Estonians and Polish respondents from pilot study, nurses reported less psychological aspects.

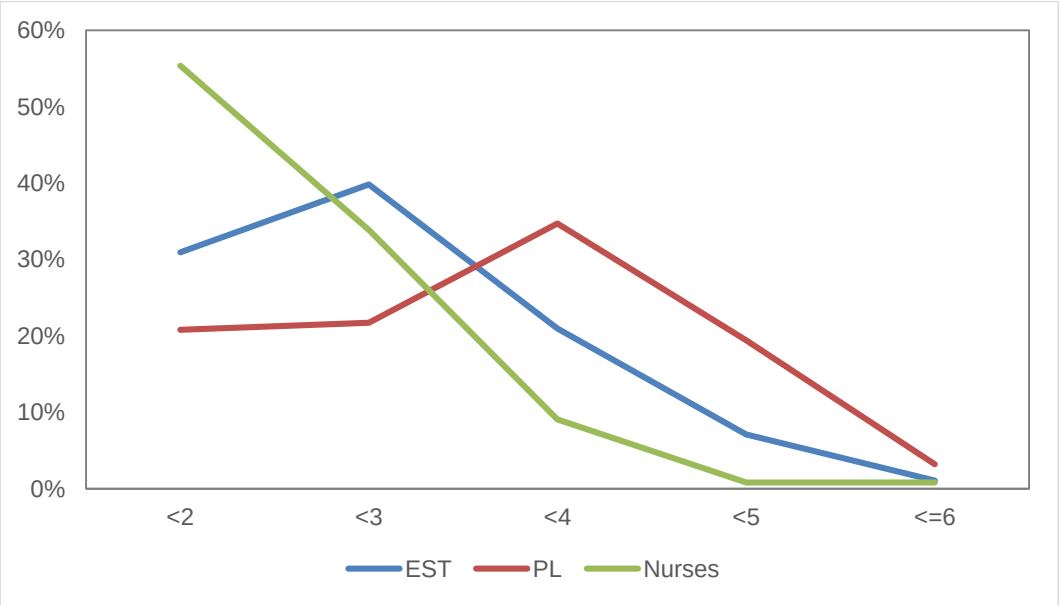

Figure 5. Psychological aspects. Estonian and Polish average and nurses.

Participants reported lower levels of negative psychological aspects towards technology than average Estonian. Respondents had in all categories low levels of negative psychological aspects regarding technology.

4.5 Behavioral aspects

Respondents reported rarely having behavioral aspects of technostress: overly comfortable with computers (mean=2,06; Mode=1; Skewness=1,2), using computer terms in non-computer conversation (mean=1,91; Mode=2; Skewness=1,69), cruising computer stores (mean=1,33; Mode=1; Skewness=3,11) and social withdrawal in favor of terminal time (mean=1,54; Mode=1; Skewness=2,14).

Cronbach's α of this module was 0,74, which show high internal consistency.

As seen on Graph 6, compared to pilot study, nurses responded experiencing less behavioral aspects.

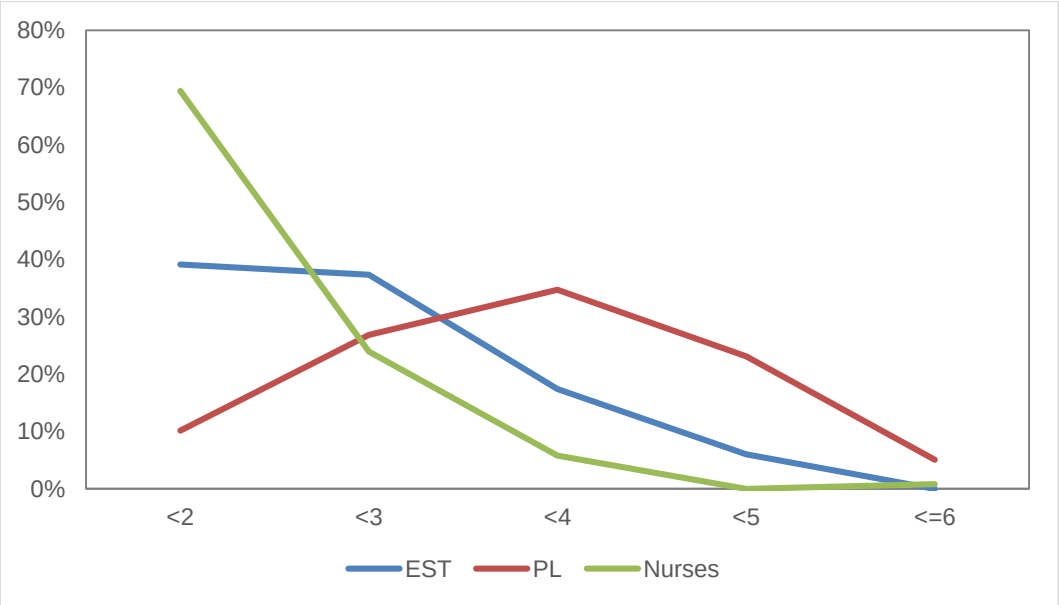

Figure 6. Behavioral aspects. Estonian and Polish average and nurses.

Participants reported lower levels of behavioral aspects regarding technology than average Estonian. Respondents reported rarely having behavioral aspects of technostress.

4.6 Creators of technostress – overload

Respondents reported low amounts of techno-overload: I am forced by this technology to work much faster (mean=2,35; Mode=2; Skewness=0,97), I am forced by this technology to do more work than I can handle (mean=2,20; Mode=2; Skewness=1,02), I am forced by this technology to work with very tight time schedules (mean=2,28; Mode=2; Skewness=0,99), I am forced to change my work habits to adapt to new technologies (mean=2,43; Mode=2; Skewness=0,87) and I have a higher workload because of increased technology (mean=2,33; Mode=2; Skewness=0,87).

Cronbach's α of this module was 0,94, which show high internal consistency.

Compared to Estonian and Polish average, nurses reported less techno-overload as seen on Graph 7.

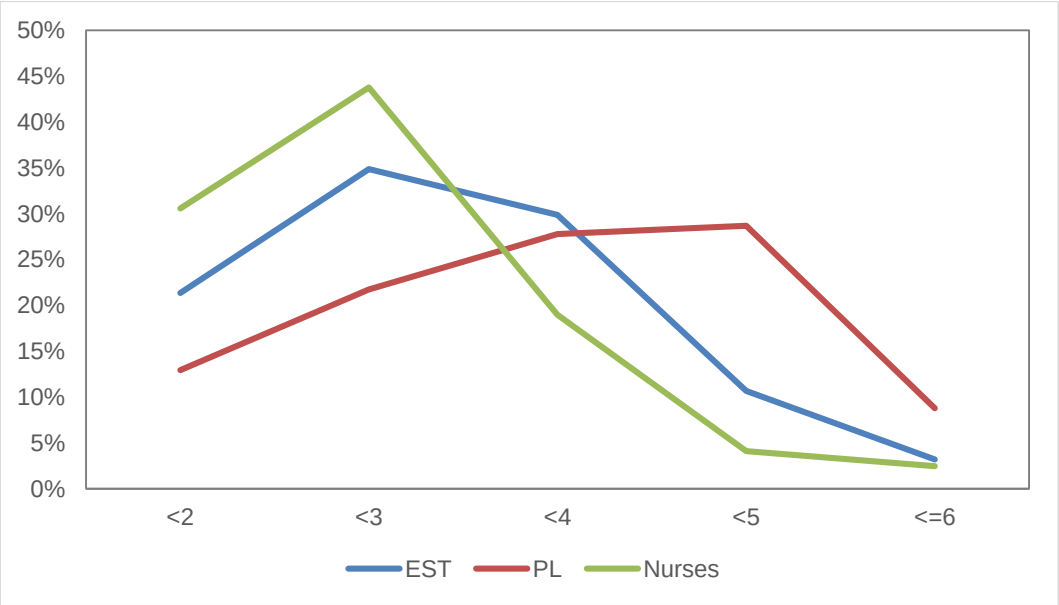

Figure 7. Techno-overload. Estonian and Polish average and nurses.

Participants reported lower levels of techno-overload than average Estonian respondent. Respondents had in all categories low levels of techno-overload.

4.7 Techno-invasion

Participants reported low amount of feeling techno-invasion: I spend less time with my family due to this technology (mean=2,12; Mode=1; Skewness=0,87), I have to be in touch with my work even during my vacation due to this technology (mean=2,13; Mode=1; Skewness=1,29), I have to sacrifice my vacation and weekend time to keep current on new technologies (mean=1,92; Mode=1; Skewness=1,64) and I feel my personal life is being invaded by this technology (mean=2,09; Mode=1; Skewness=1,26).

Cronbach's α of this module was 0,89, which show high internal consistency.

Compared to Estonian and Polish average, nurses reported less feelings of techno-invasion as seen on Graph 8.

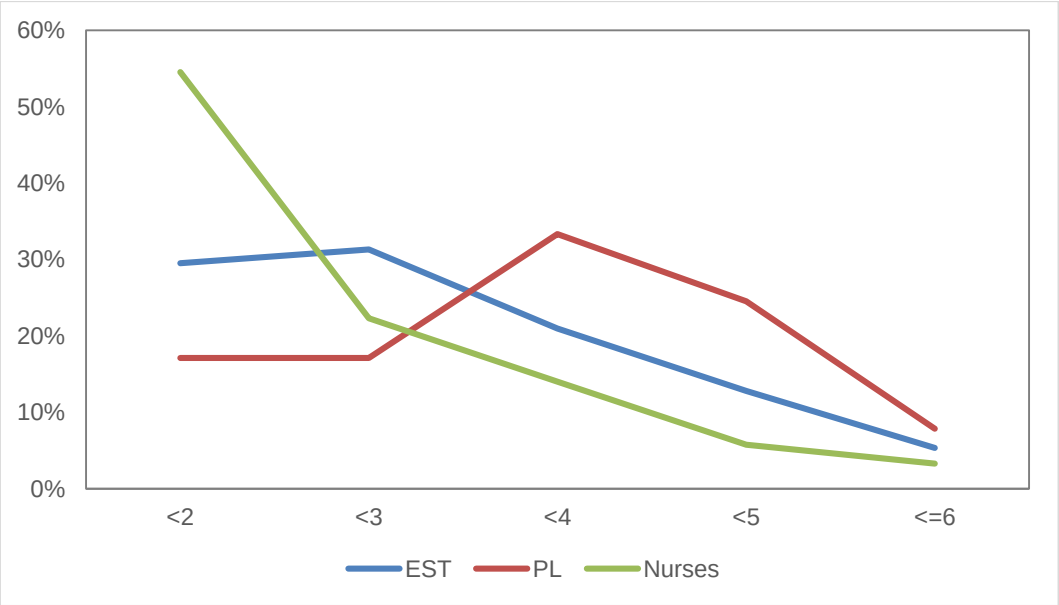

Figure 8. Techno-invasion. Estonian and Polish average and nurses.

Participants reported lower levels of techno-invasion than average Estonian respondent. Respondents had in all categories low levels of techno-invasion.

4.8 Techno-complexity

Responding to the statement "I do not know enough about this technology to handle my job satisfactorily ", respondents did not mostly agree with it (mean=1,68, mode=1, skewness=2,09). They reported feeling less techno-complexity than respondents from Estonia and Poland in the pilot study.

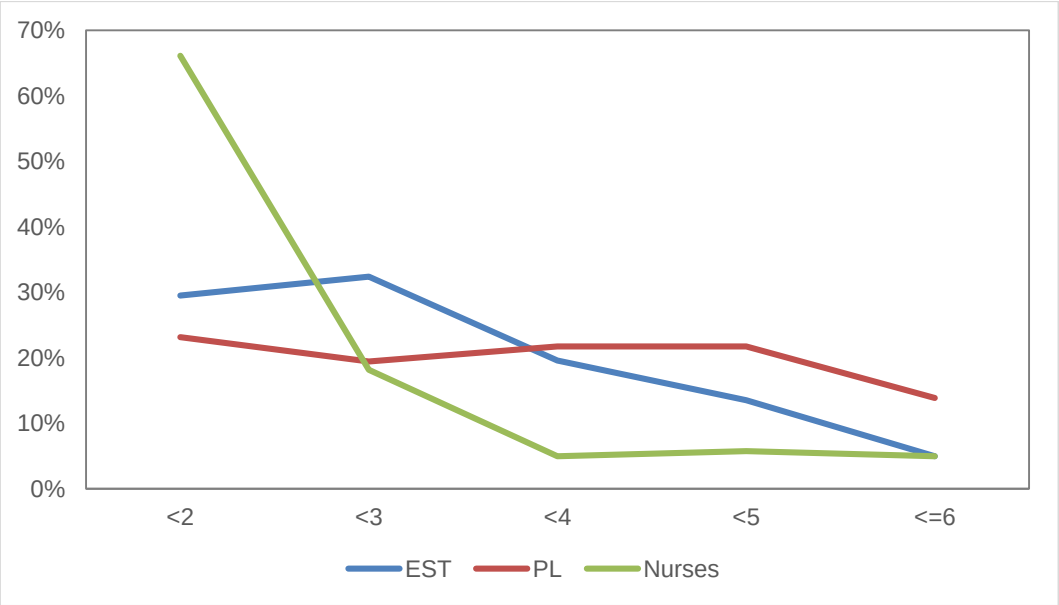

Figure 9. Techno-complexity. Estonian and Polish average and nurses.

As seen on Graph 9 participants reported lower levels of techno-complexity than average Estonian respondent.

4.9 Techno-insecurity

Respondents reported feeling low amount of techno-insecurity: I have to constantly update my skills to avoid being replaced (mean=1,93; Mode=1; Skewness=1,48), I am threatened by coworkers with newer technology skills (mean=1,84; Mode=1; Skewness=1,58), I do not share my knowledge with my coworkers for fear of being replaced (mean=1,59; Mode=1; Skewness=2,16) and I feel there is less sharing of knowledge among coworkers for fear of being replaced (mean=1,77; Mode=1; Skewness=1,61).

Cronbach's α of this module was 0,90, which show high internal consistency.

Graph 10 shows these results compared to pilot study and it is seen that nurses reported less techno-insecurity.

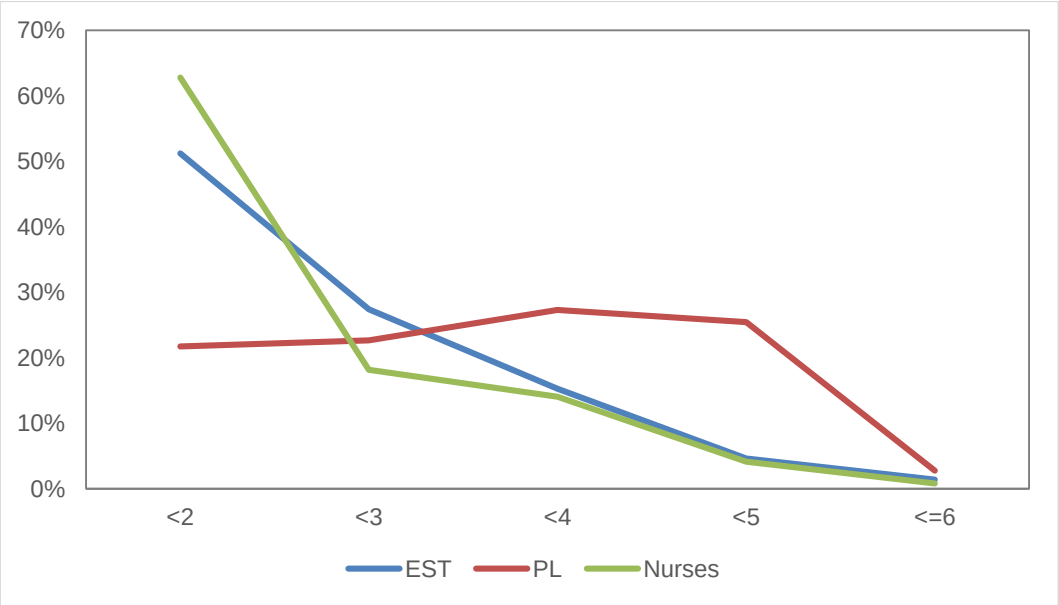

Figure 10. Techno-insecurity. Estonian and Polish average and nurses.

Participants reported lower levels of techno-insecurity than average Estonian respondent. Respondents had in all categories low levels of techno-insecurity.

4.10 Techno-uncertainty

Respondents reported feeling low levels of techno-uncertainty: There are always new developments in the technologies we use in our organization (mean=2,7; Mode=3; Skewness=0,54), there are constant changes in computer software in our organization (mean=2,65; Mode=2; Skewness=0,76), there are constant changes in computer hardware in our organization (mean=2,56; Mode23; Skewness=0,79) and there are frequent upgrades in computer networks in our organization (mean=2,59; Mode=2; Skewness=0,96).

Cronbach's α of this module was 0,95, which show high internal consistency.

As seen on graph 11 nurses reported average levels of techno-uncertainty compared to pilot study in Estonia and little bit lower than polish average.

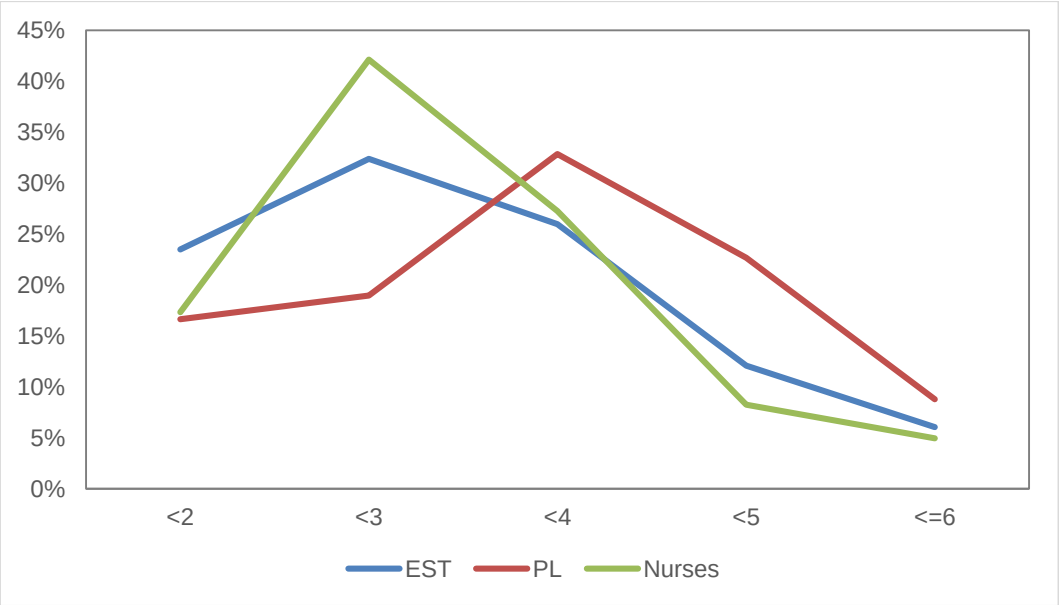

Figure 11. Techno-uncertainty. Estonian and Polish average and nurses.

Participants reported lower levels of techno-uncertainty than average Estonian respondent. Respondents had in all categories low levels of techno-uncertainty.

4.11 Technology aided productivity

Respondents reported low levels of stressors coming from increase in productivity: This technology helps to improve the quality of my work (mean=2,31; Mode=1; Skewness=0,82), this technology helps to improve my productivity (mean=2,32; Mode=1; Skewness=0,76), this technology helps me to accomplish more work than would otherwise be possible (mean=2,32; Mode=1; Skewness=0,81) and this technology helps me to perform my job better (mean=2,27; Mode=1; Skewness=0,80).

Cronbach's α of this module was 0,97, which show high internal consistency.

As seen on graph 12 it is seen that these results differed from Estonian and Polish average.

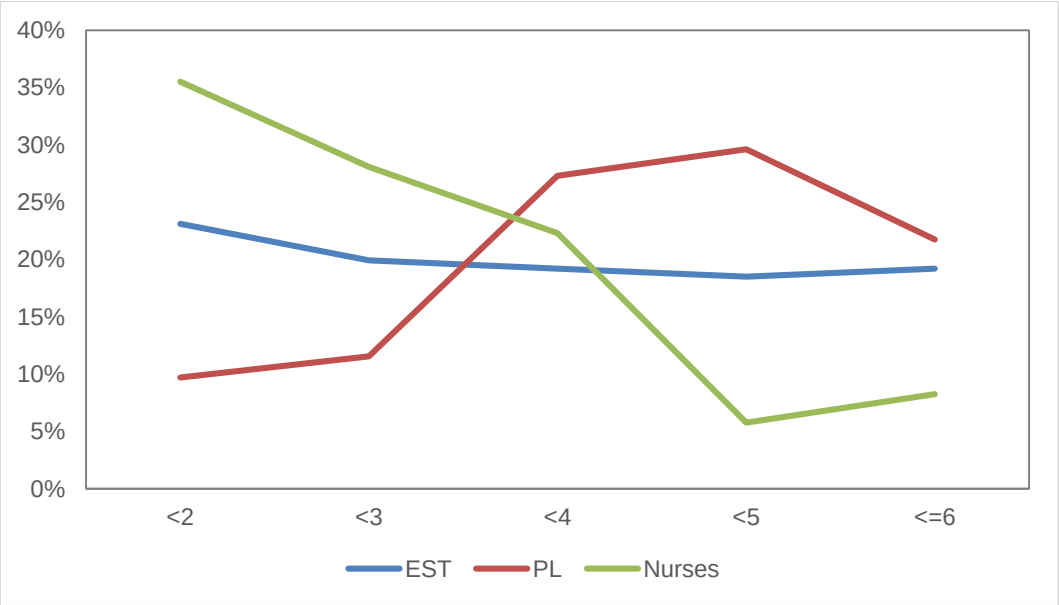

Figure 12. Productivity. Estonian and Polish average and nurses.

Participants reported lower levels of stress coming from increase in productivity than average Estonian respondent. Respondents had in all categories low levels stress regarding increase in productivity.

4.12 Productivity

Productivity was self-evaluated by participants in the scale from 1 to 12. Where 12 marked the highest level of productivity. All 16 questions together formed all-over productivity score for each participants. In graph 13 it is seen that these scores were from 6,5 to 12 and most people evaluated their productivity to be on the higher level.

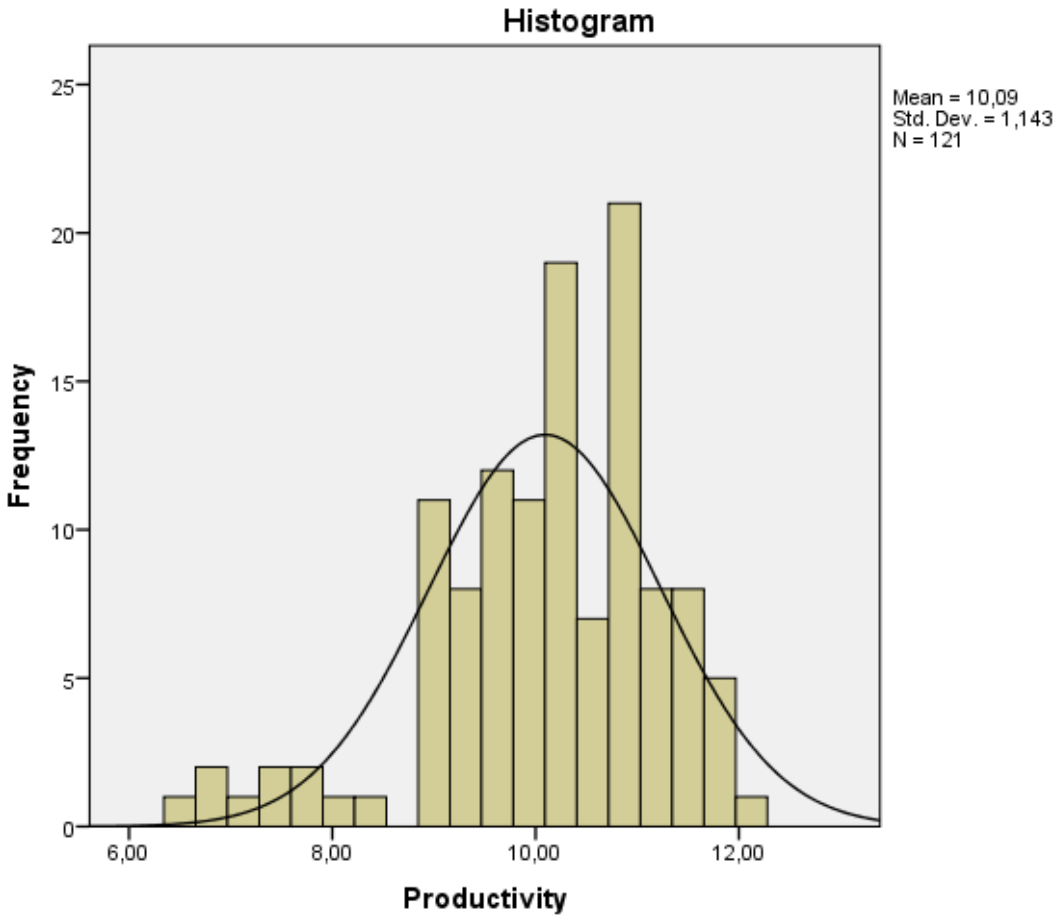

Figure 13. Histogram of productivity score.

Cronbach's α of this module was 0,94, which show high internal consistency.

Appendix 1 shows correlations between factors. From there we can see that techno pressure is significantly and positively correlated with computer hassles (r=0,588; p<0,001), psychological aspects (r=0,559; p<0,001) and techno-overload (r=0,662; p<0,001). Computer hassles are significantly and positively correlated with psychological aspects (r=0,606; p<0,001). Emotional aspects and psychological aspects are strongly and positively correlated (r=0,695; P<0,001). Psychological aspects are positively and significantly correlated with behavioral aspects (r=0,582; p<0,001) and techno-overload (r=0,609; p<0,001). Techno overload and techno-insecurity are positively and strongly correlated (r=0,501; p<0,001). Techno-invasion is strongly and positively correlated with techno-complexity (r=0,650; p<0,001) and techno-insecurity (r=0,600; p<0,001). Techno-complexity is strongly correlated with techno-insecurity (r=0,801; p<0,001).

Productivity is negatively and significantly correlated with emotional aspects (r=-0,213; p<0,001), psychological aspects (r=-0,226; p<0,001) and techno-invasion (r=-0,270; p<0,001).

5. CONCLUSIONS AND DISCUSSION

Most participants evaluated their productivity to be on the higher level. As results show nurses reported low levels of techno-stress and related issues, we could confirm the finding from Shu et al (2011) that employees with higher computer self-efficacy may perceive lower technostress and therefore computer self-efficacy can reduce technostress. We can draw connections between subjective levels of productivity and computer self-efficacy. Because nurses work is a lot connected nowadays to working with computers and they perceive themselves as competent at their work, they also feel needed level of computer self-efficacy.

Productivity is negatively correlated with emotional aspects, psychological and techno-invasion. As Trafadar *et al*. (2007) found, that technostress and productivity are inversely related, we can see the same from this study. From their study it could be interpreted that lower technostress results in higher productivity (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007) but unfortunately from this study the way of this relationship was not found and it needs to be studied further.

Participants reported lower levels of techno-pressure than average Estonian. Bigger sources of pressure were connected with being contacted anytime, and communication and information overload. These result are in accordance with findings that people are exposed to more information that they can handle (Brod, 1984) (Weil & Rosen, 1999) and this could impair performance and lead to stress (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2007).

They also reported lower levels of computer hassles than average Estonian. Bigger computer hassles were connected to slow program and computer speeds, increased time demands and need to update skills. These results show that increased time demands put a lot of pressure on technology also. Even if people are able to work faster, technology might not be. This increased time demands are also connected with findings from Trafadar et al (2007) where they found that there is relationship between technostress and productivity.

Respondents had in all categories low levels of negative emotional aspects regarding technology, as in negative psychological aspects and behavioral aspects. These results might come from our cultural background that Estonia has been one of the leading IT countries and

technology is something that our people might take as normal and necessary part of everyday lives. As nurses are usually educated, they should have even less problems with working with technology and especially having negative emotions toward it. Although there have not been many studies regarding nurses and technology from verbal communication, it is understood that technology helps them more than hurts. This help from technology explains also results, that participants reported lower levels of stress coming from increase in productivity than average Estonian respondent. Respondents had in all categories low levels stress regarding increase in productivity.

Participants reported lower levels of techno-overload, techno-complexity, techno-insecurity and techno-uncertainty than average Estonian respondent. Respondents had in all categories low levels of all these factors. Coming from Trafadar *et al.* (2011) explanation about meaning of techno-overload, we could say that nurses do not suffer from information overload. Using the same article (Trafadar M. , Tu, Ragu-Nathan, & Ragu-Nathan, 2011) we could also conclude from these results that nurses also do not find it intimidating to learn and use ICT, they do not feel insecure about their jobs regarding ICTs and they do not feel unsettled by continual upgrades.

Trafadar *et al.* (2011) reported that men experience more technostress than women. Although the hypothesis of this study was that technostress is related to gender, we could not report finding about gender differences because there were not enough male respondents. From the findings that all factors of technostress were below Estonian and Polish average we could hypothesize that this was due to the fact that most respondents were women- e.g. had lower levels of technostress.

Highest levels of technostress were connected to computer hassles and techno-invasion. From that we can assume that although they might be willing to use technology in their work, the technology might not be working correctly and therefore they might be more stressed.

One of the implications of this study is that it does not have enough respondents from the opposite gender. Unfortunately, if we see the gender division of Estonian nurses, we can see that when studying nurses from Estonian hospital, we might not in the future also get enough respondents from both genders.

Another implication is that subjective level of productivity was researched. In the future there could be added a set of measurements to see objective levels of productivity and its relationship to technostress. One reason for that is that people who are confident with technology and therefore feel less technostress, could perceive their subjective levels of productivity also higher as it actually is.

In conclusion these results could be used by all the companies who are implementing more ICTs to increase the level of productivity. It would be good to analyze before the results that are expected from implementing new technologies or systems and also to see what demands it puts to the employees and is this difference big enough to actually bring increase in productivity. Also it is good for companies who already have invested in ICTs but do not see the result that was expected to measure the levels of technostress and lower it through trainings and support.

BIBLIOGRAPHY

Aborg, C., & Billing, A. (2003). Health effects of 'the Paperless Office - evaluations of the introduction of electronic document handling systems. *Behaviour & Information Technology, 22*(6), pp. 389-396.

Agervold, M. (1987). New Technology in the Office: Attitudes and Consequences. *Work & Stress, 2*(1), pp. 143-153.

Ayyagari, R. (2007). What and Why of Technostress: Technology Antecedents and Implications.

Beehr, T., Walsh, J., & Taber, T. (1976). Relationships of stress to individually and organizationally valued states: Higher-order needs as a moderator. *Journal of Applied Psychology, 61*, pp. 41-47.

Brillhart, B. (2004). Technostress in the workplace: managing stress in the electronic workplace. *Journal of American Academy of Business*.

Brkich, M., Jeffs, D., & Carless, S. (2002). A global self-report measure of person-job fit. *European Journal of Psychological Assessment, 18*, pp. 43-51.

Brod, C. (1984). *Technostress: The human cost of computer revolution.* Boston, MA: Addison-Wesley.

Brynjolfsson, E., & Hitt, L. (1996). Productivity, profitability and consumer surplus: Three different measures of information technology value. *MIS Quarterly, 20*(2), pp. 121-142.

Burke, R. (1976). Occupational stress and job satisfaction. *Journal of Social Psychology*, pp. 235-244.

Burke, R. (1993). Organizational-level interventions to reduce occupational stressors. *Work and Stress, 7*, pp. 77-87.

Cable, D., & DeRue, D. (2002). The convergent and discriminant validity of subjective fit perceptions. *Journal of Applied Psychology, 87*, pp. 875-884.

Cartwright, S., & Cooper, C. (1997). *Managing workplace stress.* Thousand Oaks, CA: Sage.

Chilton, M., Hardgrave, B., & Armstrong, D. (2005). Person-Job Cognitive Style Fit for Software Developers: The Effect on Strain and Performance. *Journal of Management Information Systems, 22*(2), pp. 193-226.

Chisholm, R., Kasl, S., & Eskenazl, B. (1983). The nature and predictors of job related tension in a crisis situation: Reactions of nuclear workers to the Three Mile Island accident. *Academy of Management Journal, 26*, pp. 385-405.

Cooper, C. (1987). *he experience and management of stress: Job and organizational determinants.* New York, NY: Praeger.

Cooper, C., & Cartwright, S. (1994). Healthy mind, healthy organization: A proactive approach to occupational stress. *Human Relations, 47*, pp. 455-471.

Cooper, C., Dewe, P., & O'Driscoll, M. (2001). *Organizational Stress: A Review and Critique of Theory, Research, and Applications.* Thousand Oaks, CA: Sage.

Davis, A., & Gibson, L. (1994). Designing employee welfare provision. *Personnel Review, 23*(7), pp. 33-45.

DeMaagd, G. (1983). Management information systems. *Management Accounting, 65*(4), pp. 10-71.

DeTienne, K. (1993). Big brother or friendly coach. Computer monitoring in the 21st century. *The Futurist, 27*, pp. 33-37.

Don Santos, B., & Sussmann, L. (2000). Improving the return on IT investment: The productivity paradox. *International Journal of Infromation Management, 20*(6), pp. 429-431.

Edwards, J. (1991). Person-job fit: A conceptual integration, literature review, and methodological critique. *International Review of Industrial and Organizational Psychology, 6*, pp. 283-357.

Edwards, J. (1996). An Examination of Competing Versions of the Person-Environment Fit Approach to Stress. *Academy of Management Journal, 39*(2), pp. 292-339.

Edwards, J., & Cooper, C. (1988). Research in stress, coping and health: Theoretical and methodological issues. *Psychological Medicine, 18*, pp. 331-350.

Edwards, J., & Cooper, C. (1990). The person-environment fit approach to stress: Recurring problems and some suggested solutions. *Journal of Organizational Behavior, 10*, pp. 293-307.

Edwards, J., Cable, D., Williamson, I., Lambert, L., & Shipp, A. (2006). The Phenomenology of Fit: Linking the Person and Environment to the Subjective Experience of Person-Environment Fit. *Journal of Applied Psychology, 91*(4), pp. 802-827.

Fisher, W., & Wesolkowski, S. (1999). Tempering technostress. *IEEE Technology and Society Magazine, 18*(1), pp. 28-33.

French, J., Caplan, R., & Harrison, R. (1982). *The mechanisms of job stress and strain.* New York, NY: Wiley.

Frey, B. (1993). Does monitoring increase work effort. The rivalry with trust and loyalty. *Economic Inquiry, 31*, pp. 663-670.

Frone, M., Russell, M., & Cooper, C. (1992). Prevalence of work-family conflict: Are work and family boundaries asymmetrically permeable? *Journal of Organizational Behavior, 13*, pp. 723-729.

Garland, K., & Noyes, J. (2008). Computer attitude scales: How relevant today. *Computers in Human Behavior, 24*, pp. 563-575.

George, J. (1996). Computer-based monitoring: Common perceptions and empirical results. *MIS Quarterly*, pp. 459-480.

Heinssen, R., Glass, C., & Knight, L. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behaviour, 3*(1), pp. 49-59.

Hoffman, D., Novak, T., & Venkatesh, A. (2004). Has the Internet become indispensable? *Communications of the ACM, 47*(7), pp. 37-42.

Ibrahim, R., Bakar, A., & Nor, S. (2007). Technostress: A study among academic and non academic staff. *Proceedings of the 2007 International Conference on Ergonomics and Health Aspects o fWork with Computers*, (pp. 118-124).

Icancevich, J., & Matteson, M. (1980). *Stress and Work.* Glenview, IL: Scott, Foresman.

Jackson, S., & Schuler, R. (1985). A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work place. *Organizational Behavior and Human Decision Process, 1*(36), pp. 16-79.

Jenero, K., & Mapes-Riordan, L. (1992). Electronic monitoring of employees and the elusive right to privacy. *Employee Relations Law Journal, 18*, pp. 71-102.

Jex, S. (1998). *Stress and Job Performance. Theory, Research, and Implications for Managerial Practice.* Thousand Oaks, CA: Sage.

Jex, S., & Beehr, T. (1991). Emerging theoretical and methodological issues in the study of work-related stress. *Research in Personnel and Human Resources Management*(9), pp. 311-365.

Johansson, G., & Aronsson, G. (1984, July). Stress reactions in computerized administrative work. *Journal of Occupational Behavior, 5*(3), pp. 159-181.

Kahn, R., Wolfe, D., Quinn, R., & Snoek, J. (1981). *Organizational stress: Studies in Role Conflict and Ambuigity.* Malabar, FL: Krieger.

Kahn, R., Wolfe, D., Quinn, R., Snoek, J., & Rosenthal, R. (1964). *Organizational Stress: Studies in Role Conflict and Ambiguity.* New York: Wiley.

Kinman, G., & Jones, F. (2005). Lay representations of workplace stress: What do people really mean when they say they are stressed? *Work & Stress, 19*(2), pp. 101-120.

Korac-Kakabadse, N., Kouzmin, A., & Korac-Kakabadse, A. (2001). Emerging impacts of on-line connectivity. *The 9th European conference on information systems.* Bled, Slovenia.

Korunka, C. (1997). New information technologies, job profiles, and external workload as predictors of subjectively experienced stress and dissatisfaction at work. *International Journal of Human-Computer Interaction, 9*, pp. 407-424.

Korunka, C., & Vitouch, O. (1999). Effects of the implementation of information technology on employees' strain and job satisfaction: a context-dependent approach. *Work & Stress, 4*(34), pp. 341-363.

Kristof, A. (1996). Person-organization fit: An integrative reivew of its conceptualization, measurement, and implications. *Personnel Psychology, 49*, pp. 1-49.

Kudyba, S., & Diwan, R. (2002). The impact of information technology on U.S. industry. *Japan and the World Economy, 14*(3), pp. 321-333.

Lazarus, R. (1990). Theory-based stress measurement. *Psychological Inquiry, 1*, pp. 3-13.

McGrath, J. (1976). *Handbook of Industrial and Organizational Psychology.* Chicago: Rand McNally.

Millard, J. (1999). Insights from the ACTS and TAP Research Programmes. *The New Methods of Work Workshop.* Paris: The Fifth Framework Stream.

Narayanan, L., Menon, S., & Spector, P. (1999). Stress in workplace. A comparison of gender and occupations. *Journal of Organizational Behavior, 20*, pp. 63-74.

Nelson, D. (1990). Individual adjustment to information-driven technologies: A critical review. *MIS Quarterly, 14*(1), pp. 79-98.

Nunnaly, J. (1978). *Psychometric theory* (Vol. 2nd edition). New York: McGraw-Hill.

O'Connor, S. (1999). Dealing with information overload. *CAPCA Advisor Magazine*.

O'Driscoll, M. (1996). The interface between job and off-job roles: Enhancement and conflict. *International Review of Industrial and Organizational Psychology, 11*, pp. 276-306.

O'Driscoll, M., Ilgen, D., & Hildreth, K. (1992). Time devoted to job and off-job activities, interrole conflict and affective experiences. *Journal of Applied Psychology, 77*, pp. 272-279.

Parenti, C. (2001). Big brother's corporate cousin. *The Nation, 273*(5), pp. 26-31.

Rizzo, J., House, R., & Lirtzman, S. (1970). Role conflict and ambiguity on in complex organizations. *Administrative Science Quarterly, 15*, pp. 150-163.

Sami, L., & Pangannaiah, N. (2006). ''Technostress'' A literature survey on the effect of information technology on library users. *Library Review, 55*(7), pp. 429-439.

Sandblad, B. L., Gulliksen, J., Åborg, C., Boivie, I., Persson, J., Göransson, B., . . . Cajander, Å. (2003). Work environment and computer systems development. *Behaviour & IT, 22*(6), 375-387. Retrieved from http://dblp.uni-trier.de/db/journals/behaviourIT/behaviourIT22.html#SandbladGABPGKBC03

Schaubroeck, J., Cotton, J., & and Jennings, K. (1989). Antecedents and consequences of role stress: A covariance structure analysis. *Journal of Organizational Behavior, 10*, pp. 35-58.

Sellberg, C., & Susi, T. (2013, March 10). Technostress in the office: a distributed cognition perspective on human-technology interaction. *Cognition, Technology & Work, 16*(2), pp. 187-201.

Shu, Q., Tu, Q., & Wang, K. (2011). The Impact of Self-Efficacy and Technology Dependence on Computer-Related Technostress: A Social Cognitive Theory Perspective. *Journal of Human-Computer Interaction, 27*(10), pp. 923-939.

Smith, M., Carayon, P., Sanders, K., & LeGrande, D. (1992). Employee stress and health complaints in jobs with and without electronic performance monitoring. *Applied Ergonomics, 23*, pp. 17-27.

Sutton, R., & Rafaeli, A. (1987). Characteristics of work stations as potential occupational stressors. *Academy of Management Journal, 30*, pp. 260-276.

Tarafdar, M., Ragu-Nathan, B., Ragu-Nathan, T., & Tu, Q. (2005). Exploring the impact of technostress on productivity. *Proceedings of the 36th annual meeting of the decision sciences institute*.

Trafadar, M., Tu, Q., Ragu-Nathan, B., & Ragu-Nathan, T. (2007). The Impact of Technostress on Role Stress and Productivity. *Journal of Management Information Systems, 24*(1), pp. 301-328.

Trafadar, M., Tu, Q., Ragu-Nathan, T., & Ragu-Nathan, B. (2011, September). Crossing to the Dark Side: Examining Creators, Outcomes and Inhibitors of Technostress. *Communications of the ACM, 54*(9), pp. 113-120.

Wang, K., Shu, Q., & Tu, Q. (2008, September 17). Technostress under different organizational environments: An empirical investigation. *Computers in Human Behaviour, 24*(6), pp. 3002-3013.

Weil, M., & Rosen, L. (1997). *TechnoStress: Coping with technology @work @home @play*. New York, NY: Wiley.

Weil, M., & Rosen, L. (1999). Don't let technology enslave you: Learn how technostress can affect the habits of your employees and yourself. *Workforce, 78*(2), pp. 56-59.

Welford, A. (1973). Stress and Performance. *Ergonomics, 16*(5), pp. 567-580.

Wittbecker, A. E. (1986). New rules for new technology (abstract only): computer stress and human cost. In S. Richardson, & A. Ostiguy (Ed.), *SIGUCCS* (pp. 335-338). ACM. Retrieved from http://dblp.uni-trier.de/db/conf/siguccs/siguccs1986.html#Wittbecker86a

Yaverbaum, G. (1988). Critical factors in the user environment: An experimental study of users, organizations, and tasks. *MIS Quarterly, 12*(1), pp. 75-88.

Appendix 1. Correlations between factors

No			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
		Pearson Correlation	-											
1.	Techno Pressure	Sig. (2-tailed)												
		N												
		Pearson Correlation	,588**	-										
2.	Computer Hassles	Sig. (2-tailed)	,000											
		N	121											
		Pearson Correlation	,486**	,502**	-									
3.	Emotional aspects	Sig. (2-tailed)	,000	,000										
		N	121	121										
		Pearson Correlation	,559**	,606**	,695**	-								
4.	Psychological aspects	Sig. (2-tailed)	,000	,000	,000									
		N	121	121	121									
		Pearson Correlation	,341**	,374**	,480**	,581**	-							
5.	Behavioral aspects	Sig. (2-tailed)	,000	,000	,000	,000								
		N	121	121	121	121								
		Pearson Correlation	,662**	,475**	,466**	,609**	,476**	-						
6.	Creators of TS - overload	Sig. (2-tailed)	,000	,000	,000	,000	,000							
		N	121	121	121	121	121							
		Pearson Correlation	,424**	,345**	,400**	,362**	,240**	,373**	-					
7.	Creators of TS - invasion	Sig. (2-tailed)	,000	,000	,000	,000	,008	,000						
		N	121	121	121	121	121	121						
		Pearson Correlation	,451**	,337**	,354**	,420**	,236**	,464**	,650**	-				
8.	Creators of Technostress - complexity	Sig. (2-tailed)	,000	,000	,000	,000	,009	,000	,000					
		N	121	121	121	121	121	121	121					
		Pearson Correlation	,381**	,343**	,398**	,443**	,314**	,501**	,600**	,801**	-			
9.	Creators of TS - insecurity	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000				
		N	121	121	121	121	121	121	121	121				
		Pearson Correlation	,313**	,349**	,363**	,406**	,286**	,355**	,370**	,382**	,420**	-		
10.	Creators of TS - uncertainty	Sig. (2-tailed)	,000	,000	,000	,000	,001	,000	,000	,000	,000			
		N	121	121	121	121	121	121	121	121	121			
		Pearson Correlation	,419**	,255**	,352**	,310**	,275**	,447**	,259**	,295**	,334**	,578**	-	
11.	Creators of TS – technology aided productivity	Sig. (2-tailed)	,000	,005	,000	,001	,002	,000	,004	,001	,000	,000		
		N	121	121	121	121	121	121	121	121	121	121	121	
		Pearson Correlation	-,135	-,174	-,213*	-,226*	,078	-,124	-,270**	-,142	-,136	-,069	-,154	-
12.	Productivity	Sig. (2-tailed)	,139	,056	,019	,012	,397	,177	,003	,121	,136	,451	,092	
		N	121	121	121	121	121	121	121	121	121	121	121	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).