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Fit4WORK

SELF-MANAGEMENT OF PHYSICAL AND MENTAL FITNESS OF OLDER WORKERS



CO-FUNDED BY



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1. Introduction

Fit4Work aims at monitoring and improving healthy lifestyle of the elderly workers. To do that the developed system monitors the users' physical activity, mental stress and the ambient conditions at the workplace.

Fit4Work can be summarized as follows:

- It helps to improve occupational lifestyles through providing recommendations aimed at preserving health and increasing quality of work experience,
- It supports behavioural changes through focusing attention on the particular areas causing workplace strain and through helping to tackle these strain situations,
- It keeps older adults motivated and active thanks to increasing their overall quality of life,
- such solutions are not yet available on the market and present huge market opportunity.

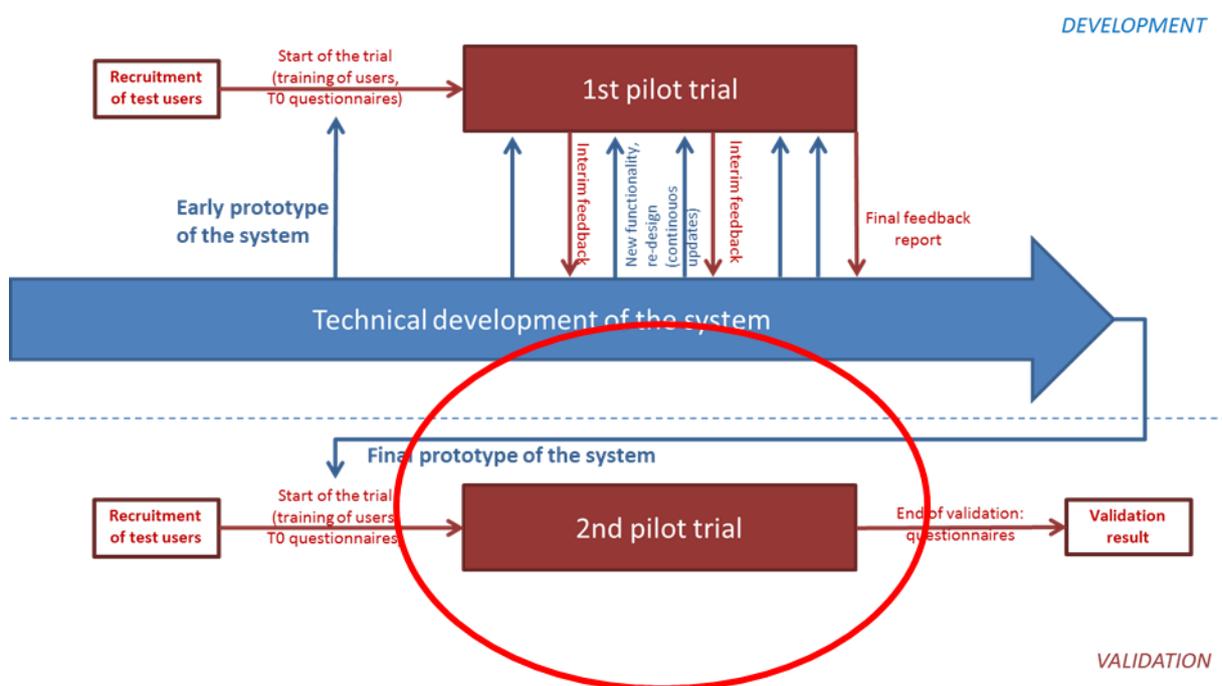


Figure 1.1 Process of development of Fit4Work including first and second pilot trials

The process of development of Fit4Work included two pilot trials (figure 1.1). This document describes the results of second pilot trial. During three months test users were using the final prototype of the system. In this document the results from the second pilot trial will be presented. The total amount of 18 participants, of which 10 in the Netherlands and 8 (two dropouts) in Poland, have used the system and provided feedback during the testing phase. The main focus of the second field trial was to test the effects of the system. This information is gained through questionnaires and physical tests at the start and in the end of the field trials. An addition was to gain general feedback by contact through email and by visiting the participants. On the

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beginning and in the end of the second pilot trial users quality of life, health-related fitness, mental stress and perceived ambient conditions were measured.

2. Material and methods

Two groups of users participated in the second pilot trial:

- 10 persons active professionally (6 women, 4 men) in The Netherlands (average age 59, range 49-72),
- 10 nurses (all women) in Poland (average age 57, range 54-60).

During the second pilot study, two persons in Poland resigned from participation in research due to health reasons, thus a total of 18 people completed the pilot study.

All participants were tested twice: at the beginning and after 3 months of using the Fit4Work system. Tests included measurements of health-related fitness, quality of life, physical activity, perceived stress and ambient conditions. The system usability scale was used at the end of the trials.

The average values and standard deviation were calculated for each variable. To determine the statistical significance of differences, the t-test for related data was used.

Health-related fitness

Health-related fitness (H-RF) was estimated by Senior Fitness Test [Rikli & Jones, 2001]. The Senior Fitness Test is used to evaluate physical function in healthy elderly people but is also used for people with dementia. It comprises six functional tests of muscular strength/endurance, aerobic endurance,, motor ability (power, speed/agility, balance) and flexibility (see Table 2.1). Each test is scored separately on different scales. The scores are not tallied into an overall score.

The Senior Fitness Test can be performed in people’s homes or in clinics and does not require costly tools or technical expertise.

Table 2.1 The health-related fitness parameters and the corresponding tests

Health-related fitness parameters	Senior Fitness Test
muscular strength/endurance (arm)	arm curl test
muscular strength/endurance (legs)	chair stand test
aerobic endurance	6-minute walk test
motor ability (power, speed/agility, balance)	8-foot up and go test
flexibility (lower body)	chair sit and reach test
flexibility (upper body)	back scratch test

The Senior Fitness Test is commonly used and described in the literature [Rikli & Jones, 2001], but for better understanding all tests are shortly presented below:

1. The arm curl test. This requires people to repeatedly lift a 5 lb (2.27 kg) weight (for women) or an 8 lb (3.63 kg) weight (for men) for 30 seconds. The number of lifts is recorded. This reflects upper body strength/endurance.
2. The chair stand test. This requires people to repeatedly stand up from and sit down on a chair for 30 seconds. The number of stands is recorded. This reflects lower body strength/endurance.
3. The 6-minute walk test. This is measured in distance (m) and reflects aerobic endurance.
4. The 8-foot (2.45 m) up and go test. This is measured in time (seconds) and reflects agility and dynamic balance.
5. The chair sit and reach test. This is measured in distance (cm) and reflects lower body flexibility.
6. The back scratch test. This is measured in distance (cm) and reflects upper body flexibility.

Quality of life

Quality of life was estimated by WHOQOL-BREF questionnaire [WHO, 1998]. The WHOQOL-BREF was derived from data collected using the WHOQOL-100. It produces scores for four domains related to quality of life: physical health, psychological, social relationships and environment. It also includes one facet on overall quality of life and general health (see deliverable D2.4 for details).

Physical activity

Physical activity was measured by short habitual physical activity questionnaire [Baecke, Burema & Frijters, 1982]. The evaluation of physical activity includes work, sport and leisure time physical activities. Additionally the sum of all physical activities was calculated (see deliverable 2.4 for details).

Perceived stress

The perceived stress scale (PSS) was created by Cohen, Kamarck & Mermelstein [1983]. PSS scale includes 10 questions and has a range of scores between 0 and 40. A higher score indicates more stress (see deliverable 2.4 for details).

Perceived ambient conditions

The estimation of perceived ambient conditions includes question related with perceived lighting, temperature, noise and air quality. Additionally the type of work related with physical effort was estimated. All used question are presented in appendix (see deliverable 2.4 for details).

System usability

The system usability scale that was used in this project is described by Brooke [1996] and shows to what extent users experience the system to be usable. The SUS consists of ten question with a range from 1 to 5. A higher score indicates a higher usability of the system (see deliverable 2.4 for details).

3. Results of the second pilot trial

3.1. Health-related fitness

The evaluation of health-related fitness components achieved by participants is presented in Table 3.1. Only in case of aerobic endurance (6-minute walk test) obtained results are below the range of norm (however it must be noted that such was the case also before the start of the pilot).

Table 3.1 Average values of health-related fitness components in comparison to range of norm

Health-related fitness component	Range of norm (25 – 75 percentile)	Average First research	Average Second research
muscular strength/endurance (arm)	13 --- 19	15,2	16,1
muscular strength/endurance (legs)	12 --- 17	13,5	14,1
aerobic endurance	545 --- 660	499	518
motor ability (power, speed/agility, balance)	6,0 --- 4,4	5,2	5,0
flexibility (lower body)	-0,5 --- 5,0	-0,1	1,3
flexibility (upper body)	-3,0 --- 1,5	-0,4	0,0

The comparison of health-related fitness results are presented in Figures 3.1 - 3.6. In all tests participants achieved better results in the second measurement, but only in case of aerobic endurance the difference is statistically significant ($p < 0,001$).

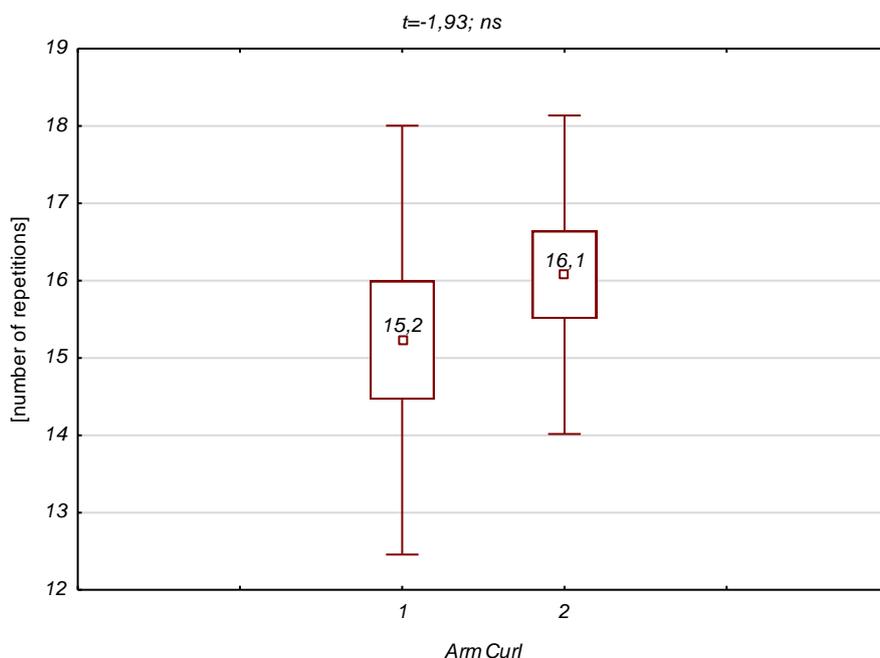


Figure 3.1 Average values of arm curl test (muscular strength/endurance - arm) on the beginning and in the end of second pilot trial

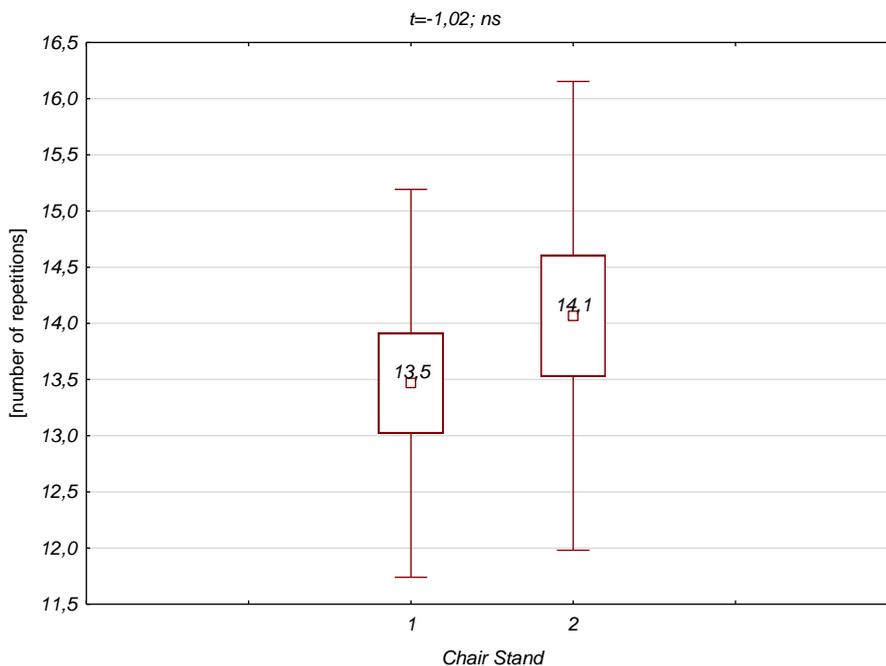


Figure 3.2 Average values of chair stand test (muscular strength/endurance - legs) on the beginning and in the end of second pilot trial

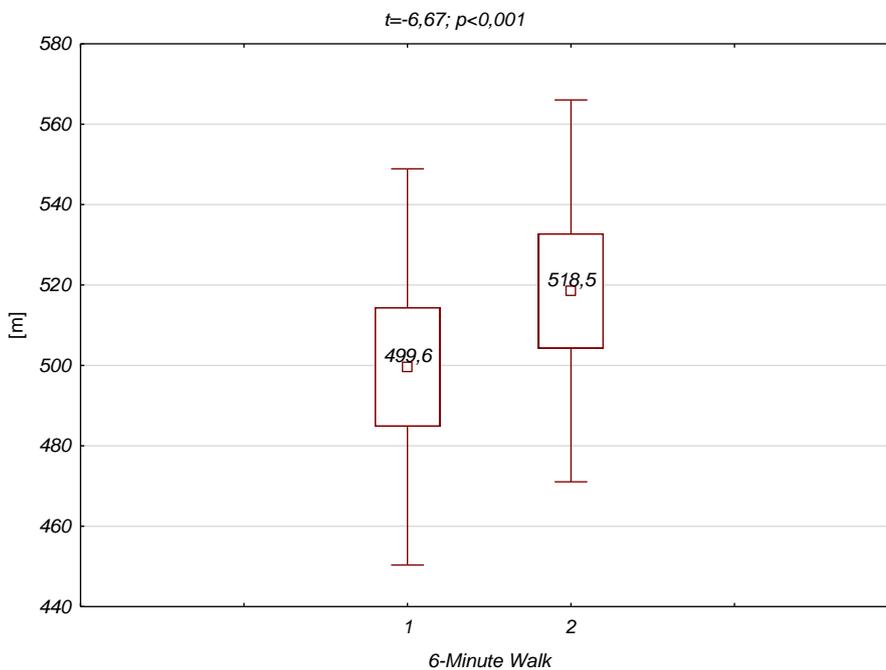


Figure 3.3 Average values of 6-minute walk test (aerobic endurance) on the beginning and in the end of second pilot trial

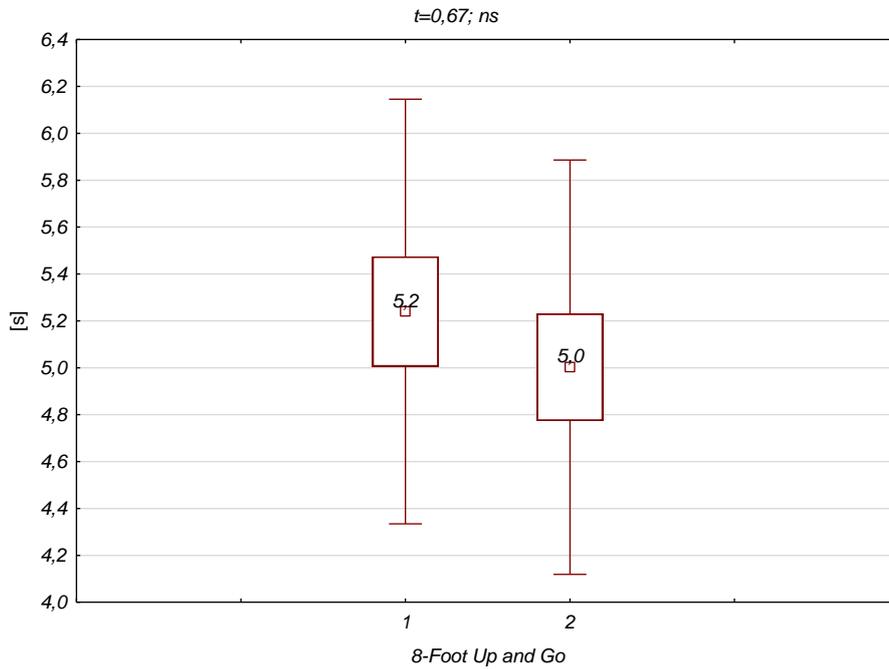


Figure 3.4 Average values of 8-foot up and go test (motor ability - power, speed/agility, balance) on the beginning and in the end of second pilot trial

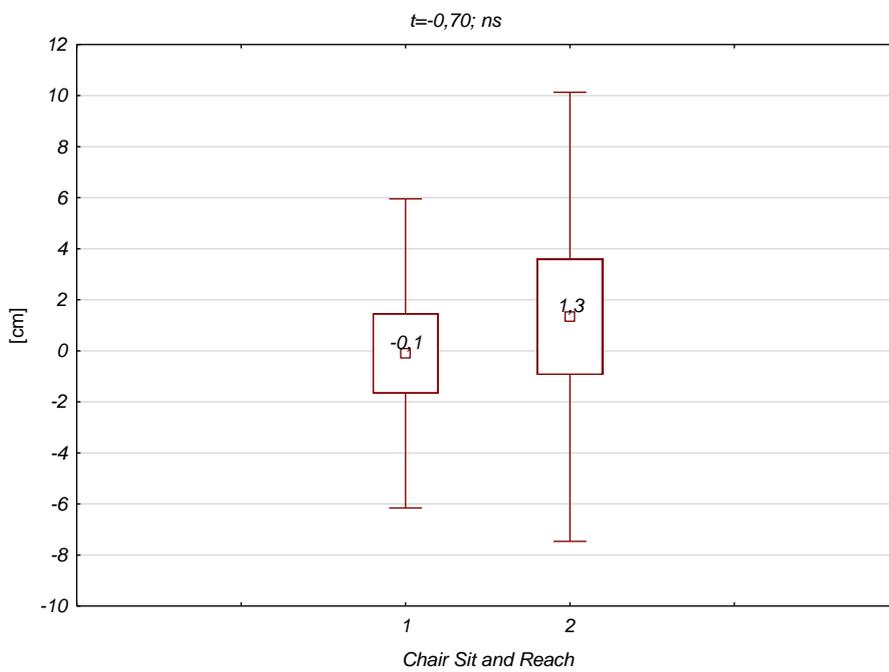


Figure 3.5 Average values of chair sit and reach test (flexibility - lower body) on the beginning and in the end of second pilot trial

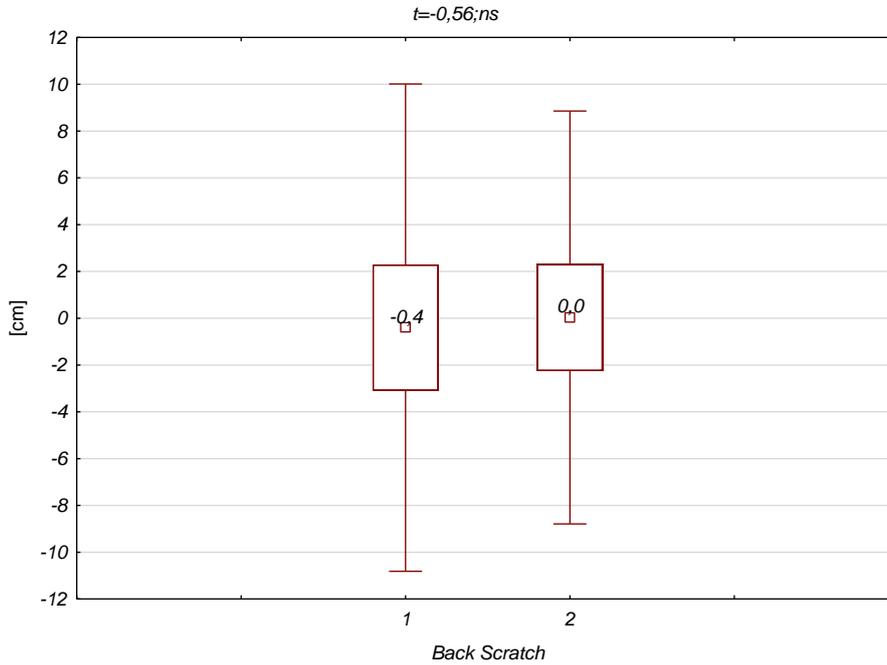


Figure 3.6 Average values of back scratch test (flexibility - upper body) on the beginning and in the end of second pilot trial

3.2. Quality of life

The comparison of quality of life results are presented in Figures 3.7 – 3.12. Participants perceived their quality of life slightly worse in most domains (except the perceived health) in the second measurement, but only in case of physical health ($p < 0,05$) the difference is statistically significant. The interpretation of that might be difficult to perform, due to the fact that the pilot took place during time where poor illumination indoors has negative effect of quality of life. This negative effect has been proven to equal the positive gain of regular physical exercise at the intensity of fitness training (Partonen 2010), which was not the case for the pilot study participants (i.e. their amount of physical activity was less than that of a regular fitness training).

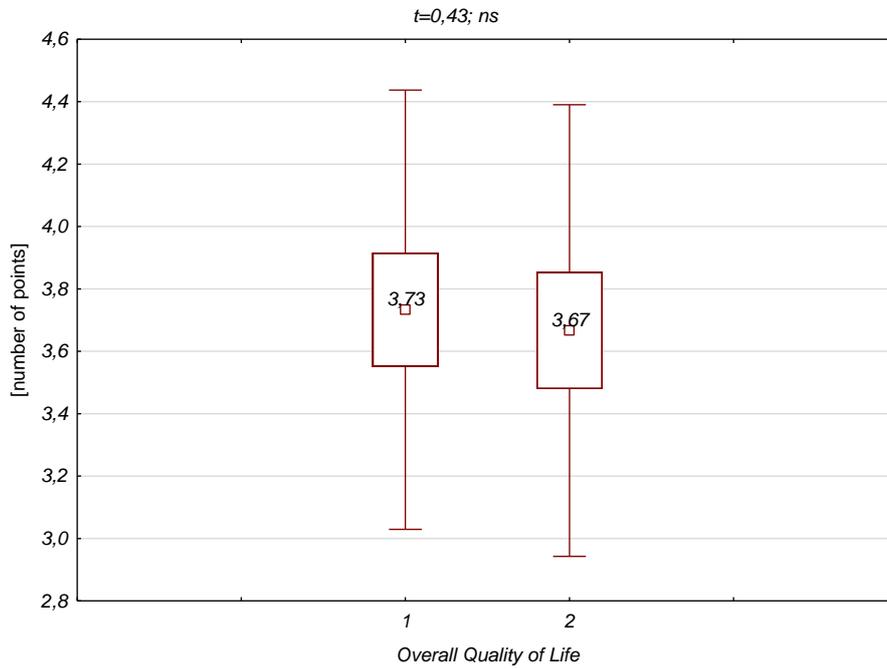


Figure 3.7 Average values of overall quality of life on the beginning and in the end of second pilot trial

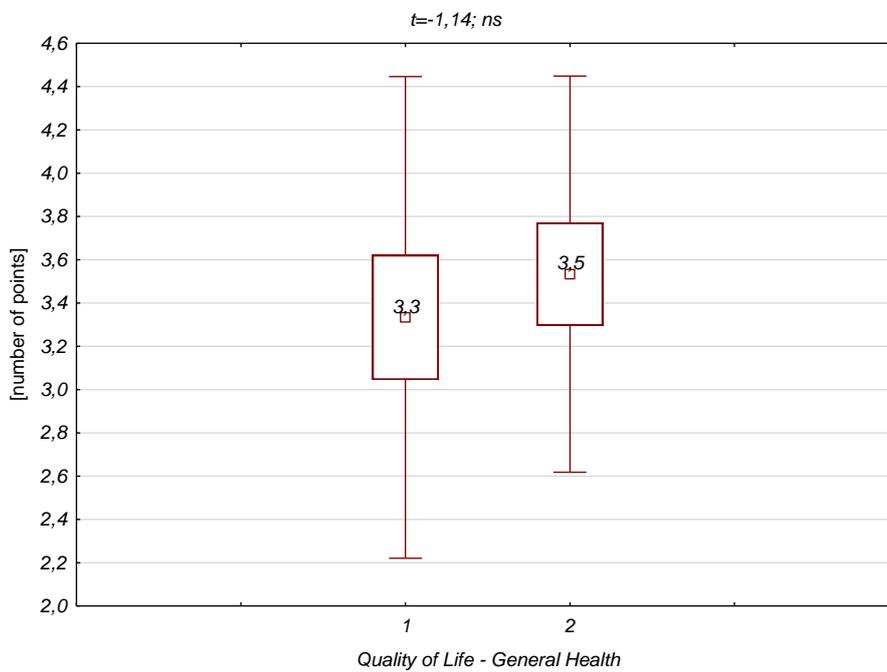


Figure 3.8 Average values of general health (quality of life variable) on the beginning and in the end of second pilot trial

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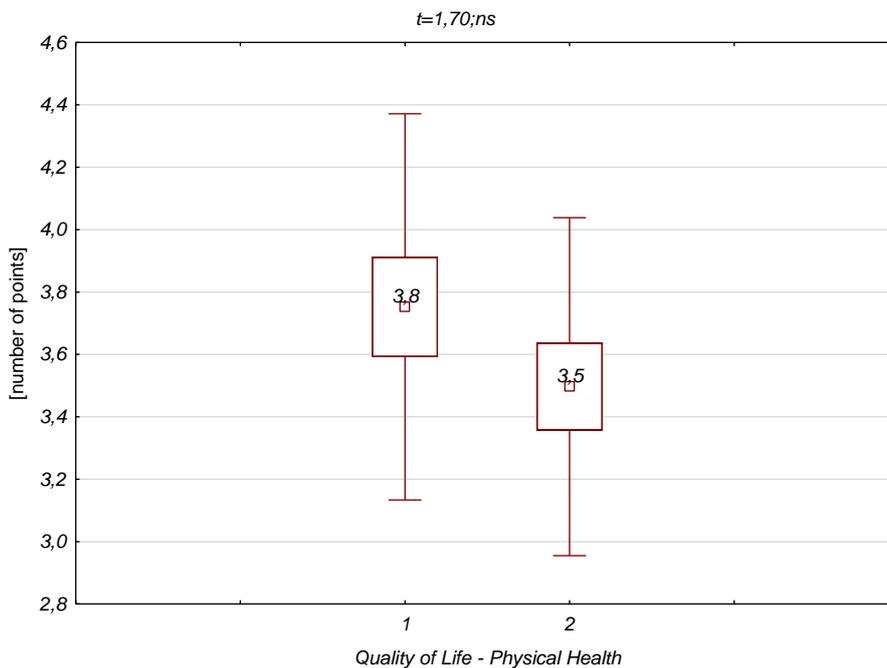


Figure 3.9 Average values of perceived physical health (quality of life domain) on the beginning and in the end of second pilot trial

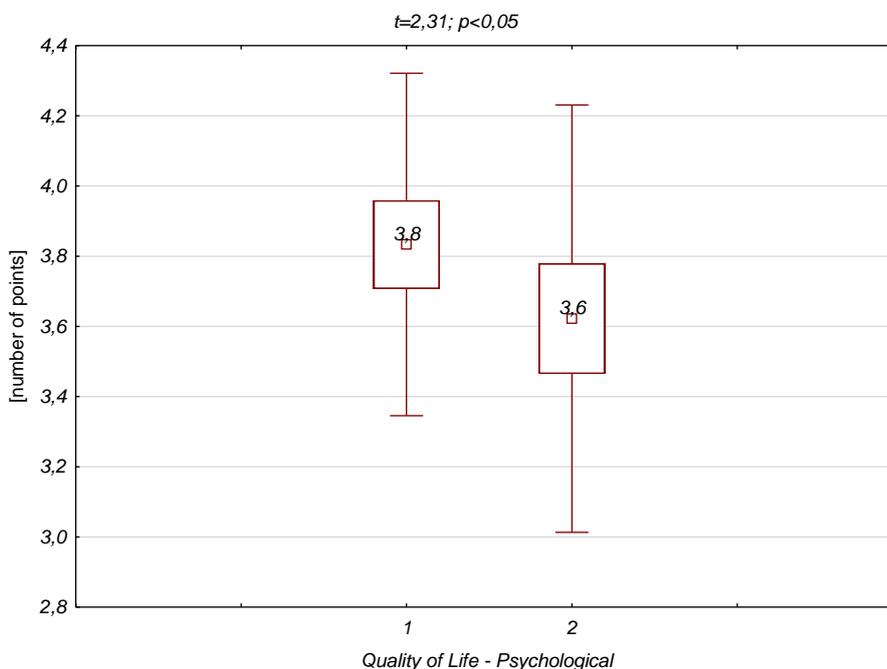


Figure 3.10 Average values of perceived psychological domain (quality of life) on the beginning and in the end of second pilot trial

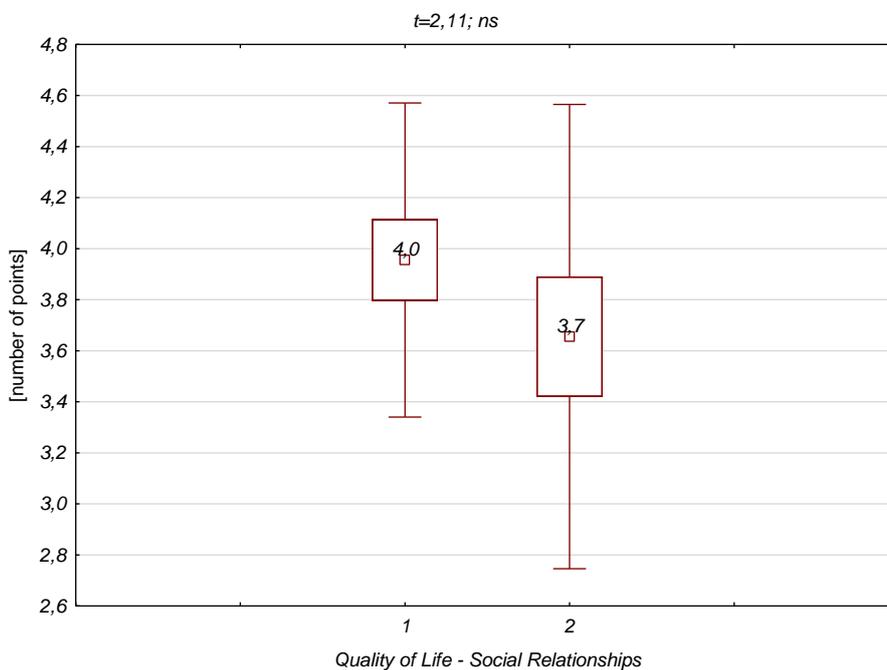


Figure 3.11 Average values of social relationships (quality of life domain) on the beginning and in the end of second pilot trial

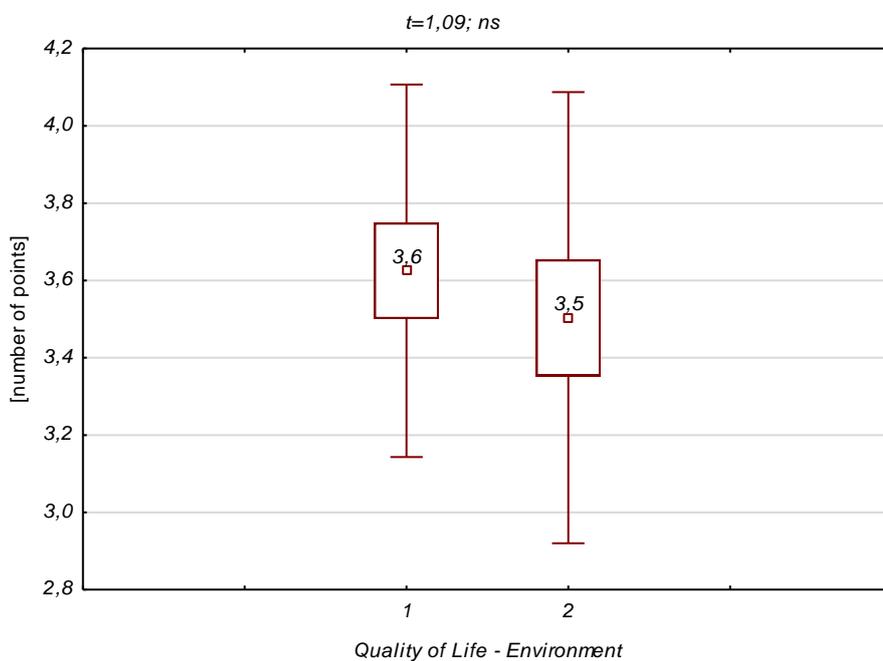


Figure 3.12 Average values of environment domain (quality of life) on the beginning and in the end of second pilot trial

3.3. Physical activity

The comparison of physical activity results are presented in Figures 3.13 – 3.16. Slightly higher level of physical activity can be observed in the second measurement, but all differences are not statistically significant.

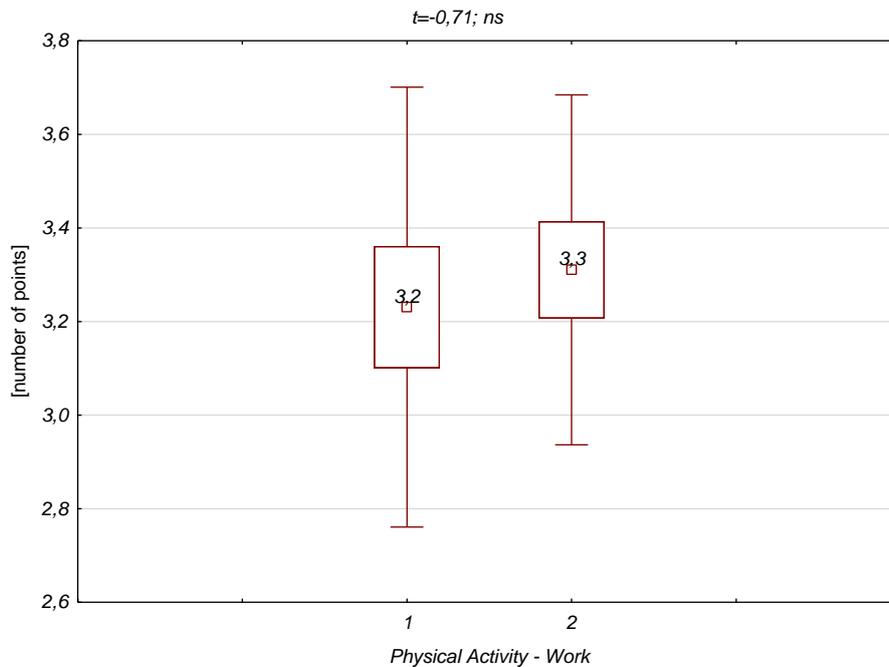


Figure 3.13 Average values of physical activity in work on the beginning and in the end of second pilot trial

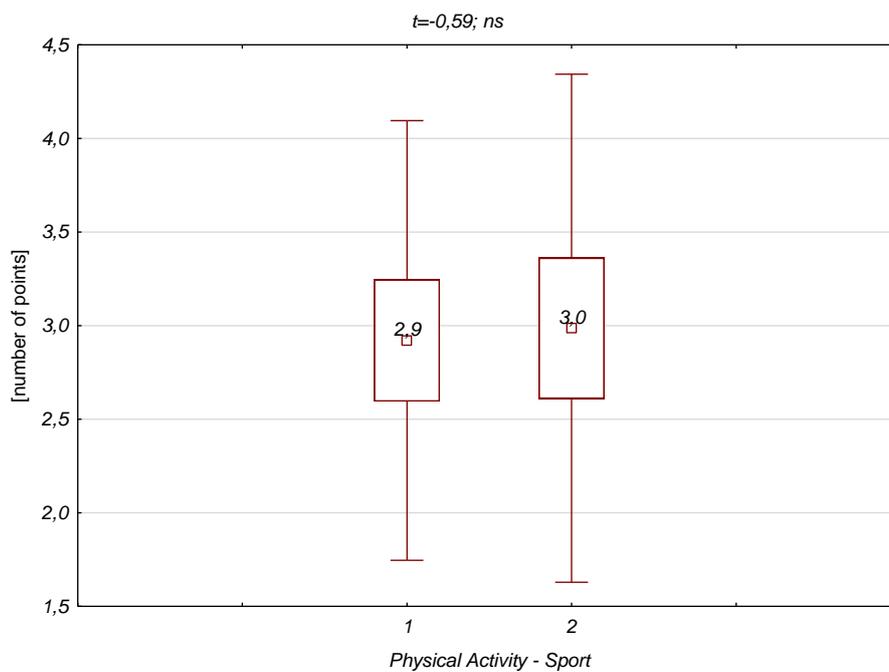


Figure 3.14 Average values of sport physical activity on the beginning and in the end of second pilot trial

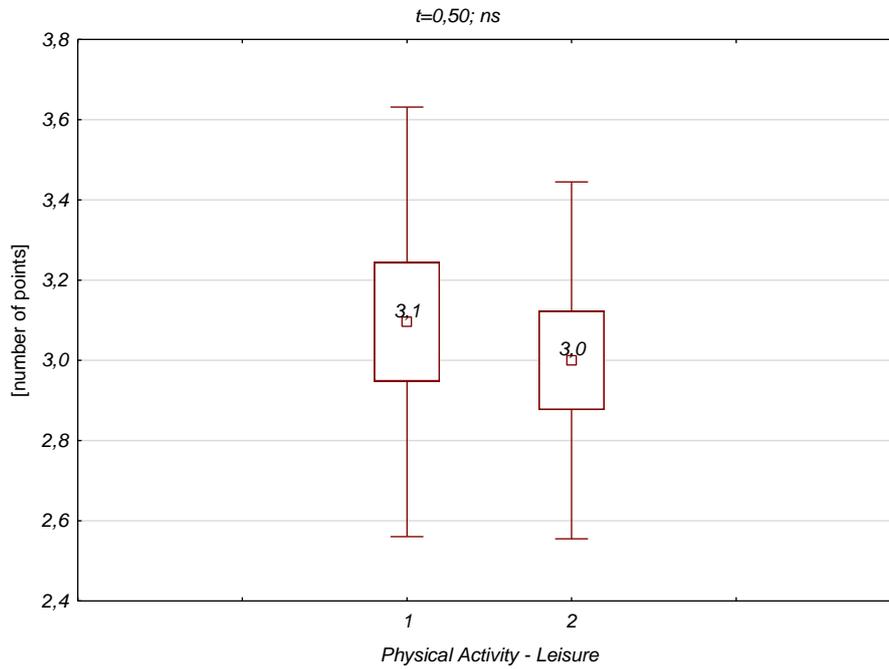


Figure 3.15 Average values of leisure physical activity on the beginning and in the end of second pilot trial

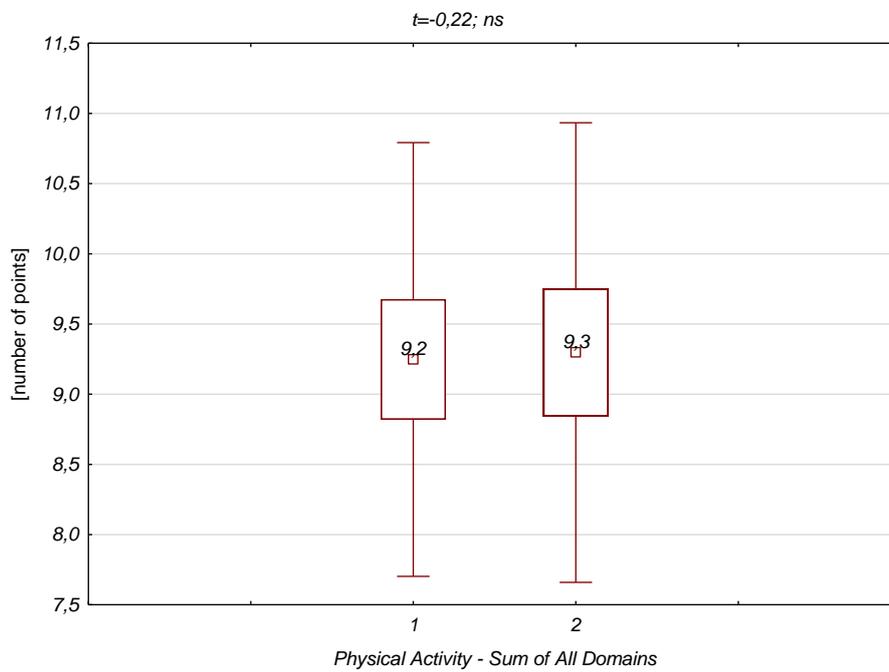


Figure 3.16 Average values of the sum of all physical activity domains on the beginning and in the end of second pilot trial

3.4. Perceived stress

The comparison of perceived stress results is presented in Figure 3.17. Both values are similar and the difference is not statistically significant.

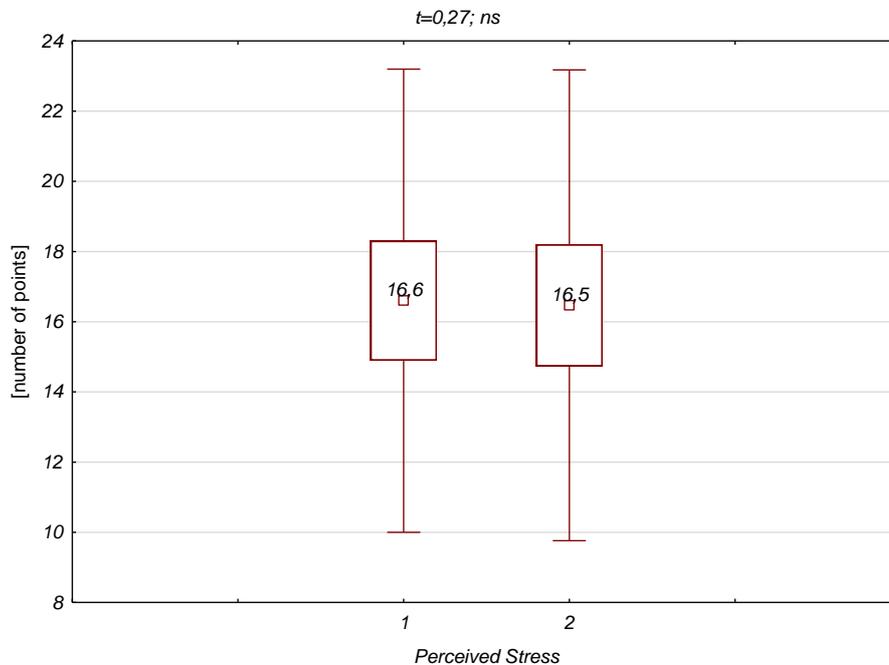


Figure 3.17 Average values of perceived stress on the beginning and in the end of second pilot trial

3.5. Perceived ambient conditions

The comparison of perceived ambient conditions is presented in Figures 3.18 – 3.22. Very small differences can be observed between first and the second measurement. All differences are not statistically significant.

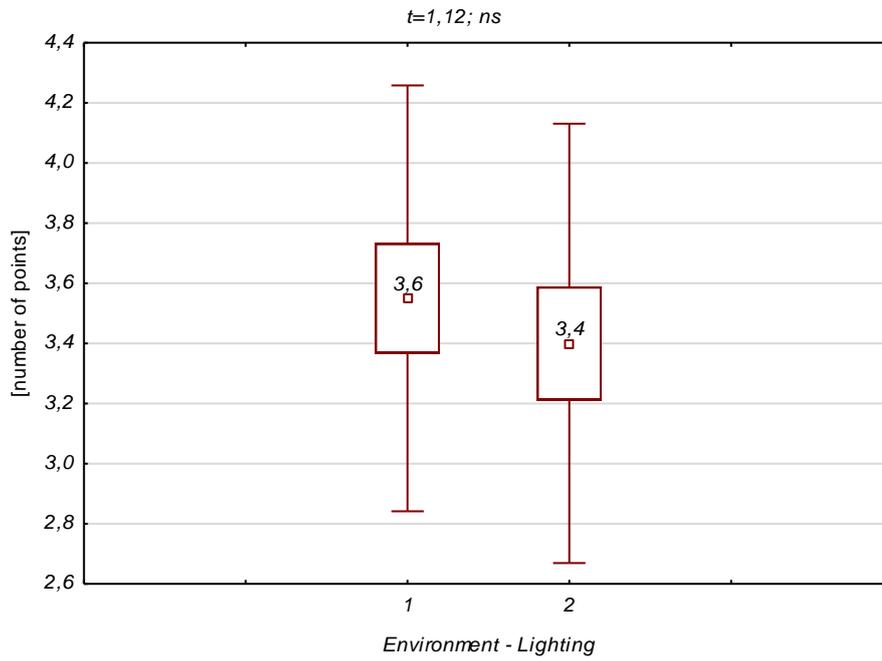


Figure 3.18 Average values of perceived lighting conditions at work (environment domain) on the beginning and in the end of second pilot trial

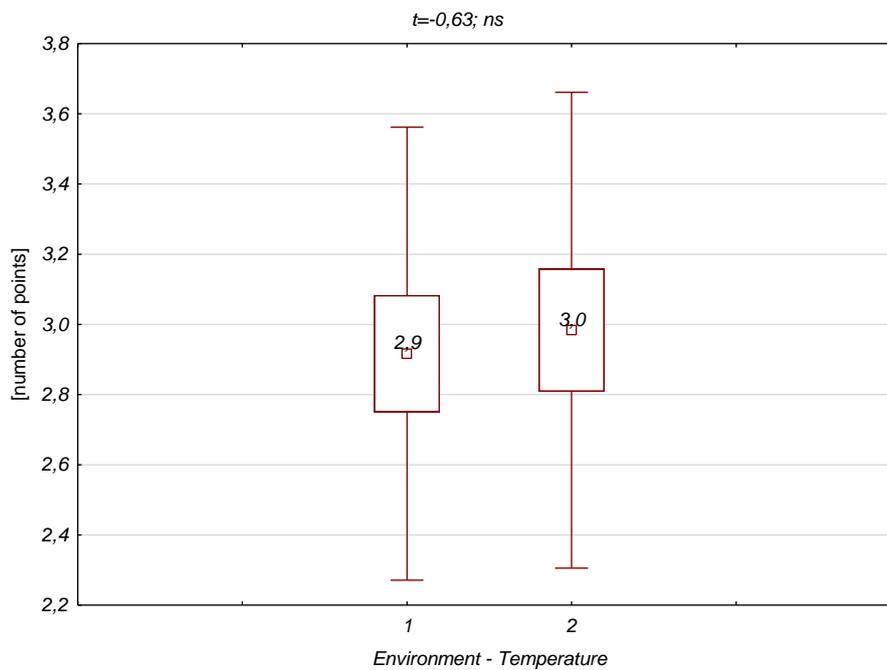


Figure 3.19 Average values of perceived temperature at work (environment domain) on the beginning and in the end of second pilot trial

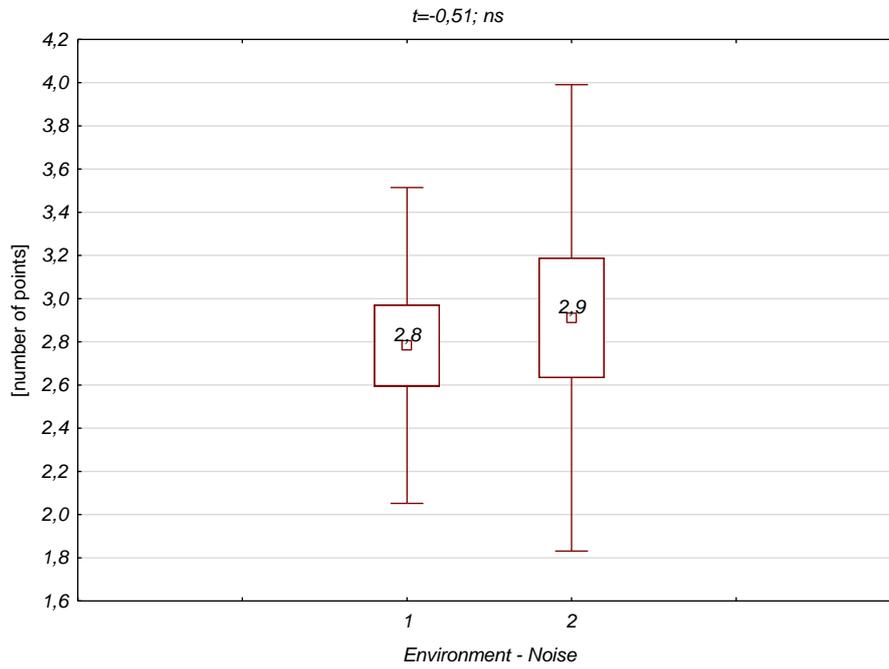


Figure 3.20 Average values of perceived noise at work (environment domain) on the beginning and in the end of second pilot trial

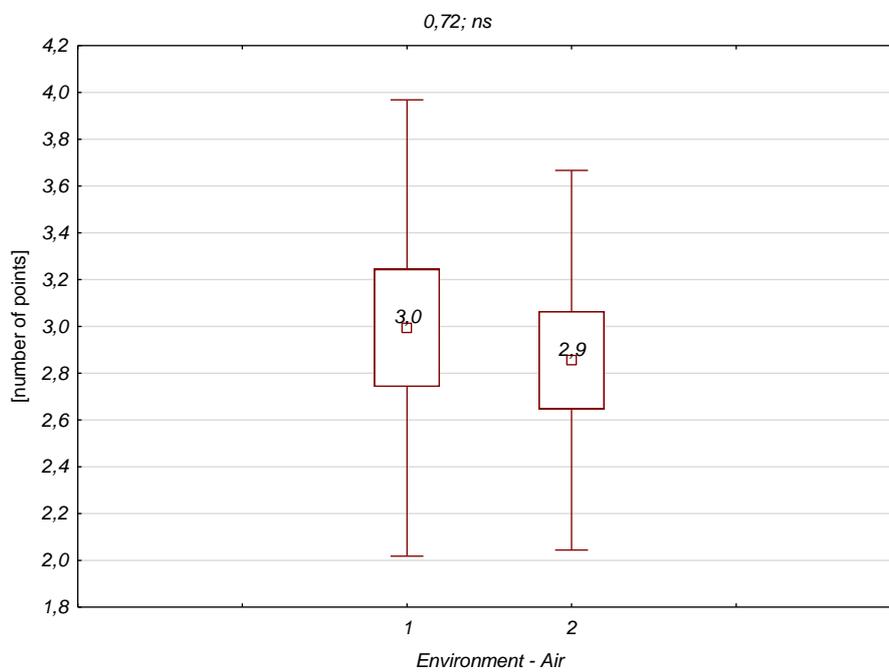


Figure 3.21 Average values of perceived air quality at work (environment domain) on the beginning and in the end of second pilot trial

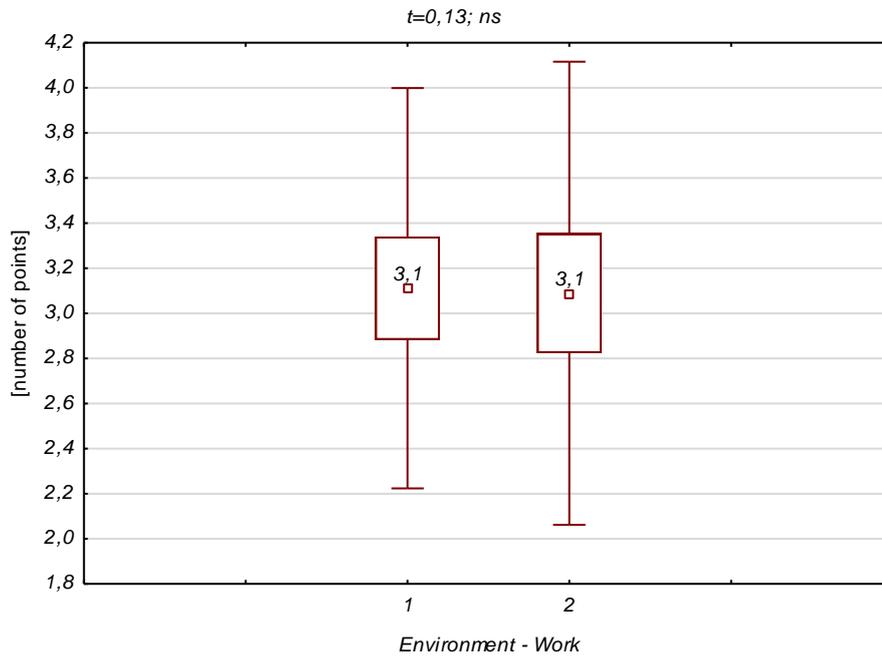


Figure 3.22 Average values of perceived physical effort related with work (environment domain) on the beginning and in the end of second pilot trial

3.6. System usability

The data of the system usability scale (SUS) indicated with an average score of 37 out of 50 a good score on the usability of the Fit4Work system (range 30 – 45). This outcome is supported by feedback gained through qualitative data from the participants. To summarize the main points, participants mentioned in the collected feedback that the idea of the system is good, that the design is attractive and that the system could be used in the daily life of an employee. The SUS shows two items with an average score of 4: *'I found the system to be simple'* and *'I would imagine that most people would learn to use the system very quickly'*. These show that the system is perceived as easy and clear to use, what also a valuable result is in this field trial.

4. Discussion and conclusion

In the summary of the obtained results it should be noted that the variables evaluated are complex properties, and their level is determined by many factors. In the global assessment of the obtained test results, no comprehensive changes of the tested properties were observed during the pilot use of the Fit4Work system. The relatively short duration of the second pilot study (three months) could also be a factor that could have a significant impact on the results. It is highly probable that a longer time of experiment would cause major changes in the measured parameters.

Regardless of the above-mentioned doubts, the benefits of using the Fit4Work system should be seen in improving health-related fitness and increasing physical activity, which in the long-term should also contribute to improving the quality of life. What is important in the discussion of these results is the fact that the primary objective of the Fit4Work system is to support its users in keeping up the good health (i.e. keep the users fit for continuing the work). Therefore, the results which do not show any negative effects on health, should be seen as positive and confirming that the system does (or has potential to) help.

Another important outcome of the pilots was that the participants were overall surprised of the system, its functionalities and that the system can easily be used in the everyday life of employees. Moreover, participants indicated that the awareness of physical and mental health was being stimulated once the system was used every day during the field trial. This could be another important causal relationship, meaning that the system stimulates awareness which results into a healthier lifestyle. The acceptance of the system plays an important role in this relationship, because the participants pointed out that having a system that works and makes sense, stimulates using it.

5. Bibliography

Baecke J.A.H, Burema J., Frijters J.E.R. (1982). A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *The American Journal of Clinical Nutrition*, 36:936-942

Brooke, J.. (1996) SUS: A Quick and Dirty Usability Scale. In P.W. Jordan, B. Thomas, B.A. Weerdmeester and I.L. McClelland (Eds.), *Usability Evaluation in Industry*. London: Taylor & Francis, 1996, pp. 189–194.

Cohen S., Kamarck T., Mermelstein R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24: 385-396

Partonen T. (2010). The habitat. In Partonen T. and Pandi-Perumal S. R. (Eds.), *Seasonal Affective Disorder: Practice and Research*. Oxford: Oxford University Press, 2010, pp. 331-338.

Rikli R.E., Jones C.J. (2001). *Senior fitness test manual*. Human Kinetics