

# PUBLICATION

Edited  
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**TWELVETH INTERNATIONAL CONFERENCE  
ON COMBINED ACTIONS AND COMBINED EFFECTS OF  
ENVIRONMENTAL FACTORS  
ICCEF 2009**

International Thematic Expert Meeting in the Field of Work Life Ability

Organized by  
*The Promotion of Work Life Ability - Networks*  
Under The Auspices of The  
*International Society for*  
*Complex Environmental Studies (ISCES)*  
*Hakusan, Japan*  
September 9-11, 2009

**Archives of Complex Environmental Studies(ACES) 16:1-2: 2010**  
<http://iccef2009.viii/>

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## Opening Address

Dear Ladies and Gentlemen,

It is my great pleasure to welcome you to the ICCEF 2009 Conference. The conference held in Hakusan City. ICCEF has been networking the environmental, toxicological and public health societies throughout the world and organizing many global activities, such as international conferences, publications of Archives of Environmental Complex Studies. The World Conference is the biggest periodical event of ICCEF to integrate its international activities. The effect of human activity on the health is increasing with the dawning of the 21st century. In this century, it will be a big challenge for us to suggest new technologies and life styles which will suit the environment better.

The meaning of ubiquity is that human beings have opportunities to get information anytime and anywhere. Radio technology and information and communication technology (ICT) support ubiquity and they are utilized in developmental activities, life of people, work style, industrial organizations, micro and macroeconomics, and cultures.

We recognize that the invisible and silent (tacit) knowledge is one of the significant environmental factors. A new physiotherapy using a most sophisticated information communication technology and self-monitoring services together with tacit knowledge is enhancing ubiquity for healthy life creation. In addition, the support technology and scientific thinking are advancing developmental activities rapidly. This kind of new information services relates developments the encourage patients and workers themselves to talk, to hear, to see about their experiences through internet on demand. ICCEF 2009 Conference will discuss about verification of these Human Centered Design and Model developmental findings. We challenge these new themes.

Akira Kimura

Chairman of The ICCEF 2009 Conference

## ICCEF History

On 22-25 September 1984 The First International Conference on Combined Effects of Environmental Factors was held in Tampere, Finland. It was my deep wish and great honor to act as convener of conference. The idea to create a warm, stimulating international forum for regular contacts between researchers like this had grew up in my mind for years.

During the last day of the conference, on 25 September 1984, a new international scientific organization was established to further research on the complex combined effects of environmental factors and to ensure continuing contact between researchers working in this field. The International Society for Complex Environmental Studies – ISCES society – came out. Consequently, the very first ICCEF Conference marked the beginning of a new international cooperation. Since those days whole bunch of international scientific events have been arranged. The next ever remembering meetings were held in Kanazawa (Japan) in 1986, in 1988 in Tampere, in 1990 in Baltimore (USA), in 1992 in Saariselkä (Finnish Lapland), in 1994 in Toyama (Japan), in 1996 in Tampere, in 1998 in Baden (Wien, Austria), in 2000 in Savonlinna (Finland) and in 2002 in Takatsuki (Japan), in 2004 in kanazawa (Japan), in 2007 in Tampere (Finland).

Olavi Manninen  
President of The International ISCES-Society

# The Effect of Self-Predictive Information and Physical Activity on HbA1c Levels in Elderly People in Longevity Area: Nagano JAPAN

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## ABSTRACT

**OBJECTIVE:** We sought to investigate whether self-predictive information (PI) together with adequate physical activity is more effective than educational advice provided by professionals on HbA1c levels in elderly people: Nagano, Japan.

**METHODS:** This interventional cohort study included 25 men and 17 women (age,  $65 \pm 4$  years, body weight,  $56.8 \pm 4.1$  kg). The participants were recruited during a local health examination. Fifteen of the participants were diagnosed with diabetes mellitus. The participants were divided into 2 groups: conventional alerts group (CG) and predictive alerts group (PG). Members of the CG group were attended to by 3 public health nurses once every 3 months who advised them regarding exercise. Members of the PG group received PI regarding the amount of PA (PIPA) from a three dimensional accelerometer and wearable computer with human-centered-design based, which used a new developmental algorithm that combined the position and the intensity of perception every week. Paired t tests were used to compare HbA1c levels between baseline and post 1 year.

**RESULT:** In the PG group, those with abnormal levels of HbA1c showed significant changes, with a baseline level of  $6.0 \pm 0.1\%$  and a level after 1 year of  $5.8 \pm 0.1\%$  ( $p = 0.029$ , 95% confidence interval 0.03996–0.49337). In the CG-group, no significant change was observed. ANOVA showed that the combination of gender and PIPA had a significant effect on decreasing HbA1c levels.

**CONCLUSIONS:** PI about physical activity positively contributed to controlling the factors related to HbA1c levels rather than to HbA1c level itself.

**Keywords :** gender-glycohemoglobin-longevity-physical activity-human centered design

## INTRODUCTION

The elderly population is increasing worldwide, and the care of this population is an important social concern. Hence, it is necessary to develop an effective, basic healthcare system for the elderly. Both optimal nutrition and adequate physical activity (PA) are vital for general well-being. There has been progress in the promotion of nutrition education, but education regarding PA has not received adequate attention. The aim of our study was to determine whether self-predictive information (PI) along with adequate PA is better than educational advice provided by professionals on HbA1c levels in elderly people in the highest longevity area: Nagano, Japan.

## METHODS

The study group in this interventional cohort study comprised 45 local senior citizens (25 men and 17 women) in the Highest Longevity Region : Nagano in Japan recruited with the help of posters displayed in the neighborhood. The aim of the intervention was to provide participants with information that would enable them to predict the amount of PA over the course of a year.

The mean (SD) age of the subjects was 65 (4) years, and the mean (SD) body weight was 56.8 (4.1) kg. These participants were recruited during a local health examination. Fifteen of the participants had diabetes mellitus, and 30 of them had no diseases. Both oral and written informed consent was obtained for participation in this study.

A target for PA was set after the participants were educated in the concept of NEAT (Non-exercise Activity Thermogenesis) and had the ability to calculate the quantity of PA by themselves. The participants were divided into 2 groups (conventional alerts group [CG] and predictive alerts group [PG]). Members of the CG group were attended to by a public health nurse once every 3 months and received advice regarding exercise. Members of the PG group were not given any such advice. However, they received information regarding PIPA from a three-dimensional accelerometer and wearable computer. The results of energy use and position, intensity, and duration were collected every week, and PI about the amount of physical activity (PIPA) was used to develop a new algorithm that combined the position and the intensity of perception every week.

Predictive alerts teach participants to predict decreases and increases in their PA as follows: sitting for over 4 hours decreases the PA level; standing for less than 2 hours decreases the PA level; and lying for over 8 hours decreases the PA level (Fig. 1).

$$\text{PIPA} = A \times \sum_{i=1}^{1440} (\text{EPI} \times \text{BW})_i$$

EPI = Energy consumption coefficient selected from Table

BW = Body weight (kg)

i = Duration of physical activity (min)

A = Modification coefficients by age and gender

	Low	Moderate	High
<b>Lying</b>	0.017	0.023	0.026
<b>Sitting</b>	0.027	0.055	0.062
<b>Standing</b>	0.045	0.059	0.097

Fig. 1: Equation for the estimation of physical activity (PA) by Intensity in Physical Activity (PIPA), devised by Dr. Akira Kimura in Japan. PIPA measures physical activity based on the energy expenditure coefficient in 9 lattices categorised into 3 postures (lying, sitting and standing) and 3 levels of exercise intensity (low, moderate and high).

The coefficient of energy consumption for any movement should fall under the ninth category. The PIPA score, expressed in kcal, represents the cumulative data for 24 hours multiplied by participant's coefficients and body weight, and the duration of motion during each activity.

The participants self-measured the quantity of PA every 3 months. In CG and PG which underwent education to follow the quantity of physical activity by oneself measured PA. An expert pointed out deviations from the targeted PA actually used attitude and soporiferous presence and question paper we stopped, and to hear a the participant's condition symptom at the time PIPA (Fig.1)

Movement of breath was measured by an erasable computer, and the PA was measured by use of a three-dimensional acceleration sensor.

The three-dimensional sensor obtained information about acceleration and used the values to estimate the type of acceleration, the cause of acceleration, and divide into

with a car and external disarray vibration than cycles per minute, takeaway information from those noisy data to human body motion's acceleration using by furrier frequency transform algorithm...

In addition, we said that anyone could determine equal energy utility after having dismantled action not what demanded an approximate value from the thing which calculated the energy utility that the question paper was similar in an actual value every conventional action item by attitude common to all action items and a matrix of exercise intensity.

All participants were shown how to use the apparatuses for 3 hours; they were also shown how to calculate the data.

We used statistical methods such as paired t tests to determine the effect of each factors on HbA1c level at baseline and after 1 year. We performed a factor analysis for information type (CG, PG) and risk of onset (knowledge of normal HbA1c, abnormal HbA1c). Logistic regression analysis was performed for each factor (information type, gender, age, PIPA, final HbA1c levels with an outcome of normal or abnormal).

Statistical analysis was performed using a paired t test for each of the factors on HbA1c between baseline and 1 year. Analysis of variance (ANOVA) was performed according to group (CG or PG), and the risk of onset (determined by the level of HbA1c) was determined by use of SPSS v16.0.

## RESULTS

In the PG group, among those with abnormal levels of HbA1c, the HbA1c value changed significantly, from a baseline level of 6.0 (0.1) % to 5.8 (0.1) % after 1 year (paired t test,  $p = 0.029$ ; 95% confidence interval [CI] 0.03996–0.49337). Among participants with normal levels of HbA1c, there was no significant change in the value of HbA1c (Fig. 2).

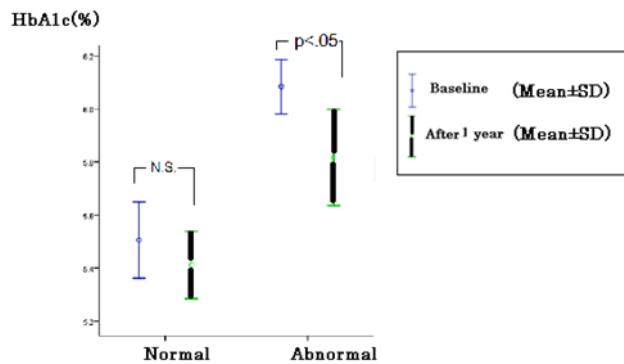


Fig. 2: The HbA1c levels at baseline and after 1 year in the PG group. There was a significant change in the HbA1c levels between baseline and after 1 year (paired t test,  $p = 0.006$ ). The 95% confidence interval of the difference in the PG group was 0.0435 to 0.235.

In the CG group, among participants with normal HbA1c, there was no significant change in the value of HbA1c (Fig. 3).

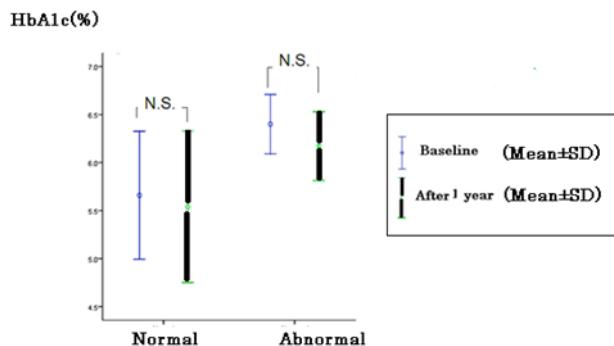


Fig. 3: The HbA1c levels at baseline and after 1 year in the CG group. In the CG participants with normal HbA1c levels, there was no significant change in the HbA1c levels. In those with abnormal HbA1c levels, there was a significant change.

Among those with abnormal HbA1c levels, there was no significant change in normal range of HbA1c, too.

Factor analysis showed a significant coefficient value of interactive effect on HbA1c between information type and gender (F test,  $p = 0.012$ ). There was no significant value

of information type and risk of onset, and gender and risk of onset.

In the PG group among both the normal and abnormal groups, there were significant changes in the value of HbA1c between baseline and 1 year (paired t test,  $p = 0.006$ ). The 95% CI of the difference in the PG group was 0.0435–0.235.

Among the PG participants with normal HbA1c levels, there was no significant change in HbA1c levels between baseline ( $5.5 \pm 0.2\%$ ) and after 1 year ( $5.4 \pm 0.2\%$ ), as determined by paired t test ( $p = 0.084$ ). The 95% CI for the difference in the PG group was  $-0.01415$  to  $0.20238$ . Among the PG participants with abnormal HbA1c levels, there was significant change in HbA1c levels between baseline ( $6.0\%$ , SD  $0.1\%$ ) and after 1 year ( $5.8\%$ , SD  $0.1\%$ ), as determined by paired t tests ( $p = 0.029$ ). The 95% CI of the difference in the PG group was  $0.03996$  to  $0.49337$ .

Among participants in the CG group with both normal and abnormal levels, there was no significant change in HbA1c level between baseline and after 1 year (paired t test,  $p = 0.058$ ). The 95% CI of the difference in this group was  $-0.00762$  to  $0.40762$ . Among the participants in this group with normal levels, there were significant changes in HbA1c levels between baseline ( $5.6 \pm 0.5\%$ ) and 1 year ( $5.5 \pm 0.6\%$ ) (paired t test,  $p = 0.438$ ). The 95% CI of the difference in the CG group was  $-0.26671$  to  $0.50671$ . Among the CG participants with abnormal levels, there were significant changes in the HbA1c levels between baseline ( $6.4 \pm 0.5\%$ ) and after 1 year ( $6.1 \pm 0.6\%$ ) (paired t test,  $p = 0.094$ ). The 95% CI of the difference in this group was  $-0.04454$  to  $0.50168$ .

The factor analysis showed significant coefficient values for interaction effects on HbA1c for information type and gender (F test,  $p = 0.012$ ) (Fig. 4).

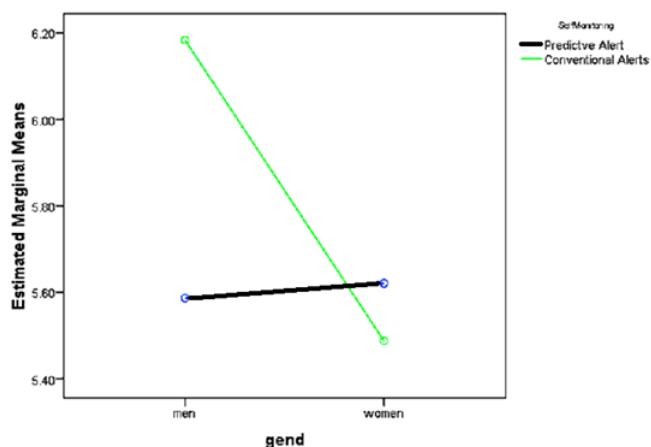


Fig. 4: Effect on estimated marginal means of HbA1c between information type and gender (determined by analysis of variance)

There was no significant value of information type and risk of onset or gender and risk of onset. The results of the logistic regression analysis showed that PIPA, information type were preventive factor for diabetes mellitus onset ( $p < 0.05$ ).

Among conation, we appealed for a lower visual person or audibly people by exteriorization, and instrumental operation produced a person to be difficult in both groups, finally 3persons drop out in this study.

## DISCUSSION

The PA level alone has a limited effect on the promoting health behaviour and improving Hb1Ac levels. Therefore, this study addressed the combined effect between enough PA to prevention of disuse condition and gender factor. Study participants were divided into 2 groups: those who interpreted information they received on their own and those who had the information interpreted by someone else. We believe that an obedient attitude would prevent healthy behaviour. However, these results lead to interesting considerations in terms of effective behaviour the active attitude.

There were no significant differences in the combination of the 2 factors: an interaction between a sense of crisis (i.e. a risk of disease development) and the use of information. However, the combined effect of gender factor and information usage was significant. This result indicates that the simple application of health behaviour theory cannot be supported. According to this theory, when given a sense of crisis and a method to remove it, people lead a healthy lifestyle. This study revealed that to promote healthy behaviour and obtain favourable outcomes, such as improved HbA1c levels, predictive information should use a combination of factors including gender and classification. Furthermore, self-efficacy theory should take into account a combined effect of gender. Thus, we suggest that more than ever before, there will be long-term gender effects concerning information usage. We believe that elderly women in this region are sensitive to predictive information. This sensitivity may be related to longevity factor.

There are likely still unknown factors regarding the healthy behaviour of elderly women living in this region with the highest longevity in Japan. Both men and women in this region experienced a health education project 30 years ago. This project may have had an impact. So far, in diabetes education, the effect of instilling a sense of crisis and increasing a sense of self-efficacy has been controlled by the method of information delivery. However, we have found that this alone is inadequate to improve the effect of healthy education. We think that health education of the elderly should take account of the gender of the information users (4, 5, 6).

The predictive-information making ubiquitous equipment improves to normal level on

HbA1c by the effects of Self-efficacy expression for abnormal HbA1c cases. (7). And, PG seems to have the sense of crisis that information cannot be received from whom. Obtaining information as easily in CG will enlarge a passive attitude. Moreover, PG can learn an enough physical activity from the result of an own action at once. CG corrects the action based on the judgment of the specialist. It takes time to correct the result inevitably to do it.

In PG, the physical activity can learn to be insufficient or extra from predictive-information.

Especially, the blood glucose increases by disuse syndrome in case of the shortage of PA..

Naturally, HbA1c increases when high levels of sugar continue. Most senior citizens seem not to know the appropriateness of their physical activity. (8, 9).

We will explore it by the research in the future considering this point.

Ubiquitous information obtained from wearable-computer with human-centered-design based is able to have been approved by discretion of all the physical activities and a new algorithm.

However, it seems that the performance gain of the computer that can acquire it is necessary to know wisdom of the appropriate physical activity that they have already acquired in the senior citizen in predictive information in longevity area.

There is a possibility that this tacit knowledge in women are the higher than the men.

Such a reason, it seems to have to do the education that uses information at higher frequency for the man.

This research suggests might have it be being necessary to change the usage of information from the difference of the man and woman in the area where information that presses the physical activity has a long life. (11, 12).

## CONCLUSION

The PA level alone has a limited effect on promoting health behaviour. Therefore, this study has addressed an issue of usage. The study revealed that predicative information positively contributed to controlling the variable factor, a combination of the predictive analytic effect and gender, thus improving health in the longevity area:Nagano,Japan. Giving such predictive information shows participants what to do next, which is an important factor.

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(receipt 2009.9.9, accepted 2009.12.20)

# **Physical Therapy as Health Support for Frail Older Citizens Living in Private Nursing Homes**

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## **Abstract**

We provided physical therapy for a total of 1,369 older people, whose relative dependency levels were highly-dependent, 46.0%; partially-dependent, 28.5%; and almost independent, 25.5%. A total of 630 people were confined to wheelchairs and lived in 39 private nursing homes that provide independent living for the elderly with an emphasis on four points: ability to walk alone, take a bath without any support, going to the lavatory by themselves, and eating meals by themselves. Especially, in this study, we targeted wheelchair users with an effort to help them become free of the need for a wheelchair.

First, we chose factors that would allow the subject to walk unaided and divided these factors into internal and external. Next, we provided interventions to improve each factor. To improve internal factors, we provided direct physical therapy. Then to change external factors, we educated staff to improve their nursing techniques and approaches to thinking about nursing as an indirect form of physical therapy.

As a result, 43 of the 630 full-time wheelchair users this study were able to stop using a wheelchair for locomotion and 184 of the wheelchair users became able to walk independently with some guidance.

Based on the results of this study and our practical observations as physical therapists, in order to remove the need for a wheelchair, it was shown that improvement of individual impairment by direct physical therapy is important. Furthermore, it was suggested that an alteration of staff consciousness about locomotion and wheelchair use, which include a lack of awareness about the importance of walking ability, and/or over-assistance and so on, is important as a form of indirect physical therapy.

In conclusion, to assure appropriate health support for frail older citizens living in private nursing homes, it is important to consider both improvement of physical function and improvement of nursing care.

**Keywords:** physiotherapy- health support- nursing home

## **Introduction**

Health support for frail older citizens is thought to involve nursing prevention and life functionality loss prevention, which results in an improvement of life function. An improvement of physical and mental function and involvement of staff and facilities is needed to achieve nursing prevention for frail older citizens. We also consider that physical therapeutic intervention is highly effective and useful for an improvement of life function. Therefore, we performed physical therapy at 39 private nursing homes providing independent living for the elderly with an emphasis on four points: ability to walk alone, taking a bath without any support, going to the lavatory by themselves, and eating meals by themselves.

In this study, we attempted to enable the subjects to walk unaided without the use of a wheelchair.

## **Subjects**

Subjects were a total of 1,369 older people living in 39 private nursing homes. Their relative dependency levels were as follows: highly dependent, 46.0%; partially dependent, 28.5%; and almost independent, 25.5%. A total of 630 people were confined to wheelchairs.

### **Physical therapeutic intervention**

First, we focused on factors that would allow the subject to walk unaided. These were divided into two categories; “internal factors” and “external factors”, and we focused our intervention on improving each of these factors. “Internal factors” comprised the patient’s physical ability, and “external factors” consisted of the staff’s nursing ability, their assistance skills, and the facilities and equipment available. We instructed subjects regarding physical therapeutic exercises and self-management of their body functions to improve the internal factors, and we instructed care-workers and other staff in providing guidance and assistance, the use of equipment in the facility, and creating a practical living environment. We only allowed one physical therapist visit, except when further therapeutic consultation was necessary. After the physical therapy session, care-workers and other staff were expected to continue the program. The whole study lasted 15 months, and there were an average of 3 physical therapy sessions with the physical therapist (range, 1–5 times).

## **Results**

Of the 630 fulltime wheelchair users, 43 persons stopped using a wheelchair for

locomotion and 184 persons became able to walk independently.

## Discussion

The conceptual paradigm for the basis of intervention in this study is demonstrated the Figure.

Four points emphasized in this study were walking alone, which was called "wheel-chair zero", taking a bath without any support, which was called "bath machine-zero", going to the lavatory by themselves, which was called "diaper zero", and eating meals by themselves, which was called "tube feeding zero", and these four factors together were called the "Four Large Zero Movement" at our hospital and company. The four large zero movement can be considered an improvement in life function in the wide sense. The factors related to the improvement of life function of frail elderly were considered to be the individual's own factors (internal factors) and those related to the facilities, equipment and/or staff (external factors). Internal factors were similar to physical fitness factors such as muscle strength, muscle power, suppleness (flexibility), agility, endurance and equilibrium. Because these factors can be put together as strength, suppleness and skill, we referred to these as 3S required for a productive life. Therefore, to deal with internal factors to promote the four large zero movement, systematic intervention to improve 3S is important. However, external factors involve the consciousness and nursing technique of staff, along with the facilities and equipment available.

To determine internal factors, we investigated the relationship between results of physical measurement (features of physical function) and the characteristics of actual daily life style such as moving ability and eating style. If internal factors related to life function were clear from the investigation, an intervention plan to improve the patient's internal factors by direct physical therapy helped their life function reach a better level of ability. As typical internal factors, we chose the following three items, named "3S".

1. Strength, which is the minimum to control their own physical exertion.
2. Suppleness (Flexibility), without focusing on only one part of the body and/or good enough for effort in only one part.
3. Skill, defined as the adjustment of neural function for management of their own body fitting to TPO by adequate timing (i.e. output of muscle strength or ability to relax the muscle).

As for the external factor, especially consciousness of the staff engaged in a private nursing home, firstly, we have to understand their structures by performing a

longitudinal and cross-sectional survey of the staff's concepts of nursing and caring for frail elderly patients. For the four large zero movement, especially the wheel-chair zero movement, it was necessary to instruct staff in the actual moving ability of elderly patients, nursing techniques and risk management in this study. Staff education was provided through lectures (school format), discussing survey results and technical guidance in practice to help minimize on the job training (OJT) issues. Furthermore, it is necessary in some cases to expand the facilities and equipments considering the elderly patients' physical function.

Fulltime wheelchair use results from individual impairments, a lack of awareness of walking ability, and/or over-assistance by staff. Therefore, treatment of impairments was needed along with a change in the attitude of staff and improvement of their nursing techniques. Previously, we emphasized muscular strength, suppleness of muscles, and joints and motion skills ("3S") in activities of daily living as internal factors, and attitudes of staff and nursing techniques as external factors.

To improve life functions, techniques to improve "3S" were strategically applied, and staff was educated to understand their nursing roles more clearly. In this study, we gained satisfactory results in removing dependence on wheelchairs in private nursing homes using physical therapeutic exercise to increase "3S" as a direct intervention, and used on-the-job training to change attitudes of staff with a progression in nursing technique as an indirect intervention of physical therapy.

## **Conclusion**

To assure the health support of frail older citizens living in private nursing homes, it is important to consider both improvement of physical function and a progression in nursing care.

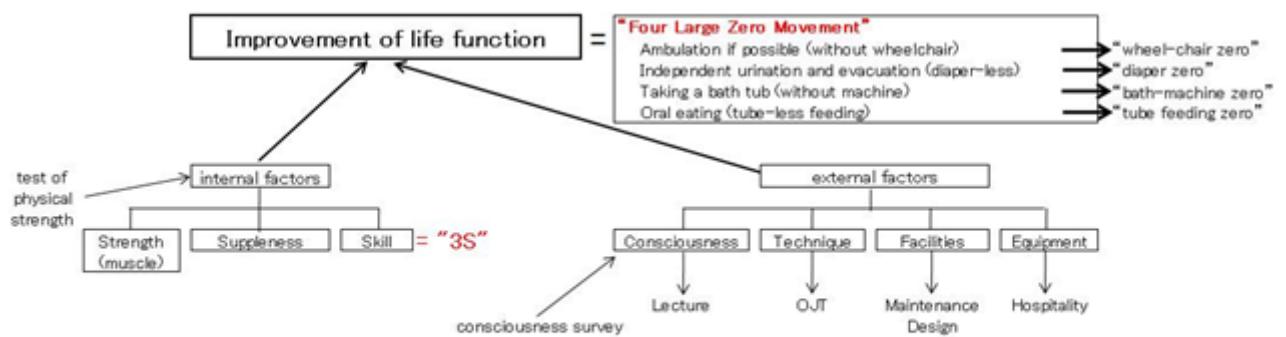


Figure. Our concept and paradigm toward to improvement of life function in frail elderly patients

(receipt 2009.9.10, accepted 2009.12.20)

# **Verification of a continuously exercise on the health promotion facility attached hospital**

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## **Abstract**

The purpose of this study was to evaluate the effect of a continuous exercise program undertaken at a health promotion facility attached to a hospital.

The program was undertaken by 45 members (19 men and 26 women) with a mean age of  $58.1 \pm 8.2$  years and a mean body weight of  $64.4 \pm 13.2$  kg. The exercise program was designed in accordance to the abilities of the participating individuals and was offered in return for undergoing blood tests and medical checkups. Each subject undertook the program for 6 months. The exercise program included pedalling an ergometer, self-stretching of the whole body, muscle strength training, aerobic exercises, and cooling down by stretching. Body weight, pulse rate, blood pressure, and levels of blood constituents were compared before and after 6 months of being on the exercise program using paired Student's *t*-test.

This study demonstrated that the exercise program led to significant improvements in weight loss; maximum blood pressure; and levels of neutral fat, HDL cholesterol, and blood sugar.

Because the program was designed to yield objective data, the staff of the hospital participated in it by supervising the exercise program. Members could undertake the exercise program for 6 months. A health promotion facility attached to a hospital is required to promote effective and safe exercises, and we believe that it is important to evaluate the effects of exercise undertaken at such facilities.

Our health promotion facility has been established as an annex to our hospital; hence, it is essential that it promotes effective and safe exercises. We should examine the effect of the exercise program offered to the member in the future.

**Keywords:** Health promotion facility—Levels of blood constituents—Effects of exercise

## **Introduction**

A health promotion facility is controlled by the law of the medical of Japan. Such a

facility is established as an annex to a hospital. It is different from sports clubs that are managed by private companies. The members of a health promotion facility perform aerobics and receive muscle strength training for the promotion of health. Our hospital also includes a health promotion facility. The facility comprises an Aerobics area; Stretching and Muscle strength training area, and Outdoor exercise area (see Figure1).



Fig.1.— There is Aerobics area (a), Stretching and Muscle strength training area (b), and Outdoor exercise area (c) in our facility

Our facility can be used by a person for various purposes. For example, the facility can be used for health promotion, follow-up after rehabilitation (Kumazaki et al., 2006), prevention or treatment of lifestyle-related diseases, and management of mild pain and diseases. Therefore, the exercises performed at a health promotion facility should be effective and safe. The features of our facility are instruction of effective and safe exercises, counselling to our members and members from other facilities, lectures on health promotion to senior members, and measurement of physical fitness.

## Purpose

The purpose of this study was to evaluate the effect of a continuous exercise program conducted at a health promotion facility attached to a hospital.

## Subjects

The exercise program was undertaken by 45 members (19 men and 26 women) with a mean age of  $58.1 \pm 8.2$  years and a mean body weight of  $64.4 \pm 13.2$  kg. Before becoming a member at our facility, they were not accustomed to performing exercises. The subjects were required to have the ability to sequentially perform exercises 2 or 3 times a week.

## Methods

The exercise program was designed in accordance with the ability of each participating individual and was offered in return for undergoing blood tests and medical checkups (see Figure2).

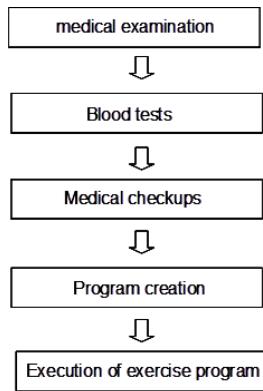


Fig.2.– The exercise program was matched to the individuals taking part, and was offered in return for blood tests and medical checkups.

Each subject undertook the program for 6 months. The program consisted of the following exercises that had to be performed sequentially 2 or 3 times a week: pedalling an ergometer as a warm-up for about 10 min, self-stretching of the whole body, muscle strength training, aerobic exercises such as treadmill running or pedalling an ergometer for about 30 min, and cooling down by stretching (see Figure3).



Fig.3.– The program was pedaling an ergometer, self-stretching of the whole body, muscle strength training, aerobic exercises, and cooling down by stretching.

Muscle strength training was performed using a machine, weights, and body weight. The load of muscle strength training was set according to an individual's muscle strength. The muscle strength training was performed at a frequency of 2 or 3 sets. Intensity of aerobic exercises was maintained at a level identified on the basis of rating of perceived exertion "It is slightly tight." Risk management was performed based on

the vital sign. After the initiation of the exercise program, the members underwent medical examination by a doctor once a month and blood tests every 2 months. The exercise load and exercise time were changed at any time during the program on the basis of the results of medical examination and blood tests. Body weight, pulse rate, blood pressure, and levels of blood constituents (neutral fat, total cholesterol, high-density lipoprotein (HDL) cholesterol, and sugar) were compared before and after 6 months of being on the exercise program using paired Student's *t*-test. Statistical significance was set at  $p < 0.05$ .

## Results

The mean body weight decreased from  $64.4 \pm 23.9$  kg before joining the program to  $63.5 \pm 23.5$  kg after 6 months of being on the program. Maximum blood pressure decreased from  $135.4 \pm 41.6$  to  $127.3 \pm 39.6$  mmHg and minimum blood pressure decreased from  $81.2 \pm 25.4$  to  $78.3 \pm 24.2$  mmHg. Pulse rate decreased from  $80.2 \pm 29.2$  to  $78.4 \pm 28.8$  beats per minute (bpm). The blood tests revealed that the neutral fat decreased from  $150.2 \pm 76.5$  to  $116.9 \pm 58.8$  mg/dl and total cholesterol decreased from  $219.4 \pm 33.8$  to  $217.3 \pm 31.6$  mg/dl. HDL cholesterol increased from  $58.0 \pm 17.4$  to  $60.6 \pm 18.2$  mg/dl. Blood sugar decreased from  $107.2 \pm 52.6$  to  $101.4 \pm 35.0$  mg/dl. The changes in weight, neutral fat, HDL cholesterol, blood sugar, and maximum blood pressure showed significant improvements (see Figure 4).

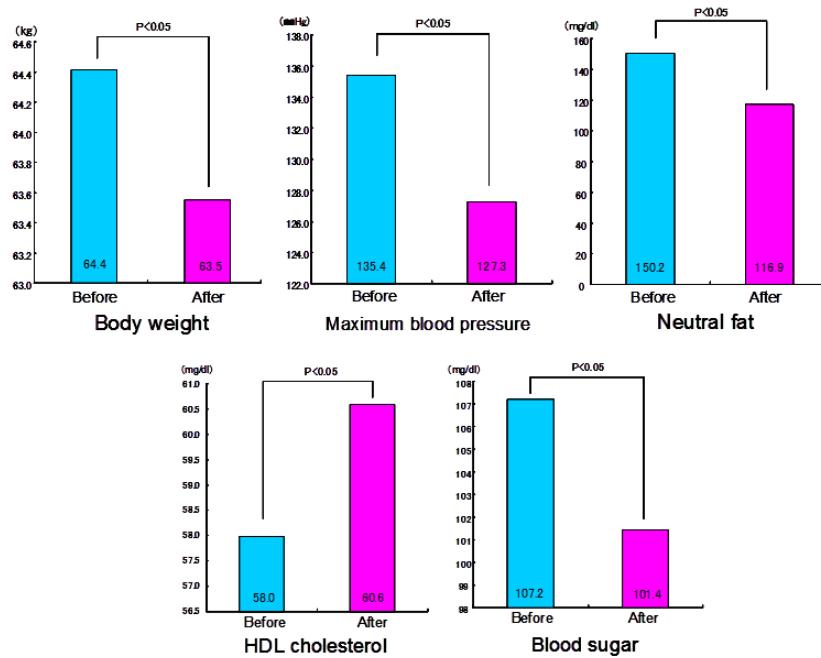


Fig. 4.—The changes in weight, neutral fat, HDL cholesterol, blood sugar, and maximum blood pressure indicated significant improvements.

## **Discussion**

Because the program was designed to yield objective data, the staff of the hospital participated in it by supervising the exercise program. All the members could continue the exercise program for 6 months. A hospital is established to treat diseases and injuries. Therefore, it is necessary to have a health promotion facility attached to a hospital to promote effective and safe exercises, and we believe that it is important to evaluate the effects of the exercises undertaken at such facilities. The effect of exercise is an important factor to determine whether exercises can be performed continuously (Daikuya et al., 2001). This study demonstrated that the exercise program led to significant improvements in weight; maximum blood pressure; and levels of neutral fat, HDL cholesterol, and blood sugar. We speculate that these changes were attributable to the effect of continuous exercise. Continuous exercise is necessary for the treatment and prevention of lifestyle-related diseases. We wish to encourage members of the program to exercise over an extended period, so that the effects of such exercise on lifestyle-related diseases and its beneficial effect for protecting against such diseases can be assessed.

## **Conclusion**

This study evaluated the effect of a continuous exercise program undertaken at a health promotion facility attached to a hospital. Continuous exercise significantly improved the changes in weight, neutral fat, HDL cholesterol, blood sugar, and maximum blood pressure. Our health promotion facility has been established as an annex to our hospital; hence, it is essential that it promotes effective and safe exercises. We should examine the effect of the exercise program offered to the member in the future.

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(receipt 2009.9.10, accepted 2009.12.20)

# **Physical therapeutic intervention in pay nursing homes for the development of locomotion ability—About the consciousness of care workers regarding the locomotion ability of residents —**

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## **Abstract**

The purpose of this study was to clarify the relationship between the locomotion ability of residents and both the awareness of employees and the physical function of the residents.

The attitude survey that was conducted revealed that it is necessary to take into consideration the employees' level of awareness and transform the method of instruction accordingly. This becomes essential because each employee may hold a different view of the nursing strategies that may be required. In addition, the results of the physical fitness survey revealed that the movement strategy of sitting, i.e., a forward bend posture of the pelvis, is important in judging the walking ability of the residents.

Therefore, the several intervention methods that can be applied by physical therapists (PT) working in pay nursing homes are as follows: 1) it is essential to change the method of instruction according to the employees' awareness of the residents' daily locomotion, 2) it is necessary to observe the pelvic movements in the FRT (functional reach test) in the sitting posture in order to judge the walking ability of the resident, and 3) we should instruct the exercise with a forward-bend posture of the pelvis on sitting.

**Keywords:** nursing home-attitude survey-locomotion ability

## **Introduction**

In this study, we instructed the employees in Japanese privately-owned pay nursing homes in the various methods of administering nursing care and exercise to residents in order to improve their locomotion ability. We believe that the important points to be considered are the physical function of the residents and the employees' attitude and awareness of the residents' daily locomotion.

## **Purpose**

The purpose of this study was to clarify the relationship between the locomotion ability of the residents and both the awareness of the employee and the physical function of the residents in order to consider several intervention methods that can be applied by physical therapists (PT) working in pay nursing homes.

### 1) Attitude survey

## **Purpose**

Firstly, since it was essential for us to understand the thought process of the employees in order to frame a methodology for intervention, we conducted an investigation on the level of awareness among care workers in pay nursing homes. The purpose of the attitude survey was to clarify the consideration of the employee with regard to the locomotion ability of residents in pay nursing homes. Hence, we performed the awareness investigation.

## **Method**

The subjects in this survey included 1075 employees from 19 privately-owned pay nursing homes. Their designations in these nursing homes were as follows: care worker, nurse, housekeeper, care manager and office worker. We conducted the questionnaire, which required the participants to respond to the 32 questions, in order to investigate the relationship between the consideration of locomotion ability and the nursing care.

The 32 items were determined on the basis of the following eight elements that were inducted to our hypothetical impression in order to examine the important aspects of nursing (Figure 1).

- Q 1. The relationship between the quantity to move and the risk of fall is direct a proportion.
- Q 2. It is hard to reduce assistance in the workplace.
- Q 3. You have a cheerful disposition.
- Q 4. An increase in assistance time will interfere with the rest of daily work.
- Q 5. You are confident of your physical strength and health.
- Q 6. The number of walkers is insufficient.
- Q 7. It is necessary for care to wait for movement.
- Q 8. There are few handrails.
- Q 9. It is good for the users to reduce the amount of assistance.
- Q10. The reduction of material assistance will increase difficulties.
- Q11. Safe transfer is good.
- Q12. A member of the care worker staff is required to push the wheelchair-0.
- Q13. The users will benefit from the method of nursing.
- Q14. Wheelchair independence is better than the assistance walk.
- Q15. The four major-0 is necessary by all means
- Q16. Quick and safe assistance is sufficient.
- Q17. Locomotion ability changes with the care technique.
- Q18. It is dangerous to leave a person suffering from dementia alone.
- Q19. The user is comfortable with the wheelchair.
- Q20. You know several ways to provide care.
- Q21. It is uneasy to reduce quantity of assistance.
- Q22. The nursing is related to mental getting well.
- Q23. The number of night-work staff is insufficient.
- Q24. You know methods of the transfer well.
- Q25. Care is to help user.
- Q26. Few and much of the quantity of assistance depend on what users want.
- Q27. Increases of locomotion ability will increase to risks.
- Q28. You are good at exercise guidance.
- Q29. When a person with dementia moves, he is in danger.
- Q30. A wheelchair is insufficient.
- Q31. It is worry that the floors and corridors are firm.
- Q32. Care is what you give.

Figure 1, 32 question items

The score was measured on an interval scale according to the subjects' impression of each question, and the answers provided were on a scale of 1–5.

We classified the subjects into three groups according to their perspectives on the amount of hardships that they may have to endure. In order to carry out this classification, we picked out two questions regarding whether "the increase in assistance time will interfere with the rest of daily work" and whether "the reduction of material assistance will aggravate their difficulties." On the basis of the answers provided to both questions, the respondents were classified into the following 3 groups: group A with-no-troublesome, group B with-no-troublesome, and group C not-whichever.

Factor analysis was applied to identify the influencing factors and the structure of the employees' awareness of the locomotion ability of the residents and their nursing requirements. We used the varimax orthogonal rotation method, and the reliability of the extracted factors was examined using Cronbach's  $\alpha$  using the SPSS 11.0 software for Windows.

## Results

We acquired 596 effective replies (55% response rate); these were then divided among group A (66), group B (44), and group C (142).

In group A, the following 2 factors were discerned: self-confidence and self-efficacy. Similarly, in group B, 4 factors were present; these were self-efficacy and risk, over-protection and staff insufficiency, nursing ideas, and wheel-chair dependence. Finally, in group C, the 4 factors that were obtained were nursing ideas, self-efficacy, locomotion, and risk and user dependence. (Table 1)

grip power	r=0.44
the forward bend on long sitting	r=0.21
the duration of the one-legged stance	r=0.07
FRT on the sitting postures	r=0.29
the pelvic postural strategy	r=0.35
in FRT on sitting	

Table 1 The result of the correlation coefficient

## Discussion

In group A, it was observed that the respondents may not face any difficulty in their daily work.

In the case of group B, it was seen that their difficulties maybe interfere with the manner in which they carry out the nursing care instructed by the physical therapist.

From this result, it was clarified that the respondents are hesitant to take a risk, readily complained about the size of the staff, and were dependent on the wheelchair.

Therefore, in such a group, with an aim toward improving the residents functioning, it is important to encourage them to consider the significance of appropriate nursing and to emphasize the importance of risk management.

This result clarified that their nursing may be carried out without any difficulty even if the situation requires extra care.

Therefore, in such a group, the individual efficacy and confidence must be stimulated along with understanding the usefulness of adequate guidance toward the improvement of the residents' functioning.

Finally, the results of group C clarified that the respondents tended to provide care to the residents according to their own judgments since they were anxious about the risk factors.

Therefore, in such a group, with an aim to improve the of residents' functioning, it becomes essential to demonstrate the manner in which they may assist the resident

while conforming to his/her functioning ability while taking into consideration the risks, so as to stimulate individual efficacy, and to emphasize that the initiative to choose the nursing method belongs to individual care worker.

#### Findings from the attitude survey

The following speculations related to instruction in nursing for improving the functioning of the users were obtained. In group A, individual efficacy and confidence must be stimulated with understanding the usefulness of adequate guidance toward the improvement of functioning. In group B, significance of improving the residents' functioning and risk management must be emphasized. Finally, it is important to demonstrate to group C the manner in which to assist the employees in conforming to the residents' functioning abilities while understanding the risk and stimulating individual efficacy, and it is effective to emphasize that the initiative to choose the nursing method belongs to the individual care worker.

## 2) Physical fitness survey

### **Method**

The study involved the participation of 354 residents in 20 pay nursing homes, and we performed the t-test to develop the relationship between locomotion ability and each test.

Further, in order to investigate the factors related to locomotion ability, we measured factors such as grip power, the forward bend on long sitting, the duration of the one-legged stance and the functional reach test (FRT) on the sitting postures.

Figure 2 and 3 represent the administration of the functional reach test (FRT) on the sitting postures. During the FRT that was performed while sitting, we took a picture of the subjects' postures from the lateral view using a digital camera in order to compare the pelvic alignment before and after the reaching task. In addition, figures 4, 5, and 6 are depictions of the pelvic postural strategy, in which we observed whether the pelvis appeared to be bent forward after the reaching task. We determined the pelvic postural strategy using the pelvic alignment.

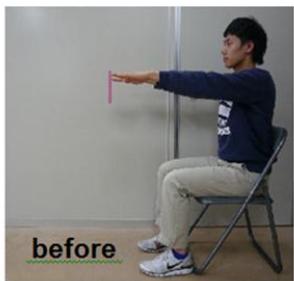


Figure 2: Before the reaching task

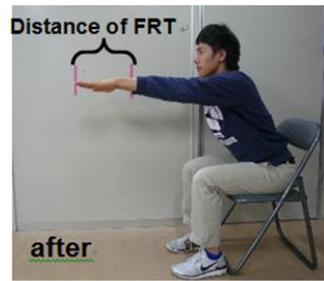


Figure 3: After the reaching task

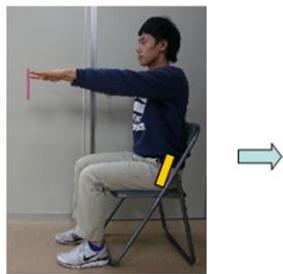


Figure 4: Normal posture



Figure 5: Pelvic forward-bend



Figure 6: Disappeared pelvic movement

## Results

We enquired with the nursing home staff about the ambulatory ability of the residents and classified the subjects into an ambulation group and a non-ambulation group.

The ambulation group comprised 267 subjects, while the non-ambulation group comprised 87 subjects.

The average age in the ambulation group is  $84.4 \pm 6.9$  y.o (60–103 y.o), and the average age in the non-ambulation group is  $86.2 \pm 8.0$  y.o (63–103 y.o). As a measure of physical fitness, a significantly high correlation between locomotion ability and (a) grip power ( $r = 0.44$ ), and (b) the pelvic postural strategy in FRT on sitting ( $r = 0.35$ ) was observed (Table 1).

From the results of the measurement of physical fitness, the distance of FRT on sitting is large in the ambulation groups. However, there was a high variation (Table 2).

	the forward bend on long sitting	FRT on the sitting postures	grip power	the duration of the one-legged stance
the ambulatory group	167.2 ( $\pm 91.5$ ) (mm)	314 ( $\pm 117$ ) (mm)	13.7 ( $\pm 6.06$ ) (kg)	8.45 ( $\pm 16.6$ ) (sec)
the non-ambulatory group	121.7 ( $\pm 73.68$ ) (mm)	235 ( $\pm 104$ ) (mm)	7.04 ( $\pm 4.83$ ) (kg)	4.35 ( $\pm 3.37$ ) (sec)
t-test	p<0.001	p<0.001	p<0.001	n.s.

Table 2: The average and standard deviation of each test

The t-test results reveal a significant difference between the 3 tests, except in the case of the duration of the one-legged stance.

### **Discussion**

There is a significant correlation between the locomotion ability and grip power and the appearance of the pelvic postural strategy in FRT on sitting.

This result suggests that the resident may have a walking ability, if he/she assumes a forward-bend posture of the pelvis in FRT on sitting.

With regard to a practical application in nursing, we suggest that the employees pay attention to the pelvic movements of the resident as he/she stands up and reaches out while sitting in activities of daily living..

### **Conclusions**

The results of the attitude survey clarified that it is essential to change the method of instruction according to the employees' awareness of the residents' daily locomotion. furthermore, it is necessary to observe the pelvic movements of the residents in the FRT on sitting in order to be able to judge his/her walking ability. Thus, we should instruct the exercise with a forward-bend posture of the pelvis on sitting in order to improve the locomotion ability of the residents.

(receipt 2009.9.10, accepted 2010.06.20)

# Body Fat of Elderly in JAPAN

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## Abstract

**Purpose:** This study aimed to determine the relationship between the percentage of body fat (%BF) and the percentage of skeletal muscle (%SK) as measured by commercially available body composition analyzers in elderly Japanese people along with the relationship of %BF with physical activity (PA) and abdominal skinfold thickness.

**Methods:** The subjects comprised 31 people (15 men; mean (SD) age, 82 years (7 years) and 16 women; mean (SD) age, 84 years (5 years)) who availed of healthcare facilities for the elderly. We explained the research protocol to the subjects and their families and obtained informed consent from them prior to the commencement of the study. Body composition (%SK and %BF) was measured using BIA on HBF-362 (Omron Healthcare Co., Japan). Skinfold thickness under the umbilicus was measured using ultrasound imaging on HS-2000 (Honda Electronics Co., Japan). Physical therapists interviewed the subjects to record the subjects' activities in the past 24 hours, and the level of PA was calculated on the basis of the position and intensity of physical activity (PIPA). We compared the measurement data between the men and women, and evaluated the relationship between body composition and skinfold thickness.

**Results:** The mean (SD) value of %BF was 25.2% (4.6%) in men and 33.8% (6.1%) in women, while that of %SK was 25.6% (1.6%) in men and 20.4% (2.6%) in women. A strong and significant correlation was found between the %BF and abdominal skinfold thickness in both men ( $r = 0.613, p = 0.015$ ) and women ( $r = 0.624, p = 0.001$ ).

**Conclusion:** The %BF, as measured using a body composition analyzer, was positively correlated with the abdominal skinfold thickness, suggesting that the body composition analyzers marketed in Japan are useful for the evaluation of the body composition of elderly Japanese people.

**Keywords:** Body Fat, Elderly, Bioelectrical impedance, Physical Activity

## Introduction

Poor lifestyle habits, such as overeating and physical inactivity, cause destructive changes in the human body, bringing on the onset of lifestyle-related diseases, such as diabetes mellitus, hyperlipidemia, and arteriosclerosis. In Japan, westernization has led to altered dietary habits, while the use of vehicles such as cars has increased comfort levels. Therefore, there has been an increase in the incidence of vascular diseases such as arteriosclerosis. In a survey conducted by the Ministry of Health, Labour and Welfare in 2008 for "Causes of death and morbidity in Japan," malignant neoplasms ranked first; cardiac disease, second; and cerebrovascular disease, third. Cardiac disease and cerebrovascular disease caused by arteriosclerosis comprised approximately 30% of all causes of death.

Japan is expected to soon become a super-aged society. In Japan, more than 28 million individuals are aged 65 years and older, and elderly individuals account for approximately 22% of the total population (Ministry of Internal Affairs and Communications, 2008). In the national health nutrition survey of 2007, the percentage of elderly men with  $BMI \geq 25$  was greater than those with  $BMI = 18.5$ . Every year, there is an increase in the incidence of metabolic syndrome among elderly people. The reserve and affected individuals of metabolic syndrome in the 60–70 years age group numbered approximately 60% of men and 25% of women.

Nursing care for the elderly in Japan poses a significant burden on the healthcare infrastructure. In the Japanese elderly care insurance system where care is provided using the assistance of the country, subjects needing nursing care are increasing yearly. It appears that one of the causes of this increased burden in nursing care is the various diseases caused by poor lifestyle habits.

The number of patients with cerebrovascular disease or myocardial infarction caused by arteriosclerosis requiring physical therapy is increasing in the clinical setting. Body fat accumulation related to abnormal levels of high price blood lipid, which is one of the causes of arteriosclerosis, is a very serious problem. According to the report by Dishman and Washburn, appropriate physical activity can prevent atherosclerosis (Dishman, et. al., 2004). The percentage of body fat is an important risk factor affecting the increase in the morbidity caused by angina pectoris or cardiovascular disease (Calling, et al., 2006). Therefore, body fat evaluation is an essential noninvasive measurement that can reflect lipid metabolism.

In Japan, there is an urgent need for the implementation of measures that can increase healthy life expectancy. Recently, body composition estimation by bioelectrical

impedance analysis (BIA) has been introduced for body fat evaluation around the world. The body composition analyzers commercially available in Japan that use the BIA technique are inexpensive and easy to use, not requiring expert supervision. However, they can only be used in individuals aged between 18 and 80 years.

This study aimed to determine the relationship between the percentage of body fat (%BF) and the percentage of skeletal muscle (%SK), measured using commercially available body composition analyzers in elderly Japanese people along with the relationship of %BF with physical activity (PA) and abdominal skinfold thickness.

## **Methods**

### **1. Participants**

The participants comprised 31 people (15 men; mean (SD) age, 82 years (7 years) and 16 women; mean (SD) age, 84 years (5 years)) who availed of healthcare facilities for the elderly. The original sample comprised 230 individuals, 199 of whom were excluded based on the following exclusion criteria: no consent from the doctor for participation in the study; inability to support oneself in the standing position; presence of severe dementia, cancer, heart failure, renal failure, or pacemaker implant; or cannot contact sensor of feet or hands. We explained the research protocol to the subjects and their families and obtained informed consent from them prior to the commencement of the study.

### **2. Design**

We determined the %BF and %SK of elderly people who availed of healthcare facilities for the elderly in Japan using a body composition analyzer based on bioelectrical impedance analysis and determined abdominal skinfold thickness using ultrasound imaging. Outcomes were %BF, %SK, abdominal skinfold thickness, daily physical activity. This cross-sectional study compared the measurement data between the men and women, and researched the relationship between body composition and skinfold thickness.

### **3. Measurements**

The body composition (%BF and %SK) was measured using HBF-362 (Omron Healthcare Co., Japan). The subjects stood barefoot during body composition measurement, and their hands and feet were slightly wetted using a moist towel for better conduction. We determined body weight in a standing position on the body composition analyzer, and then determined the %BF and %SK. An assistant kept watch

over all subjects constantly to prevent falling during body composition measurement. Skinfold thickness was measured under the umbilicus using ultrasound imaging on HS-2000 (Honda Electronics Co., Japan). It was determined in a supine position after body composition measurement. The measurements by the body composition analyzer and skinfold thickness were determined three times, and we used their average value for statistical analysis. Physical therapists interviewed the subjects to record the subjects' activities in the past 24 h, and the level of PA was calculated on the basis of the position and intensity of physical activity (PIPA). PIPA measures the PA based on the energy expenditure coefficient in 9 lattices categorized into 3 postures (lying, sitting, and standing) and 3 levels of exercise intensity (low, moderate, and high).

The coefficient of energy consumption for any movement in humans should fall under the ninth category.

PIPAs represent the cumulative data for 24 h multiplied by the relevant coefficients and body weight as well as the duration of motion during each physical activity. PIPAs are expressed in kcal.

#### 4. Statistical analysis

The data for men and women were analyzed separately. The Mann-Whitney test was used for comparing the measurement data between men and women. Spearman's rank-correlation coefficient was calculated to determine the relationship between %BF and %SK, abdominal skinfold thickness, and PA. We used SPSS ver. 17.0 for statistical analysis. The level of statistical significance was set at  $p < 0.05$ .

## Results

The physical characteristics of the subjects are shown in Table 1.

Table1. Patient characteristics

	Men (n = 15)	Women (n = 16)	
Age (years)	83 ± 8	84 ± 5	
Body height (cm)	156.6 ± 4.5	145.1 ± 6.5	
Body weight (kg)	55.0 ± 7.5	43.2 ± 5.2	
BMI (kg/m <sup>2</sup> )	22.4 ± 2.9	20.5 ± 2.3	
Skinfold thickness (mm)	14.9 ± 4.0	16.1 ± 6.6	$P < 0.01^{**}$
Percent of body fat (%)	25.2 ± 4.9	33.8 ± 5.8	$P < 0.01^{**}$
Percent of skeletal muscle (%)	25.6 ± 1.6	20.4 ± 2.6	$P < 0.01^{**}$
PA (kcal)	1238.4 ± 168.4	903.2 ± 113.8	$P < 0.01^{**}$
PA/BW (kcal/kg)	22.5 ± 1.0	20.9 ± 1.5	$P < 0.01^{**}$

The mean (SD) value of %BF was 25.2% (4.6%) in men and 33.8% (6.1%) in women, while that of %SK was 25.6% (1.6%) in men and 20.4% (2.6%) in women. Significant differences were observed between men and women with regard to the values for %BF, %SK, abdominal skinfold thickness, PA, and PA per kilogram body weight (PA/BW). A strong and significant correlation was found between %BF and abdominal skinfold thickness in both men ( $r = 0.613, p = 0.015$ ) and women ( $r = 0.624, p = 0.001$ ) (Figure 1). No significant correlation was found for PA/BW in either men or women.

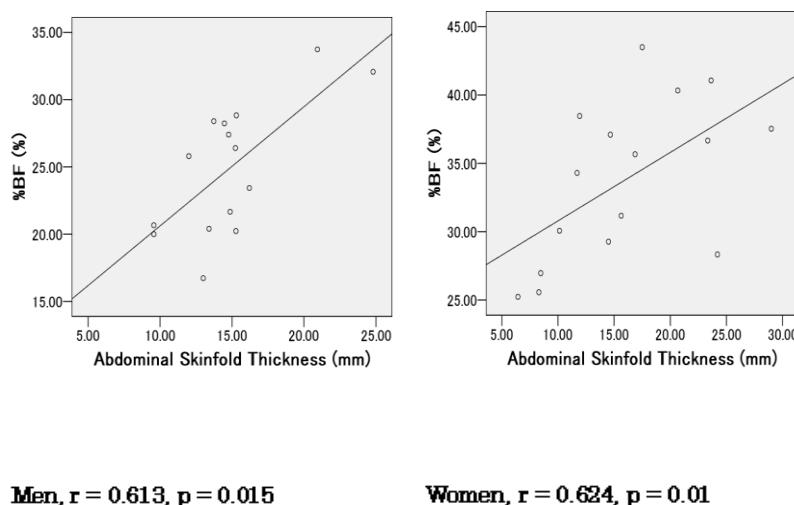


Figure 1. Abdominal Skinfold Thickness vs. %BF

## Discussion

In BIA, a feeble current present between contact electrodes estimates the electrical resistance between the electrodes, i.e., in the human body. Muscles, blood, and bone have high fluid content with resultant high electroconductivity; however, adipose tissue contains lower fluid levels and accordingly, low electroconductivity. The electroconductivity is a reciprocal number of the electrical resistance, i.e., the electroconductivity is lower if the resistance is high. The body composition analyzer used in this study was able to measure four electrodes, i.e., both hands and feet. The presence of four electrodes provides the advantage of measuring the combined resistance as well as the specific resistance of the upper extremities, trunk, and lower extremities each.

Body fat in Japanese individuals increases gradually with age, but decreases slightly after 50 years of age in both men and women. However, in Japanese men, a slight increase in body fat is again noted after 65 years of age. In this study, the %BF of men

and women were  $25.2 \pm 4.6\%$  and  $33.8 \pm 6.1\%$ , respectively. Visser et al. reported that the disability of elderly people is not related to skeletal muscle mass; moreover, in the individuals of the Framingham Heart Study, disability was related to an increase in %BF in a cross-sectional study (Visser, et. al., 1998). The participants of our current study comprised elderly people in need of nursing care, and were generally classified as frail. On the average, their %BF showed a tendency to increase as compared to that in young individuals; moreover, our results suggested a relationship between increased %BF and disability, similar to Visser et al.'s survey.

Our results noted the %SK of men and women to be  $25.6 \pm 1.6\%$  and  $20.4 \pm 2.6\%$ , respectively. These %SK values represent equipment-specific data, and comparable data for other groups is not available. However, in the experience of the authors, the %SK is generally above 30% in a majority of young individuals. Therefore, we considered that the %SK values for elderly individuals may tend to decrease with age.

We noted a significant correlation between %BF and skinfold thickness in both men and women. In a previous study that examined the relationship between trunk fat mass by BIA and the amount of visceral fat under the umbilicus, a significant correlation between the two was noted; further, trunk body fat mass was found to be an effective predictive factor for visceral fat (Demura and Sato 2007). A significant relationship between visceral fat and the fat mass of the upper extremity, lower extremity, and trunk has also been previously shown. Therefore, we consider that the %BF as shown by the body composition analyzers in Japan reflects visceral fat data, suggesting the possibility that %BF may be useful as a health administration index.

Kyle et al. reported a negative correlation between PA and body fat mass irrespective of the gender ( $r = -0.89$ ,  $p < 0.001$ ) (Kyle, et al., 2007). However, in this study, we found a positive correlation between %BF and PA. The PA value is normally affected by the body weight, since the equation for estimating PA by PIPA involves body weight as a factor. To nullify this influence on PA, we calculated a final value by dividing the PA by the body weight (PA/BW). However, no significant correlation was noted between PA/BW and %BF.

The correlations noted in this study between %BF and abdominal skinfold thickness show that these values can be effectively used in health monitoring and administration for elderly individuals. However, it is essential to find appropriate cut-off values in the future for adequate maintenance of health. Reports regarding health indices in the elderly Japanese population are few in number, and the relationship between PA and %BF remains unclear. We consider that a longitudinal study that stratifies body type along with other factors is necessary in the future for greater clarity.

## Conclusion

We noted a significant correlation between the %BF and abdominal skinfold thickness in elderly Japanese individuals, suggesting that body composition analyzers in Japan may be useful for evaluating the body compositions of elderly Japanese populations.

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(receipt 2010.12.10, accepted 2010.6.20)

# **Profitable Means of Promoting Work Life Ability, Willingness and Ability to Keep on Working**

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## **Abstract**

Work life ability will be a key factor in the success of enterprises and work organisations in a constantly globalising economy. The theme is urgent due to the prevailing age structure of population, issues in the availability and retention of labour as well as due to using and dimensioning of staff at workplaces. Consequently, a general objective of activity related to this theme is finding new easy-to-use developmental procedures where the functionality of working communities is closely intertwined with the development of the productivity of work and experienced wellbeing. In this paper practical means of improving work and working communities through promoting work life ability are introduced. To pinpoint relevant measures at the very work sites determinants for willingness and ability of people to keep on working are presented by age groups, work tasks and by types of work culture. For example, majority of the employees were willing to keep working until 63 years or later if the workplaces had designed and personnel had dimensioned correctly. Compared to other persons, supervisors, managers and young workers were more often unwilling to keep working even though they rated themselves to be fit to continue working. In general, willingness to keep working markedly depends on the work culture. Trust-based, fair and appreciative use of personal expertise and knowledge forms crucial means of commitment to good work. The results also reveal that the ability of work organisations to respond to tomorrow's challenges ahead is linked to the degree of respect and utilisation of expertise and experiences of the personnel. Furthermore, temporal comparisons of results demonstrate improvements in those working communities whose prevailing work cultures are labelled "good". Similar positive changes cannot be detected in the working communities having "average" or "bad" work culture. The research material was collected during the follow-up studies carried out by Work Life Ability Network in the years of 2005 and 2008. The study was participated by cooperative private and public companies and different work organisations having totally more than nine thousands employees. Research activities comprised both work culture chartings and interactive action

research in the cooperative companies. Specific developmental tasks of the action research were based on the results of work culture chartings and included e.g. tailored training and complimentary data collections.

**Keywords:** work life ability-Trust-based-willingness and ability

## **Introduction and background**

Work life ability will be a key factor in the success of enterprises and work organisations in a constantly globalising economy.

Definition for work life ability

The theme is urgent due to the prevailing demographic structure of population - especially due to aging - issues in the availability and retention of labour as well as due to the use and dimensioning of staff at workplaces.

The utilization and sufficiency of work force constitute a multidisciplinary set of challenges that is reflected on all levels of developed, industrialized countries. In Finland, for example more work force exits the labour market than enters it. The average early retirement age in Finland is slightly over 59 years.

The main causes underlying the present situation are declining birth rates, longer life expectancies, changes in the family structure and individual values, and, on the other hand, they have made active, skilled and productive work force highly wanted.

Objectives and tasks

Both the competitiveness and success of companies, work organizations and the general well-being depend largely on the work life ability of workers.

Correct investments on work force at work site are proven profitable. Keeping workers of a workplace active and working a few years longer may bring savings of tens of thousands of euros per worker. Shortly, a good (high-quality) workplace and work leads to increased productivity and reduces overall costs of both the company and the society.

Consequently, a general objective of activity related to this theme is finding new easy-to-use developmental procedures where the functionality of working

communities is closely intertwined with the development of the productivity of work and experienced wellbeing.

#### Target groups and data collection

Extensive research material was collected during the follow-up studies carried out by the Work Life Ability Network in the years of 2005 and 2008 in the Tampere-Pirkanmaa region in Finland.

In general, the network is estimated to reach a total of half a million of persons in enterprises and work organizations. The modes of activities and progress of the network are described in more detail in another presentation of the ICCEF 2009 Conference.

The field study itself was participated by cooperative private and public companies and different work organisations with a total of more than nine thousands employees. The research activities comprised both work culture chartings and interactive action research in the cooperative companies.

#### Presentations of results

The specific developmental tasks of the action research were based on the results of work culture chartings and included, for example, tailored training and complimentary data collections.

To pinpoint relevant measures at the work sites determinants for willingness and ability of people to keep on working are presented by age groups, work tasks and types of work culture.

#### Main predictor and explanatory factors

#### Types of work culture

**8. Dia**

**Continuing to work until the age of 63 or older**

**Combinations of willingness and ability ratings**

11 = The person is willing and rates him- or herself to be able to continue working  
 12 = The person is willing but rates him- or herself to be unable to continue working  
 21 = The person is not willing but rates him- or herself to be able to continue working  
 22 = The person is not willing and rates him- or herself to be unable to continue working

Working culture (index) and combined working culture (sub-indices) characterize the following five areas of working culture: Operation of the organization, Management communication, Interaction of personnel, Social working conditions, and Trust in work organization.

#### Categories of age

Based on the chronological age people are divided into five age groups: younger than 26 years, 26 to 35 years, 36 to 45 years, 46 to 54 years, and 56 years and older.

#### Work task

Based on the nature of the principal work tasks people are divided into managers, supervisors, experts, office workers and other productive workers.

#### Willingness and ability to keep working until 63 years or later

Willingness and ability to keep working is based on the subjective ratings of the people themselves. Rating results were obtained through postal inquiries (see the classification of combinations).

#### Combinations of willingness and ability ratings

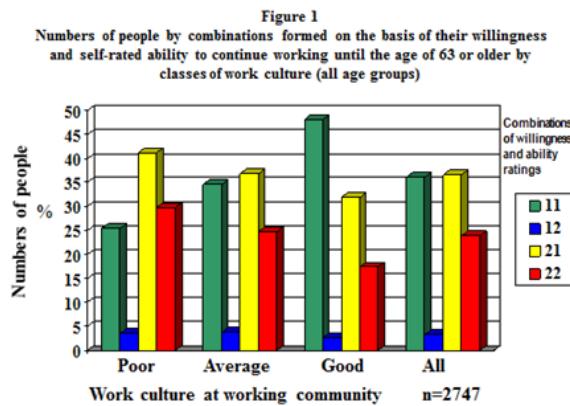
#### Main findings

Figure 1 demonstrates that, in general, willingness and ability to keep working depends markedly on the work culture.

Those work communities whose prevailing work cultures are labelled as "good" support and motivate people to keep working. Similar positive changes cannot be

detected in the working communities having an "average" or "bad" work culture.. For example, a majority of the employees are willing to keep working until 63 years or later if the workplaces are designed and personnel dimensioned correctly.

Figure 1( all persons)



Willingness and ability to keep working varies between age categories and types of work.

Figures 2, 3, 4, 5 and 6 show that compared to older persons, young people are not as willing to keep working in the present job even though they rate themselves to be fit and able.

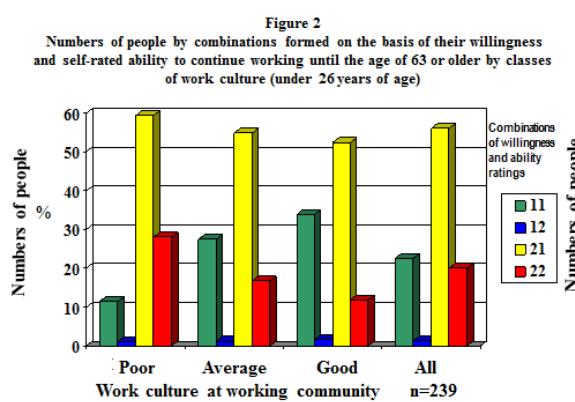


Figure 2 (age group under 26 years)

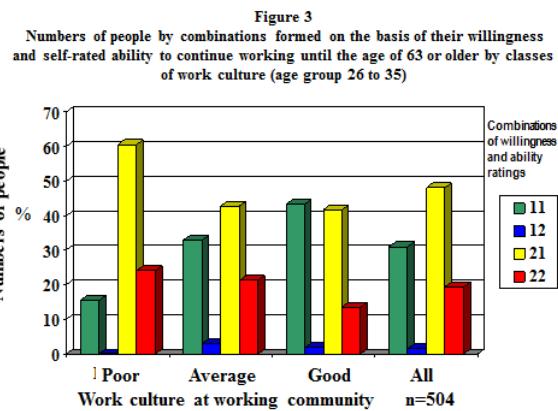


Figure 3 (age groups 26 to 35 years)

**Figure 4**  
Numbers of people by combinations formed on the basis of their willingness and self-rated ability to continue working until the age of 63 or older by classes of work culture (age group 36 to 45)

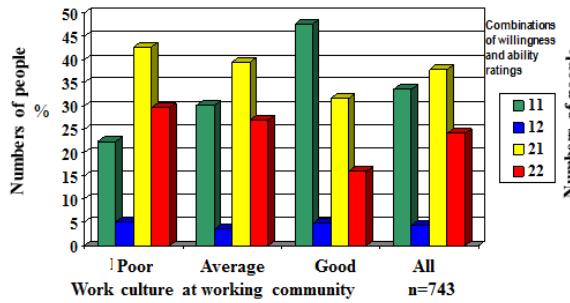


Figure 4 (age group 36 to 45 years)

**Figure 5**  
Numbers of people by combinations formed on the basis of their willingness and self-rated ability to continue working until the age of 63 or older by classes of work culture (age group 46 to 55)

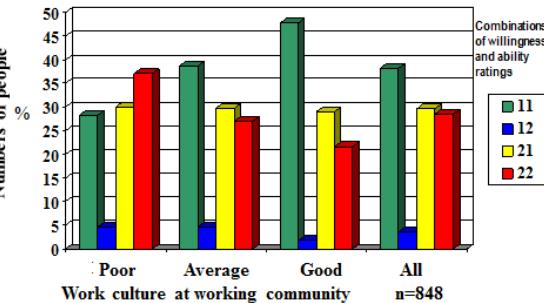


Figure 5 (age group over 46 to 55 years)

**Figure 6**  
Numbers of people by combinations formed on the basis of their willingness and self-rated ability to continue working until the age of 63 or older by classes of work culture (aged 56 years and older)

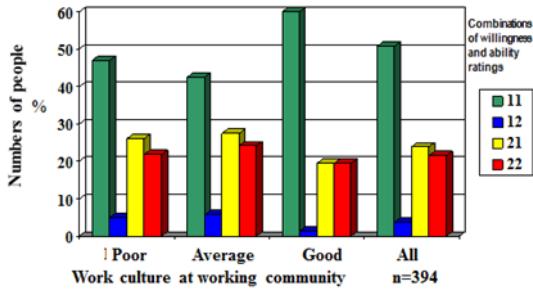


Figure 6 (age group 56 years and older)

## Main findings (continued)

Further, compared to other persons, supervisors and managers are more often unwilling to keep working even though they rated themselves to be fit to continue working.

The results also reveal that the ability of work organisations to respond to tomorrow's challenges ahead is linked to the degree of respect and utilisation of expertise and experiences of the personnel.

Furthermore, temporal comparisons of results (i.e. results obtained in 2005 and in 2008) demonstrate improvements in those working communities whose prevailing work cultures are labelled as "good".

Similar positive changes cannot be detected in the working communities having

"average" or "bad" work culture.

## Conclusions

In general, coping with various work tasks depends not only on individual factors but also on many organization-, work- and work environment - related factors: by performing the work wrong under poor circumstances, we can accelerate the weakening of our willingness and ability to work and overall performance, and by performing the work right under good circumstances at work sites we can decelerate it. Maintaining the well being of employed people requires above all a new kind of holistic and multidisciplinary qualitative development of working communities. To meet the challenges both today and ahead in future, we need, besides interdisciplinary research and training based on real needs, a genuine interest in continuously improving our knowledge of interactive multidimensional functions of modern work life.

The main point is in combining the well-being of employees and the profitability of companies: the best way to ensure attainment of the business goals of a company is to take proactive care to ensure that the personnel is motivated, skilled, healthy and satisfied with their work and their life. Trust-based, fair and appreciative use of personal expertise and knowledge forms a starting point for commitment to good work.

All in all, "well-being and ability spell success". In this sense the crucial factor is the level of work life ability of each employee and the working community.

### Work Life Ability (definition)

"Work life ability refers to the ability and willingness of persons to learn, apply and combine the latest know-how and knowledges related to products, work, work ability, working community, working environment and the business operations of the company (as well as their interconnections) in creative ways that benefit the individual, the company and society" (Manninen 2004).

(receipt 2009.9.10, accepted 2009.12.20)

# **Improvement of Well-Being and Work Ability through Targeted Worksite Training and Knowledge Sharing in Various Types of Working Communities**

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## **Abstract**

The objective of the intervention research was to find out about the preconditions, contents, suitability, intensity, frequency and effectiveness of training organized at workplaces with different management and work culture. The research project was also concerned with the question, how to make the latest knowledge available to be fully utilized in working communities to promote the work ability and performance of 40-45 year-old voluntary female workers (n=108). The project was conducted in a total of 18 shoe, leather, textile and clothing enterprises. The research setting was based on a 2-3-3-type variance analysis model. The results reveal that at the end of the project the subjects had less symptoms of the upper and lower back. The adverse effects of the symptoms had decreased and the work ability index had increased. The well - being and activeness of the workers had increased during the year. Moreover, the workers did more frequently fitness exercises during their free time at the end than at the beginning of the project. The confidence of the workers in their possibilities to affect the ergonomics of their work had increased. Personal face-to-face training proved to be the most effective training method. The more often the worksite training session was repeated, the more markedly it seemed to decrease adverse effects of symptoms. The management and work culture largely decides how the educational message and the latest knowledge will be received and what kind of effects the training will have. The work culture also determines which combination of training methods and means should be used.

**Keywords:**well being-work life ability-Targeted work site training-knowledge shariring

## **Introduction and background**

One of the greatest challenges we are faced with here is how to support work life

ability in working communities.

Regarding the promotion of work life ability the most topical and central challenges related to education and communication arise from the experiences gained from and observations made in the past few years in the enterprises and working organizations included in our research activities.

There are a number of interesting challenges involved in the implementation of training for workplaces and the utilization of the latest knowledge.

Managers and supervisors play a key role in enterprises and organizations as persons who communicate, promote the flow of information, talk to people and listen to them. In an atmosphere of distrust managers tend to act as gatekeepers because they decide whether they share information, share it after altering it or keep it entirely to themselves without passing it on in the working community.

This reveals a central problem in the flow of information – how it reaches its target. It may fail to reach its intended target, and even if it reaches the physical department or work unit, it may miss the people who would need it most.

## **Objectives**

The objective of the intervention research was to find out about the preconditions, contents, suitability, intensity, frequency and effectiveness of training organized at workplaces with different management and work culture.

The research project was also concerned with the question of how to make the latest knowledge available to be fully utilized in working communities to promote the work ability and performance of workers.

Target organizations and persons

The project was conducted in the form of field study during one year in a total of 18

manufacturing enterprises, which represented the shoe, leather, textile and clothing sectors.

The enterprises were located in various areas in the region of Tampere–Pirkanmaa.

The subjects were voluntary 40-45 year-old female workers (n=108).

The enterprises which represent branches of industry involved are presently under heavy reorganizations and structural renewing.

Disorders, symptoms, complaints and dissatisfaction incidences related to upper and lower back are very common among the female employees and are correlated with sick leaves and loss of productivity.

So, the quality of workplace and work is an important consideration that gives rise to substantial costs.

### Research setting

The research setting was based on a 2-3-3-type variance analysis model.

One explanatory variable in the model was work culture; on the basis of the results of interviews and postal inquiries made at the beginning of the project half of the enterprises represented 1) a “good” (active) work culture and half an 2) “ordinary” (not active) work culture.

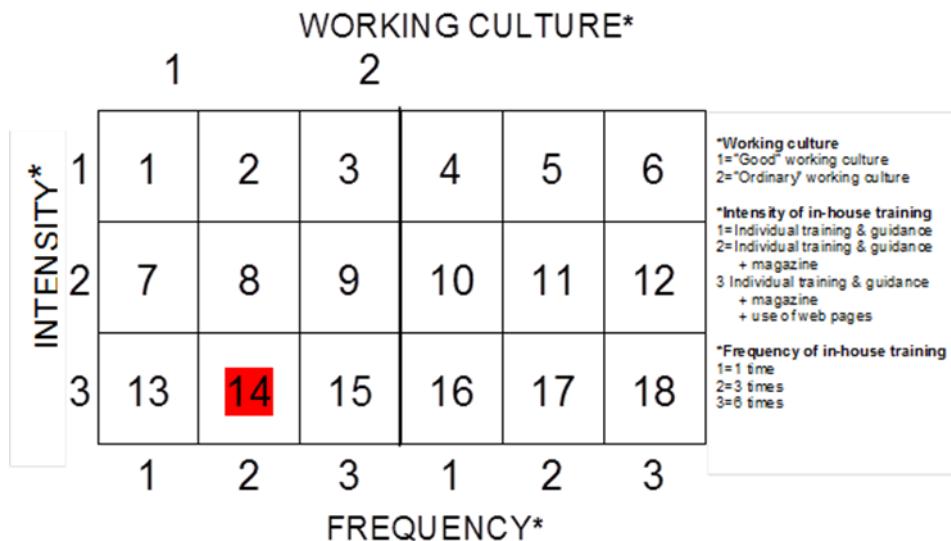
“Good” (active) working cultures were characterized by a high level of support and commitment by the management and good interaction between the management and the employees. The same did not apply to ordinary working cultures.

Another explanatory variable was the intensity of the training, which was in practice realised by offering the employees 1) only personal training, 2) personal training and a related magazine, 3) personal training, a magazine and encouragement to access the project’s web pages.

The third explanatory variable in the model was the frequency of the training, which was offered 1) once, 2) three times, or 3) six times, using the above combinations of training methods and means.

Figure 1 shows the design of intervention study

**Figure 1.** Research setting. The 2-2-3 type variance analysis model used in the study



### Training contents

One in-house training session at the workplace took about two hours. It consisted of six different modules.

Modules dealt with 1) physical exercise and well-being, 2) personal assessment of work tasks, 3) functional work environment, 4) working postures and motions, 5) work stress and fatigue, and 6) rest and recovery at work.

### Collection and analysis of data

Basic measurements were carried out twice; initial measurement just in the beginning of the study and final measurements just at the end of the study. The subjects acted as their own controls.

During both measurement rounds interviews and postal inquiries were complemented by physical examinations at the workplace.

Changes in work ability, well-being, symptoms, adverse effects of the symptoms, frequency of fitness exercises, ergonomic thinking and willingness to continue working were analyzed by computing a work ability index, a symptom effects index, and well-being and activity index for each subject and by comparing the results of the initial and final measurements.

## **Results and conclusions**

The results reveal that at the end of the project the subjects had significantly less symptoms of the upper and lower back. The adverse effects of the symptoms had decreased and the work ability index had increased. The well-being and activeness of the workers had increased during the year. Moreover, the frequency of the workers' fitness exercises increased towards the end of the project.

The confidence of the workers in their possibilities to affect the ergonomics of their work had increased. Personal face-to-face training proved to be the most effective training method. The more often the worksite training session was repeated, the more markedly it seemed to decrease adverse effects of symptoms.

The management and work culture largely decides how the educational message and the latest knowledge are received and what kind of effects the training has. The work culture also determines which combination of training methods and means should be used.

Positive changes are relatively bigger in enterprises with an ordinary work culture and among the subjects with a poor health.

(receipt 2009.9.10, accepted 2009.12.20)

# **Interactions between Complexity and Combinations of Environmental Factors and Human Health**

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## **Abstract**

Interactions between complex combinations of environmental factors and health indicators may manifest in many ways, ranging from immediate reactions and extreme events like death to slowly proceeding maladies, to delayed after effects, to temporary small scaled causes and to subtle deviation of comfortness with occurring separately, simultaneously or sequentially. In general, when studying combined actions and combined effects, time is a crucial factor and must be taken along. Accordingly, instead of looking at the state of health it is more relevant to talk about dynamic health. Human health is a certain kind of continuum; thus the health and the various determinants of health (e.g. total content or volume) are changing as a function of time. Expressions like functional, biological, social, economic and subjective age of a person are ways to characterize the changeable aspect of the concept; the mere chronological age in years matches badly with the involving concept.

Multifactor diseases, inconveniences and injuries such as life style - related diseases like obesity, bipolar disorder, experienced tiredness and fatigue and deviation of safety such as accidents and falls in older adults are thought having been caused by complex interactions between human body functions and various environmental factors. Consequently, the impacts of combinations or sets of environmental factors on human health, performance and life are receiving more and more visibility and attention in the contemporary public debate. In this sense, we use terms like healthy society, healthy workplace, healthy environment and healthy life.

First of all, understanding relationships of environment and health requires a holistic approach due to the very complex nature of the combined actions and effects. Holistic approach would help us to carry out correct environment related measures at work sites and communities as well as to improve the cost-effectiveness of health services, of interventions, of education, of disseminations of information and of data collections itself. By making people aware of the traced relationships of the risk for diseases and injuries and environmental hazards are preconditions for continuous development, effective prevention in practice, productivity as well as for using proper multifactor

pattern in designing good investigation, good workplace or good product.

Along these lines, this presentation indicates the importance of understanding ubiquity, multidimensionality and interdisciplinarity of the environment - health issue. In addition to definitions of terms and newest study findings presentation details ideas of utilizing multiple-objective action planning to conduct multifactor studies. The presentation provides additional argumentations to necessity to explore the linkages between various components of environment and the diversity of possible health change impacts. All in all, this implicates real tasks for representatives of different sciences, experts, educators, business people and decision makers.

**Keywords:** complexity and combinations–environmental factors -human health

## **Introduction**

Interactions between complex combinations of environmental factors and health indicators may manifest in many ways, ranging from immediate reactions and extreme events like death to slowly proceeding maladies, to delayed and retarded after effects, to temporary small scaled causes and to subtle deviation of comfort occurring separately, simultaneously or sequentially.

In general, when studying combined actions and combined effects, time is a crucial factor and must be taken into consideration.

### Dynamicity

Accordingly, instead of looking at the state of health as a permanent condition it is more relevant to talk about dynamic health. Human health is a certain kind of continuum; thus health and its various determinants (e.g. total content or volume) change as a function of time.

Expressions like functional, biological, social, economic and subjective age of a person are ways to characterize the changeable aspect of the concept; mere chronological age in years matches badly with the underlying concept.

### Estimation of own age – subjective age

The ageing of the human body is characterised by a number of age-related concepts

and expressions. Common expression includes the chronological age, which refers to the physical age measured in years, biological age and subjective age. However, it is not possible to point out the precise moment when people and the parts and functions of their body start to grow old. Ageing is a highly individual process.

The most popular measure of age is the chronological age. Chronological age usually refers to age measured using a clock and a calendar between birth and death. But people are much more complex than that, so age should also be perceived as a multi-dimensional phenomenon. For instance, in terms of versatile skills and know-how, work experience, education and professional development play a more central role than age. Likewise, with a view to the physical and mental performance and work ability biological age is more important than the chronological age of a person.

Biological age is usually evaluated by examining such variables as the person's bone structure, blood pressure, near vision, hearing, mobility of joints,

Estimation of own age – subjective age (continued)

elasticity of tissues, and the operation of internal organs.

In the light of recent scientific findings ageing and growing old is attributed to small parts at the ends of chromosomes, the so-called telomeres. The shorter the telomeres, the older the person.

The people at workplaces who participated in the working culture charting were asked to report their subjective age, that is their own estimate of their age apart from their chronological age measured in years.

Subjective age is assumed to work as a general index that reflects either the energy and vitality or the wear-out and frailty of persons and is thus associated to experienced well-being, health and social interaction.

The attached figures illustrate, on the one hand, the connection of the subjective age of persons and their willingness to continue working until the age of 63 or older, and on the other hand, the connection of their subjective age and their ability to continue working.

Estimation of own age – subjective age (continued)

The respondents who felt themselves 5 to 10 years younger than their chronological

age were willing to continue working. By contrast, those who felt themselves 5 to 10 years older than their chronological age were unable to continue working.

Figure 5 (Willingness to continue in present employment until the age of 63 or older with a view to subjective age)

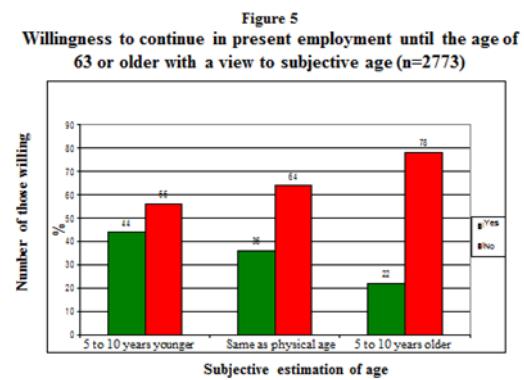
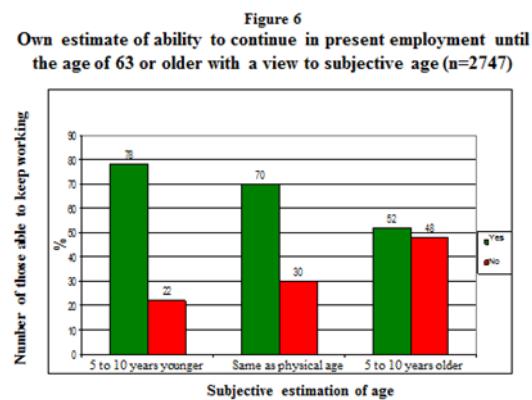


Figure 2 (Own estimate of ability to continue in present employment until the age of 63 or older with a view to subjective age)



It is interesting how people's subjective estimate of their willingness or ability appear as two different dimensions that serve together as holistic indicators of the psychosomatic and functional state of persons.

Subjective age is the age within. Reported subjective ages are useful, for example, when considering proactive measures against the loss of work ability and well-being. Self estimation of age refers to individual capacity as a whole.

## **Environmental burden of diseases and injuries**

Multifactor diseases, inconveniences and injuries such as lifestyle-related diseases like obesity, bipolar disorder, experienced tiredness and fatigue, and adverse changes in safety such as accidents and falls in older adults are thought to be caused by complex interactions between human body functions and various environmental factors.

Consequently, the impacts of combinations or sets of environmental factors on human health, performance and life are receiving increased visibility and attention in the contemporary public debate.

Regarding complexity it is worthy and wise to recognise and also correct shortcomings linked to existing accepted guidelines, limits and maximum allowable values and exposure durations. In this context, the use and selection of criteria (i.e. target organ, target function, target phenomena etc) should be done extremely carefully because any changes of criterion values reflect these complex interactions and combined actions as a function of time.

## **Causes of fatigue or tiredness**

Tiredness and fatigue can be caused by several different factors.

They can have physical causes, mental or emotional causes, work-related, lifestyle-related causes or health-related causes.

### **Falls in older people**

- There are 105000 fatal injury cases per year in EU-region
- There are nearly 40000 deaths from falls among elderly per year in EU-region
- Injuries among elderly generate high health care costs

Previously it was said that falling is an age-related functional consequence. It is now widely agreed that falls and mobility problems result from multiple, diverse and interacting factors.

Falls are the result of a combination of factors rather than one isolated risk factor. Factors are intrinsic (or individual), extrinsic (or environmental like lighting, slippery floors, uneven surfaces, footwear) and exposure to risk.

#### Exposure to risks

- 1) The most active and the most inactive people
- 2) Specific activities seems increase the risk of falls (falls by getting on and off vehicles, chairs, bed, use of tools, toilet, baths etc)

#### Elimination of risks

- 1) Correcting and improving conditions that cause falls (in home, community and in residential areas).
- 2) Learning in advance life-altering conditions and situation ahead.

#### Special meaning of the expression 'healthy'

We use the word healthy in various terms such as healthy society, healthy workplace, healthy environment and healthy life.

First of all, understanding relationships between environment and health requires a holistic approach due to the very complex nature of the combined actions and effects. A holistic approach would help us to carry out correct environment-related measures at work sites and communities as well as to improve the cost-effectiveness of health services, of interventions, of education, of disseminations of information and of data collections itself.

Making people aware of the traced relationships between the risk for diseases and injuries and environmental hazards is a precondition for continuous development, productivity and effective practical prevention of hazards. It also helps in using proper multifactor pattern in designing good investigation, good workplace or good product.

### **Conclusion**

Shortly: Along these lines, this presentation indicates the importance of understanding the ubiquity, multidimensionality and interdisciplinarity of the environment health issue.

In addition to definitions of terms and newest study findings the presentations here details ideas for utilizing multiple-objective action planning to conduct multifactor studies (see the working principle of the Work Life Ability Network - Interactive mode of action at real work sites).

The presentations provide additional argumentations to the necessity to explore the linkages between various components of environment and the diversity of possible health change impacts.

All in all, this implicates real tasks for representatives of different sciences, experts, educators, business people and decision makers.

(receipt 2009.9.10, accepted 2009.12.20)

## **Vocational Adult Education in FINLAND**

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### **Abstract**

The purpose of vocational education in Finland is to raise the level of the population's vocational competence, to develop working life and fulfill it's needs for skilled labor, to promote employment and to support lifelong learning. Vocational education in Finland can be either initial vocational education or competence-based qualification. Initial vocational education is mainly for young people and competence-based is mainly for adults (over 20 years), which have before participated in working life. Competence-based qualifications can be initial, further and specialist vocational qualifications. A competence-based qualification can be completed independent of the method of acquiring the vocational skills. Tampere Adult Education Center offers 96 different competence-based qualifications and development of skills to over 12 000 students every year. Students are adult people from 20 years to over 60 years, both women and men. Students are mainly from Finland, but 10 % are from 40 different nationalities. The four vocational departments are technology industry, business and information services, service industry and construction industry. Education can be employment training, apprenticeship training, in-service training or self-motivated training. There are available tailored instant courses covering actual needs of business branches and issues of various disciplines.

**Keywords:** vocational education- competence-based qualifications- business branches - issues of various disciplines

### **The Finnish National Board of Education (FNBE)**

The Finnish National Board of Education (FNBE) is the national agency subordinate to the Ministry of Education. The FNBE has a wide range of tasks related to the development of education all through pre-primary and basic education, general upper secondary education, vocational education and training, formal adult education and

training, liberal adult education (incl. folk high schools, study centres, summer universities) and basic education in the arts.

FNBE is responsible for drawing up the national core curricula for basic and general upper secondary education and the framework for vocational qualifications and competence-based qualifications.

## **Education structure**

### **Fundamental principles**

The main objective of Finnish education policy is to offer all citizens equal opportunities to receive education, regardless of age, domicile, financial situation, sex or mother tongue. Education is considered to be one of the fundamental rights of all citizens. Firstly, provisions concerning fundamental educational rights guarantee everyone (not just Finnish citizens) the right to free basic education; the provisions also specify compulsory education. Secondly, the public authorities are also obligated to guarantee everyone an equal opportunity to obtain other education besides basic education according to their abilities and special needs, and to develop themselves without being prevented by economic hardship.

In addition, the public authorities are obligated to provide for the educational needs of the Finnish- and Swedish-speaking population according to the same criteria.

Approximately 5.5 per cent of the population have Swedish as their mother tongue. Both language groups have the right to education in their own mother tongue. Regulations on the language of instruction are stipulated in legislation concerning different levels of education. The entirely Swedish-speaking Province of Åland has its own educational legislation.

A major objective of Finnish education policy is to achieve as high a level of education and competence as possible for the whole population. One of the basic principles behind this has been to offer post-compulsory education to whole age groups. In international terms, a high percentage of each age group goes on to upper secondary education when they leave comprehensive school: more than 90 per cent of those completing basic education continue their studies in general upper secondary schools or vocational upper secondary education and training. Issues of educational equality are among the key topics in the new Development Plan for Education and Research for

2007–2012. Its objectives include raising the level of education of the population. The aim is that 92.5 per cent of the age group 25-34 –years-olds will by 2015 pass an examination on upper secondary or tertiary level.

The general structure of education reflects these principles through building open avenues and avoiding dead ends which would lead offside after inconsiderate choices at whatever junction.



**Vocational Upper Secondary Education and Training** Students in vocational upper secondary education and training are mainly aged 16-25 years. The school-based education system means full-time studies for three years at a vocational institution. Education and training of compulsory studies is primarily organised in year classes. Else, students follow their individual study plans.

In the apprenticeship system, training is not based on age groups. The minimum age is 15 and there is no maximum age.

Geographical accessibility of education in Finland is high. The school network is comprehensive at all levels of education throughout the country.

Applicants, who have completed the basic education syllabus or a corresponding earlier syllabus, may be admitted as students to education and training leading to an upper secondary vocational qualification. More precise student admission criteria are determined by the Ministry of Education. The criteria include previous study record in basic education or general upper secondary education (average grade of all subjects and grades emphasized in the relevant field), work experience and entrance or aptitude tests.

Education providers may ignore the order of scores in student admission for individual student-related reasons ("flexible selection"): applicants deemed by the education provider to have sufficient capabilities to complete the education and training may also be admitted as students.

People who have accomplished the matriculation examination and general upper secondary education also have the opportunity to complete an upper secondary vocational qualification.

Admission as a student requires a good state of health, such that it does not form an obstacle to participation in the education concerned.

Admission procedure will take place through the joint application system, which is today an electronic process maintained by the Finnish National Board of Education.

Students are free to choose which educational institution they apply to. If a person does not gain admittance to the school of his or her first choice, other possible schools are considered.

Vocational upper secondary education and training is based on the basic education syllabus. The scope of upper secondary level vocational qualifications taken after basic education is 3 years (120 credits). The duration of studies is up to 40 credits shorter for those who have completed the general upper secondary school syllabus, as some of their studies are accredited.

Even if the education and training mostly takes place in institutions, all qualifications include at least 20 credits (approx. six months) of instruction at the workplace (on-the-job learning). Vocational qualifications may also be completed as apprenticeship training, which also contain courses arranged in the institutions. Furthermore, upper secondary vocational qualifications may also be obtained through competence tests independent of how the vocational skills have been acquired. Like other vocational adult education and training, competence-based qualifications are governed by a separate act.

The objective of upper secondary vocational education and training is to provide students with the knowledge and skills needed to acquire vocational competence and to provide them with the potential for self-employment as well as further studies.

**Upper secondary vocational education and training is primarily free of charge for students, but students have to pay for the materials.**

**A three-year vocational upper secondary qualification gives general eligibility for higher education in both polytechnics and universities.****General Issues**

Vocational upper secondary qualifications and study programmes are defined in a Ministry of Education decree. The fields of education are as follows:

- Humanities and education;
- Culture;
- Social science, business and administration;
- Natural sciences;
- Technology, communication and transport;
- Natural resources and the environment;
- Social services, health and sport;
- Tourism, catering and domestic services

Vocational upper secondary education and training in humanities, education and sports is mainly provided by liberal adult education institutions.

There are altogether 53 vocational upper secondary qualifications and 119 study programmes in them. The qualifications provide the students with a wide variety of basic skills as well as more specialised skills in some areas.

The Vocational Education Act 630/1998 stipulates that the aim of Finnish upper secondary vocational education and training is to provide students with the knowledge and skills necessary to gain vocational expertise, as well as the capabilities to find employment or to become self-employed. In accordance with the provision of the Vocational Education Act 630/1998 and the Government Resolution 213/1999, upper secondary vocational education and training provide students with extensive basic vocational skills for various assignments in their field and more specialised

competence and vocational skills as required by working life in one sector of the qualification. This enables those who are qualified to find placements in working life, to perform various tasks in their field in changing conditions, and so to develop their vocational skills throughout their lives.

Upper secondary vocational education and training fall within level 3 of the EC classification, according to the Council Decision on the comparability of vocational qualifications between the Member States of the European Community (85/368/EEC) and the Recommendation of the Ministry of Education on the classification of Finnish vocational education and training (1998).

#### Upper Secondary Vocational Education and Training in a Nutshell

- Admission requirement is the completion of basic education syllabus;
- Education providers primarily select their students based on earlier academic achievement but may also hold entrance exams or aptitude tests and may take the applicant's work experience into consideration;
- Application takes place through a joint application system electronically;
- The studies primarily aim at obtaining the vocational skills needed in working life;
- Additionally, three-year studies give general eligibility to apply for studies at universities and polytechnics ;
- Opportunities for individual progress in studies have been enhanced;
- A vocational upper secondary qualification can be obtained through attending a vocational school, through apprenticeship training, or through a competence test;
- 20 credits (around 6 months) of the studies are conducted on-the-job;
- Skills demonstrations were launched in 2006 as proof of having reached the goals given to vocational studies.

#### **Adult education**



Adult education policy is designed to provide a wide range of study opportunities for the adult population. Different institutions arrange a great variety of courses and programmes for adults at all levels of formal education, and the provision of liberal adult education is extensive.

With the exception of further and specialist vocational qualifications, adult education and training leading to qualifications is provided free of charge. The government also subsidises other forms of education and training intended for adults in order to keep student fees at a reasonable level.

The annual number of participants in adult education and training is 1.7 million, which makes half of the working age population. This is a very high figure in international terms. The aim is to raise the participation rate in adult education and training to 60% by 2008.

The challenges facing adult education in the future will be to respond to the constant ageing of population and to growing multiculturalism, to motivate adults to study, to improve the learning-to-learn skills among the poorly educated and trained, and especially to ensure equity and equality.

The aim of the adult education is to

1. enhance the knowledge and skills of the adult population;
2. increase educational opportunities for groups that are under-represented in adult learning, and to promote equality and active citizenship.

According to the Adult Education Committee the strategy of adult education and training should be built on four principles in the future:

- 1.self-improvement will form part of the lives of a growing number of citizens, as work communities evolve towards learning organisations;
- 2.adult education and training will provide trained work force for all job categories and all vocations and professions;
- 3.adult education and training will develop teaching and learning methods and content, providing quality opportunities for people to develop themselves both in qualifying and liberal education; and
- 4.adult education and training will maintain and strengthen participatory democracy, prevent exclusion and support active citizenship.

### **The Provision**

Adult education and training is provided by some 800 institutions in Finland; some of them are specialised adult education providers. Adult education is available within the official education system and in liberal adult education in adult education centres, folk high schools and summer universities. Liberal adult education does not lead to a qualification but the studies completed in liberal adult education may be taken into account in preparatory training for competence-based qualification and when making an individual plan for completing competence-based qualifications.

Adult education also includes staff-development and other training provided or purchased by employers. Labour market training is financed by the labour administration and mainly intended for unemployed persons and those aged 20 or over who are threatened by unemployment.

Educational establishments arrange education and training intended for adults at all levels of the education system. It may lead to qualifications or relate to general self-development.

The objective of adult education in Finland is to support lifelong learning among the citizens, to develop society's coherence and equality and to enhance the knowledge and skills of the adult population. Efforts have been made to make the provision as flexible as possible in order to enable adults to study alongside work, among other.

Finnish adult education and training has traditionally been divided into two main areas: general adult education and vocational adult education and training.

Educational institutions and other corresponding education providers involved in adult education and training may be divided into the following groups

General and interest-oriented:

- General upper secondary schools for adults;
- Folk high schools;
- Adult education centres, study centres, and educational organisations;
- Physical education centres;
- Institutions providing basic art education, like music institutions;
- Summer universities.

Vocational:

- Institutions providing vocational education and training;
- Vocational adult education centres;
- Specialised vocational institutions;
- Continuing education centers of universities;
- Polytechnics;
- Home economics counseling organizations;
- Organizations for crafts and design.

Others:

- Commercial organizations

Vocational adult education and training

Vocational adult education and training can be divided into upper secondary and additional vocational education and training. The education or training may be either certificate-oriented or non-formal. Upper secondary vocational education and training is certificate-oriented, whereas additional vocational training may be either.

Adults can maintain and enhance their competencies and to study for qualifications or parts of qualifications through different types of training and approaches such as (i) In-service training; (ii) Apprenticeship training; (iii) Competence test system; and (iv) Labour market training (adult employment training).

### **In-service training**

In terms of the participation rate, in-service training is the most extensive form of adult education and training. According to studies carried out by industrial organizations, companies have started to invest more in the professional development of their personnel. In all companies, at least half of the salaried employees participate in some form of training. Financing of in-service training is mainly the responsibility of the companies.

### **Apprenticeship training**

Apprenticeship training is one form of arranging vocational education and training, which has become popular in recent years. The provider of apprenticeship training (a local authority, joint municipal authority, registered association or foundation) is also responsible for managing apprenticeship training and supervising the apprenticeship contracts. Formal vocational education and training comprises vocational qualifications, further vocational qualifications and special vocational qualifications. Qualifications of all three levels may also be completed as apprenticeship training. Apprenticeship training is available to both adults and young people.

The number of participants in apprenticeship training has traditionally been relatively low in Finland, but student volumes have increased considerably in recent years as a result of increased Government inputs. The number of students more than tripled during the period 1994–1999. In 2006 some 55 000 students took part in apprenticeship training.

The apprenticeship training is based on a working contract, and the practical training periods take place at the workplace in connection with ordinary work assignments.

This is complemented by theoretical studies, which may be arranged at institutions providing vocational education and training, at vocational adult education centers, or at other educational institutions, where necessary.

Apprenticeship training is based on a national core curriculum or the requirements for the relevant competence-based qualification, according to which the student's individual learning programme is formed. It is drawn up so as to allow for the needs and prerequisites of the workplace and the student.

The students' previous education and work experience must be taken into account and accredited in the learning programme. The learning programme is drawn up by the student, the employer and the local administrative authorities in co-operation, so that it can be appended to the apprenticeship contract when the contract is approved.

In apprenticeship training, the employer pays the student a wage for the apprenticeship period. The theoretical studies of apprenticeship training are free of student fees and for the time they spend in theoretical studies, students may receive daily allowance, family allowance as well as financial support for transportation and accommodation expenses. The State is responsible for all these costs.

In terms of financing the apprenticeship system, the State is responsible for fully covering funding: the statutory government transfer accounts for 100 percent of the unit cost confirmed by the Ministry of Education.

### **Competence-based qualifications**

Finland has been developing competence-based qualifications since 1994. This system is intended to enable working-age adults to gain qualifications without necessarily attending formal training. It is possible to take competence-based vocational qualifications, further vocational qualifications and special vocational qualifications or only parts of them through the competence test system, within which competence acquired through various ways is recognized and validated. The competence test is completed by demonstrating competence required in the profession. Although taking part in competence tests does not require formal preparation, about 95% of candidates attend some training, in which they are provided with individual learning programmes. Upper secondary vocational education and training provides preparation

for upper secondary vocational qualifications and additional vocational training prepares for further and specialist vocational qualifications.

In 2007, nearly 64 000 people participated in the competence test; some 32 000 obtained their vocational qualification (all three levels of vocational upper secondary qualifications, further vocational qualifications, and specialist vocational qualifications included) through the competence-based qualifications system and nearly 15 000 a part of it.

There are 53 vocational upper secondary qualifications (qualifying for jobs in the relevant field) and some 300 further vocational qualifications (providing vocational skills required of professionals in the field) and specialist vocational qualifications (those who obtain these are competent in the most demanding tasks in the field) on offer.

The requirements are outlined in the official requirements for competence-based qualification defined by the Finnish National Board of Education. The main principles regarding competence tests are as follows:

- cooperation between employers, workers, and education sector when the qualifications framework and requirements of competence-based qualification are defined and competence tests are organized and assessed;
- the independence of a qualification regardless of the way competence has been acquired;
- completing a qualification or a module demonstrating competence in a test;
- individualisation of learning and the completing of the qualification.

### **Labour market training**

Labour market training (adult employment training) is mainly intended for unemployed people. Some training is also offered to those at risk of losing their jobs and those who are becoming excluded from the labour market. The proportion of unemployed people in the number of new participants has, however, continuously increased during the past few years.

Labour market training is financed by the labour administration and mainly intended for unemployed persons and those aged 20 or over who are threatened by unemployment.

Those participating in labour market (mainly vocational) training or employment training purchased by the labour authorities are paid either a training or employment benefit as well as compensation to cover expenses for travel, food and accommodation arising during the training. The aim of the training is to maintain the balance between labour demand and supply and prevent unemployment and labour shortage.

Teachers and educational staff



At all school levels, teachers are highly qualified and committed. A Master's degree is a requirement, and teacher education includes teaching practice. As the teaching profession is very popular in Finland, universities can select the most motivated and talented applicants. Teachers work independently and enjoy full autonomy in the classroom.

In the spring term of 2005, there were 44,300 teachers and principals in total within basic education and 12,000 in vocational upper secondary education and training.

At general educational institutions, instruction may be given by

- kindergarten teachers, who may give pre-primary education in separate pre-primary classes

- class teachers, who mainly provide instruction for grades 1–6 in basic education, teaching all subjects, and who may also give pre-primary education
- subject teachers, who teach one or several subjects in basic education (primarily in grades 7–9) and/or in general upper secondary education and who may also work at liberal adult education institutions and as teachers of core subjects in vocational institutions
- special needs teachers and special class teachers, who may provide instruction for children in need of special needs education
- pupil counsellors and student counsellors, who may offer educational guidance in basic education and in general upper secondary education.

Teaching staff at vocational institutions may include:

- teachers of core subjects
- teachers of vocational studies
- teachers providing special needs education
- student counsellors of vocational institutions

The principal is also considered a member of the teaching staff. Polytechnics have official teaching posts and other teaching positions for principal lecturers and senior lecturers. In addition, polytechnics may have lecturers and visiting lecturers. Education staff includes e.g. student counsellors, special needs assistants, school psychologists, school public health nurses, school doctors, librarians and administrative staff.

Teachers enjoy pedagogical autonomy in the classroom. Teachers are considered pedagogical experts, and are entrusted with considerable independence in the classroom, and also have decision-making authority as concerns school policy and management. They are deeply involved in drafting the local curricula and in development work. Furthermore, they have almost exclusive responsibility for the choice of textbooks and teaching methods.

Teachers are recruited by the municipalities.

## Teacher training

The education of teachers varies according to the level and type of education or institution they want to be qualified for. In general education class teachers have a Master's degree with a major in pedagogy, whereas subject teachers major in the subject that they teach. Teachers in vocational education and training in turn take pedagogical studies after first having completed a degree in the relevant vocational field. Special needs teachers as well as guidance and student counsellors specialise after having completed their teacher education. In higher education, in polytechnics and universities teachers are generally required to have a post-graduate research degree.

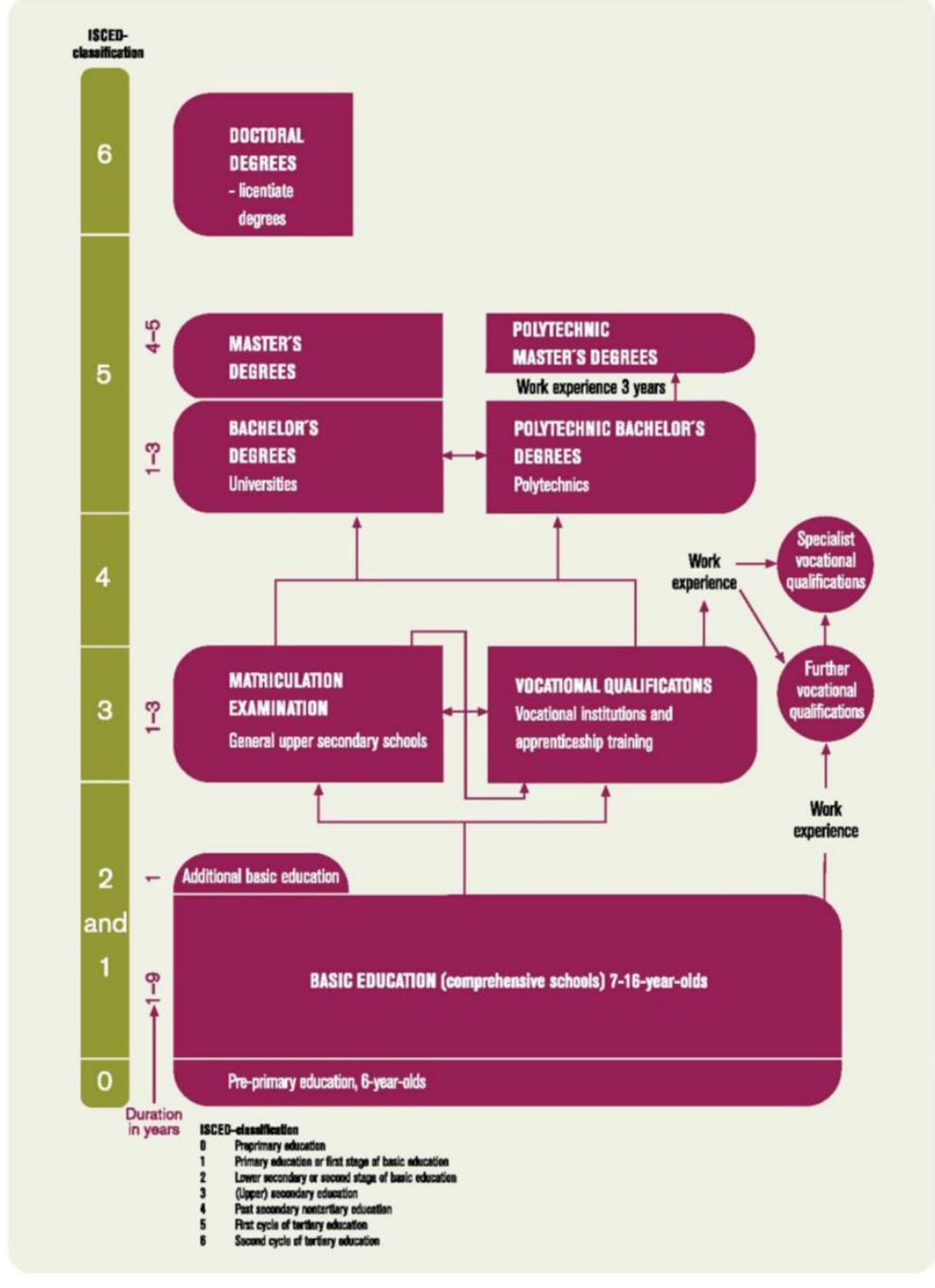
### Teachers at Vocational Institutions and Polytechnics

Since 1 August 1996, Finnish vocational teacher education has been organised at vocational teacher education colleges operating in conjunction with five polytechnics. In addition, two vocational teacher training colleges provide education for vocational special needs teachers and student counsellors.

Vocational teacher education in Swedish is provided by the Faculty of Education at the Åbo Akademi University, as is other teacher education in the Swedish language. There are no specific teacher training schools for vocational teacher education; instead, teaching practice takes place at different educational institutions.

The length of vocational studies teacher depends on the degree they have studied. The basis is the degree, which shall be followed by 3 years work experience and pedagogical training 60 ECTS, of which practical training is 20 ECTS. The pedagogical training for vocational teachers combines theoretical studies with practice, comprising basic studies in education, studies in vocational pedagogy and teaching practice as well as optional studies which can include studies in adult education or special needs education, for example.

## THE FINNISH EDUCATION SYSTEM



(receipt 2009.9.10, accepted 2009.12.20)

## **Safety Management in FINLAND**

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### **Abstract**

Occupational health and safety is a central issue today in Finland. In many workplaces one central goal is a high level of safety and health. Effective occupational health and safety activities at workplace level have demanded persistent long-lasting efforts. Occupational health and safety work is an everyday obligation shared by employers and employees. Good occupational health and safety work has reduced occupational accidents considerably but also improved productivity and safety culture. The Occupational Safety and Health Act (2002) and Occupational Health Care Act (2001) were renewed and they are generally similar to those in the EU. Consequently, a holistic approach to safety management is necessary from the very practical point of view. In Finland we have used methods such as interviews to experts in the field of occupational safety and health as well as interviews and audits at workplaces, which are active in occupational safety and health work. Through this we can also promote and implement best practices at work sites. Results from these projects show that many workplaces have weaknesses in organizing occupational health and safety activities and also in attitudes. Furthermore, results of safety management show that occupational health and safety work has become everyday work and is no longer differentiated from other forms of management such as quality management. Risk assessment has become routine and a systematic mode of action. Measurement and follow-up procedures are essential, and interviewees see them as a central method to improve occupational health and safety. As a rule, experts and representatives of companies agreed on most discussed issues. The results lend support to the notion that the main elements of a good occupational safety management system are a safety policy, defined obligations and responsibilities, risk assessment, measurement and follow-up as well as training and interaction.

**Keywords:** occupational health- safety- Health Act- Occupational Health Care Act- EU

## ESSENTIAL ISSUES IN THE OCCUPATIONAL SAFETY AND HEALTH ACT

The Finnish Occupational Safety and Health Act (or OSH Act), is a good indicator for improving occupational safety and health. The Act entered into force in the beginning of 2003.

The central message of this Act is to put the workplaces into a good condition, to improve them.

Modern management today in workplaces aims at better results both in economy and safety. The same management attitude is also included in the modern concept of occupational safety and health.

Only a good level of well-organised safety and health at work can produce good results. The targets of safety and health can be seen both in economic and qualitative assessments. However, the most essential result is that employees can carry out their work tasks in healthy and motivating working conditions.

The Act does not mention safety management by that name. However, many provisions of the Occupational Safety and Health Act include the idea of safety management. It is necessary to lead and manage work in a way that systematically takes account of safety. If this is not accepted or understood at the workplace, it is very difficult to get safety matters under control there.

Management means being in control of matters

### 1. Risk assessment

Safety management starts with analysing and understanding the problems and circumstances at the workplace and what they mean regarding safety. The tool offered by the Act for this purpose is risk assessment. It belongs to the employer's duties to carry out a risk assessment in the workplace and to keep it up-to-date.

The analysis and identification of the hazards and risk factors at work in accordance with section 10 in the OSH Act provides a good foundation for risk assessment. It is important to understand that matters must be improved and faults corrected as soon as possible.

The best results are achieved through an accurate risk assessment. It is necessary to learn from the past, to use expert help, and to have versatile intern

interaction that serves the investigation of the background of different problems in the workplace.

## 2. Occupational safety and health policy

In accordance with section 9 in the OSH Act, the employer shall draw up an occupational safety and health policy for the planning, organisation and execution of measures. The policy is used to promote health at the workplace and prevent the arising of hazards and risks at the workplace.

The policy presents the workplace's common viewpoint on occupational safety and health, when also the employees make it their duty and commit themselves to the policy.

For the planning of measures there is also reason to take account of sections 12 and 13 in the OSH Act. Additionally, it is necessary to ensure that the new work conditions are going to be in conformity with the law.

## 3. Effective measures

The most important issues for the management to decide is, naturally, the measures. Section 8 in the OSH Act includes provisions on them. The employer must carry out the necessary measures with care. In that connection, the employer shall consider the circumstances related to the work, working conditions and other aspects of the working environment as well as the employees' personal characteristics and qualifications.

The goal of the measures is to improve the working conditions. This has to be seen as a continuous obligation.

Section 1 in the OSH Act puts emphasis on three sectors of the improvement of working conditions. These three sectors are: -promotion; -prevention; and -protection.

The state of the workplace shall be continuously improved. The principle of continuous improvement helps to understand that the development of working conditions is a process that aims at constant evaluation, new measures and more and more efficient solutions regarding occupational safety and health.

## 3. Auditing

Any new assessment demands uninterrupted follow-up to its support. According to section 8 in the OSH Act, the employer shall continuously monitor and audit the working environment, the state of the working community and

the safety of the work practices.

The monitoring has to be extensive and comprehensive, but at the same time detailed enough to be effective. The impacts of measures put into practice on safety and health at work form an important sector of the monitoring. Such follow-up of impacts often demands a rather long time span. In that process it is good to get support from various indicators like the development of sick leaves and other health data. A careful employer also acquires information from occupational health care service providers and uses their expertise in the follow-up and development work.

#### Towards a safe working culture

The safety level of the workplace and its daily routines are affected by the employer's safety solutions. Good results that function well are achieved by mutual cooperation and interaction at the workplace. The results are achieved with the help of trust and open discussion that require good knowledge on safety at work. Also work induction, guidance and safety training as well as special expertise are very important in this connection.

Section 14 of the OSH Act deals with the training and guidance to employees in a versatile way, and the section also reminds that the instruction and guidance shall be complemented when necessary, and whenever the circumstances change.

All parties of the workplace must be aware of their safety duties and tasks and carry out them very well. A minor neglect can lead to severe consequences.

Only working safely can, in the long run, be competitive and give good results. Good working conditions are also a proof of a clear commitment to modern safety culture where accidents and bad luck are given less and less opportunities.

Annexes The Finnish Occupational Safety and Health Act, sections 1, 8, 9, 10, 12, 13 and 14 Two diagrams

#### Annex I

Department for Occupational Safety and Health Finland

Mr. Reino Kanerva Government Counsellor, Legal Affairs September 7, 2009

SOME SECTIONS OF THE FINNISH OCCUPATIONAL SAFETY AND  
HEALTH ACT (NO. 738/2002)

## Section 1 – Objectives

The objectives of this Act are to improve the working environment and working conditions in order to ensure and maintain the working capacity of employees as well as to prevent occupational accidents and diseases and eliminate other hazards from work and the working environment to the physical and mental health, hereinafter referred to as health, of employees.

## Section 8 – Employers' general duty to exercise care

(1) Employers are required to take care of the safety and health of their employees while at work by taking the necessary measures. For this purpose, employers shall consider the circumstances related to the work, working conditions and other aspects of the working environment as well as the employees' personal capacities.

(2) Such unusual and unforeseeable circumstances which are beyond the employer's control, and such exceptional events the consequences of which could not have been avoided despite the exercise of all due care, are taken into consideration as factors restricting the scope of the duty to exercise care.

(3) Employers shall design and choose the measures necessary for improving the working conditions as well as decide the extent of the measures and put them into practice. Accordingly, the following principles shall be observed as far as possible:

- 1) preventing the creation of hazards and risk factors;
- 2) eliminating the hazards and risk factors or, if this is not possible, selecting a less hazardous or harmful alternative;
- 3) adopting safety measures which have a general impact before individual measures; and
- 4) taking account of technological developments and other available means.

(4) Employers shall continuously monitor the working environment, the state of the working community and the safety of the work practices. Employers shall also monitor the impact of the measures put into practice on safety and health at work.

(5) Employers shall ensure that safety and health measures are taken into account in an appropriate manner in the operations of each part of their organisations.

#### Section 9 – Occupational safety and health policy

The employer shall have a policy for action needed in order to promote safety and health and to maintain the employees' working capacity. The policy must incorporate the need to develop the working conditions and the impact of the working environmental factors (occupational safety and health policy). The objectives for promoting safety and health and maintaining working capacity deriving from the policy must be taken into account in the workplace development and planning, and they must be discussed together with the employees or their representatives.

#### Section 10 – Analysis and assessment of the risks at work

(1) The employer shall, taking the nature of the work and activities into account, systematically and adequately analyse and identify the hazards and risk factors caused by the work, the working premises, other aspects of the working environment and the working conditions and, if the hazards and risk factors cannot be eliminated, assess their consequences to the employees' safety and health. When doing so, the following matters must be taken into account among other things:

- 1) the risk of injury and other illness, paying special attention to such hazards and risks of the work or at the workplace concerned as mentioned in Chapter 5;
- 2) any accidents, occupational diseases and work-related illness and hazardous incidents at the workplace;
- 3) the employees' age, gender, occupational skills and other personal capacities;
- 4) factors related to workload; and
- 5) the potential risks to reproductive health.

(2) If the employer does not have adequate expertise for the action referred to in subsection 1, he or she shall use external experts. The employer shall make sure that the experts have adequate competence and other qualifications needed for carrying out the task properly. Provisions on the use of occupational health care experts and professionals and on workplace surveys are laid down in the Occupational Health Care Act (1383/2001).

(3) The employer shall be in possession of the analysis and assessment referred to in subsection 1. The analysis and assessment must be revised when the conditions essentially change, and it must also otherwise be kept up-to-date.

(4) Further provisions on the written or other verifiable form and content of the analysis and assessment, and specifying how the matter shall be handled at the workplace, taking account of the employer's line of business, the nature of the activities and hazards and risks associated with them, and the size of the workplace, may be given by Government decree.

## Section 12 – Design of the working environment

(1) When designing the structures of the working environment, working premises, working or production methods or the use of machinery, work equipment and other devices used at work as well as the use of health-hazardous substances, employers shall ensure that their impact on the safety and health of employees are taken into account and that they are suitable for the intended use. The provisions of section 10(1) shall be observed, as appropriate, in analysing and assessing hazards and risks.

(2) In connection with design, it shall be ensured that the conditions under design meet the requirements laid down in this Act. When necessary, handicapped employees and other employees whose working activities, as well as health and safety, otherwise call for special measures shall be taken into consideration in the arrangements.

(3) If the design work referred to in subsection 1 is assigned to an external designer, the employer shall give the designer adequate information on the workplace under design.

## Section 13 – Work design

In designing and planning work, the physical and mental capacities of employees shall be taken into account in order to avoid or reduce hazards or risks from the workload factors to the safety and health of the employees.

## Section 14 – Instruction and guidance to be provided for employees

(1) Employers shall give their employees necessary information on the hazards and risk factors of the workplace and ensure, taking the employees' occupational skills and work experience into consideration, that:

- 1) the employees receive an adequate orientation to the work, working conditions at the workplace, working and production methods, work equipment used in the work and the correct method of using it, as well as to safe working practices, especially before the beginning of a new job or task or a change in the work tasks, and before the introduction of new work equipment and new working or production methods;
- 2) the employees are given instruction and guidance in order to eliminate the hazards and risks of the work and to avoid any hazard or risk from the work jeopardising safety and health;
- 3) the employees are given instruction and guidance for adjustment, cleaning, maintenance and repair work as well as for disturbances and exceptional situations; and
- 4) the instruction and guidance given to the employees is complemented, when necessary.

(2) Further provisions governing the instruction and guidance as well as written working instructions provided for employees and the occupations and tasks requiring special competence, and the ways to prove such competence, may be given by Government decree. An acceptable proof of competence is also a qualification, certificate or other document on education issued abroad in accordance with the provisions of the Act on the Implementation of the General System for the Recognition of Professional Qualifications of European Community Citizens or the provisions of international agreements binding on Finland.

(receipt 2009.9.10, accepted 2009.12.20)

# Diverse Types of Entrepreneurs: Report on a German Research Project

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## **Abstract:**

The Global Entrepreneurship Monitor (GEM) 2007 Report states again that women entrepreneurs make an important contribution to the development of the world economy. Nevertheless, the image of the entrepreneur in Germany continues to be based on the (masculine) entrepreneur of the early 20th century, which might be one cause of the gender gap in starting and growing businesses in Germany. In this paper this hegemonic image of the entrepreneur is confronted with a more diverse picture derived from a research project in which a variety of qualitative methods were applied. From interviews with women entrepreneurs as well as with men four types emerged: The strategic planner is the only type who corresponds closely with the hegemonic image of the entrepreneur: working around the clock for his plan-guided business, unburdened by caring for his family. The step-by-step entrepreneurs develop their business in a planned out, step-by-step process, adjusting to the respective circumstances that arise. These include both the personal living circumstances as well as market conditions. Before encountering a critical life event, none of the crisis entrepreneurs gave much consideration to the challenge of taking up an entrepreneurial activity. Nevertheless, they developed entrepreneurial qualities by running a business. Bricoleurs use elements of their biography (key experiences, specific qualifications), thus constructing resources and business opportunities.

**Keywords:** strategic planner- step-by-step entrepreneurs- crisis entrepreneurs- Bricoleurs

The Global Entrepreneurship Monitor (GEM) 2007 Report on Women and Entrepreneurship states again that women entrepreneurs make an important contribution to the development of the world economy. Therefore, investment in women's entrepreneurship is a key contributor for countries to increase the volume of new venture creation. Ignoring the potential of women's entrepreneurial activity means for the authors of the GEM-Report on Women and Entrepreneurship "that countries

put themselves at a disadvantage and thwart their opportunity to increase economic growth. For this reason, finding ways to empower women's participation and success in entrepreneurship is critical for more sustainable and successful economic development in all countries. (Allen/Elam/Langowitz/Dean 2008: 6)

Keeping in mind that women's entrepreneurship matters to foster the creation of value the German government supported women-run businesses. According to German government statistics, since 1998 over 1 billion euros have been spent on supporting women-run businesses. Nevertheless, around 75% of German female business founders still see themselves as discriminated in comparison to men (bga 2007) and in 2006 Germany maintained the critical position 36 (out of 37 countries) in GEM concerning support of female start up activities (see Sternberg/Brixy/Hundt, 2007). Rolf Sternberg and Heiko Bergmann (2003: 33) have pointed out that besides a lack in supportive infrastructure there still exist cultural factors that are "not necessarily conducive for women starting business in Germany. [...] In recent years, media reports about starting businesses have increased, but the image of the typical business founder continues to be male dominated". Still nowadays, the image of the entrepreneur in Germany continues to be based on the (masculine) entrepreneur of the early 20th century, which might be one cause of the gender gap in starting and growing businesses in Germany<sup>\*1</sup>.

### **The Hegemonic Image of Entrepreneurs**

In viewing the growth model of 'classical' entrepreneurship theory, (See Flamholtz/Randle 2000, Baghai/ Coley/ White 2000, Timmons 1999) it also becomes apparently that the "normal case" of growth is to be found in the expansion of the business in terms of employees and sales, which is implicitly or explicitly evaluated in a positive way. In this entrepreneurial image the "entrepreneurial hero" or the "heroic self-made man", respectively, continue to predominate (see Reich, 1999: 25, see also Ahl, 2006: 599, 613). According to this myth, the unspectacular people encountered in everyday life have no place in founding and running a business; nor is there room for the entrepreneurial thinking and acting of female employees: "To the entrepreneurial hero belongs all the inspiration; the drones are governed by the rules and valued for their reliability and pliability." (Reich, 1999: 26)

The functionality of such views for industrial societies may have held sway for a long time, but, in light of an increasingly observed transformation to a knowledge-based information society, many now see these views as obsolete at the very least, if not dangerous. This hegemonic (masculine) type of entrepreneurship belies the

heterogeneity of today's entrepreneurial activities in Germany (and the world at large). The latter are characterised much more by the diverse forms of businesses themselves as well by the entrepreneurial individuals and their motivations in founding, running or taking over a business. Therefore Dorothy Moore (2006: 8) calls for the development of a new "career lens" that captures the fluid character of the context in which female careers develop: "For the womanpreneur, irrespective of any single career strategy or combination, it is the ability to self-design a career and make the necessary crossovers at important life points that are keys to success. As depicted here, the interacting links and the core of energy drive the entrepreneurial woman. How that drive works out depends on personal and environmental factors, backgrounds, perceptions and individual circumstances, and the moderating influence of seeking work-life balance." Recent studies point to a growing proliferation of different business forms, a development seen to be largely attributable to the increase in female businesses. (See Arum/ Müller 2004; Lohman/ Luber 2004: 37.) Thus, apart from the traditional entrepreneurship, there is also a distinct 'part-time entrepreneurship' or 'side entrepreneurship' and a 'necessity entrepreneurship,' which is founded in an unemployment situation or to avoid it, but which exhibits or can develop entrepreneurial characteristics. (see also Bührmann/Pongratz 2010)

We confronted this hegemonic image of entrepreneurs with a more diverse picture <sup>\*2</sup> derived from a research project, in which a variety of methods were applied. In order to gain an adequate understanding of entrepreneurial activity, a trans-disciplinary research design is required, one that is constructed in a process-oriented way and contains both quantitative and qualitative methods. Nevertheless, there is an emphasis on qualitative methods in our approach, the use of which has been increasingly called for by the international entrepreneurial research community (see e.g. Hindle, 2004: 577).

Qualitative approaches are particularly suited to the task of investigating new phenomena or ones caught in an emergent stage and enable the study of especially intricate aspects of these phenomena, such as feelings and thought processes (see, for instance, Strauss/Corbin, 1998: 11).

At first we performed a discourse-analysis<sup>\*3</sup> of the image of female entrepreneurs of organisations and institutions that consult and support prospective (female) entrepreneurs. Our focus was laid on understanding what knowledge about founding a business our interviewees are confronted with and whether and to what extent they are able to identify with this knowledge. Thus, we considered the websites as an element of the inter-discourse, concerning the topic of starting, running or taking over

a business.

By conducting this discourse analysis we reconstructed what we call the 'normal entrepreneur'. This entrepreneur is implicitly expected to be male, because he is working around the clock for his plan-guided business, unburdened by caring for his family. He is founding his business as a solo entrepreneur, not as part of a team or a cooperative (see also Bierbaum 2008).

Furthermore:

- He makes lengthy preparations to become self-employed and structures life around preparing for self-employed activities.
- He shows a distinct type of 'enterprising self' (Miller / Rose 1995). His care for the business is complemented by a pronounced desire for self-realisation. A high value is placed on ongoing personal and professional training and education.
- He uses mainly cultural capital as a resource and obtains specific qualifications to realise goals.
- Family is important for him, however, as social capital.

We conducted 29 narrative, problem-centred interviews with female and male entrepreneurs. In a process of open coding, developing categories and relating them to subcategories, we made patterns emerge which we then connected to theoretical concepts found in literature. Our result of this part of the project is a typology<sup>\*4</sup> covering the following four types which emerged from interviews with women entrepreneurs as well as with men<sup>\*5</sup>:

- Strategic Planners
- Step-by-Step Entrepreneurs
- Crisis-Entrepreneurs
- Bricoleurs

Those types differ regarding the categories: reason for starting the entrepreneurship, the entrepreneurial process, the capital resources of the entrepreneur<sup>\*6</sup> and their self-perception as an enterprising self.

The **strategic planner** corresponds closely with the hegemonic image of the 'normal entrepreneur'. This type is working around the clock for his plan-guided business, unburdened by caring for his family - on the contrary, the family cares for him and functions as a support system "in the background." Entrepreneurs of this type make long-time preparations to start their business and structure their lives around preparing for their self-employed activities.

"I became self-employed at age thirty three. I had planned that ten years previous. I had always told my girlfriend that at some point I would work for myself by running a fitness studio.... After I trained to be a clerical worker, I took the next path and became a physical therapist, because it's really important for me to be well qualified. It's always been of the utmost importance for me to have solid professional training and to be prepared for everything." (Ms. E.)

The strategic planner shows a distinct type of enterprising self. A high value is placed on ongoing personal and professional training and education. Apart from a marked willingness to pursue "life-long learning," a caring attitude concerning the well-being of the business is a motivating factor of the entrepreneurial activities of the strategic planner.

**Step-by-step entrepreneurs** develop their business in a process that has been planned out, beginning with the start-up idea (which often is based on professional experience or the acquisition of specific knowledge), and adjusting to the respective circumstances that arise.

"Each interim goal I reach brings a new goal. I've noticed that I'm someone who's always moving forward. I've come to think in dimensions—I never thought that was possible. But that's in fact how it is." (Ms. K.)

Those entrepreneurs do not primarily assess the development of the business in terms of quantitative growth. Planned reduction is an accepted option, depending on the personal and market-related circumstances:

"I don't want any more growth, because it won't work out if I grow and remain solo. I have to find a partner to do that and I don't want that right now. Of course, I ask myself at the moment, where do I stand? Or, what position am I actually in as a business?...It's a difficult question, because for the first time in my life I'm asking myself if I should take a step back and become smaller. And that's almost more difficult than becoming larger, in terms of how I lead my life..." (Ms. J.)

Entrepreneurs of this type direct their care mainly toward themselves, "... being content with a manageable business that provides them with a living."<sup>17</sup> "Doing something I have fun doing" is a common motivation, as is "being able to work the way I want to". Many interviewees of this type regarded themselves as lacking leadership ability in the early stages of their business' development. They have grown step-by-step into their role as the "boss":

"And I had to learn and realise that despite everything, even though I'm nice, I'm still the boss ... there are two worlds and I can't enter the other world. Of course, I'll go with them to eat an ice cream or something, but there are areas where my

presence isn't wanted. And I had to recognise this (differentiation of roles), which was extremely difficult in the beginning." (Ms. J.)

They identify themselves closely with their businesses and see this as "typical for an entrepreneur." This identification is mainly functional in nature and an important identification criterion is success:

"I'm definitely an entrepreneur—otherwise I wouldn't be successful." (Ms. K.).

Entrepreneurial characteristics the interviewees ascribe to them-selves included ambition, a high degree of professional competence, possession of a wealth of ideas as well as the willingness to take on responsibility. At the same time, some of them have difficulties labelling themselves as entrepreneurs:

"You're labelled an entrepreneur even as a small business with three, four employees. That's simply what you're considered, but I don't feel like some raving entrepreneur who has to be in this group. I'd rather continue to see myself as a freelancer. I don't really see myself as an entrepreneur." (Mr. E.)

Obviously, the status attached to being a (female) entrepreneur, which is defined through the hegemonic image of the entrepreneur, does not offer the interviewed persons of this type a figure they can identify with.

The third type we named '**Crisis Entrepreneurs**'. Their decision to engage in entrepreneurial activities has been initiated or even dominated by external factors people have little or no control over. Specific critical life events we were able to identify as relevant in Germany at the beginning of the 21st century are

- unemployment or looming unemployment, connected with poor or non-existent possibilities in the labour market,
- the German reunification in 1990, which led to massive changes in economic structures the decades following,
- death of a father or husband, which necessitated the decision to continue running or to take over the family business.

Even if these business founders and owners seem very heterogeneous at first glance there are many commonalities that emerged in the interviews. Before encountering a critical life event, none of the crisis entrepreneurs gave much consideration to the challenge of taking up an entrepreneurial activity. Nevertheless, they developed entrepreneurial qualities by running a business. The care for others, whether they be children, family or employees, is the central concern in the founding or taking over of a business. Caring about the business is likewise pronounced, but is clearly perceived as a means to an end. The first priority is caring about people, about others. Self-concern

is focused on little or not at all.

The entrepreneurs characterised here from the new (east) and old (west) German states share a tendency to identify much more with the image of the entrepreneur as expressed through individual entrepreneurial attributes, rather than with the entrepreneurs as associated with big business and high management ratios. Their image of the entrepreneur is characterised by boldness and innovation. In contrast to the image of the normal entrepreneur, their idea of an entrepreneur is a founder who works actively with others and draws on a wealth of ideas.

The hegemonic entrepreneurial image obviously hinders these women from identifying themselves as entrepreneurs.

Interviewer: "Do you see yourself as an entrepreneur?

Ms. I.: ... not as a traditional entrepreneur.

Interviewer: What is a traditional entrepreneur?

Ms. I.: Well, someone who learned everything from scratch and had a very different background than I have, because I had to learn a lot over time. I don't have this typical background, a degree in business and accounting ..." (Ms. I.)

A clear link can be seen here between the growth of an entrepreneurially-moulded self-perception and the successful development of the business. The entrepreneurs recognise what they do for the business and grow into their roles:

"I really grew into it. It just came to me." (Ms. T.)

"I see myself as being ...stronger as an entrepreneur. Since I've been freed from this certain pressure here and we've restructured, management-wise—I've seen myself more as an entrepreneur since that time." (Ms. I.)

These entrepreneurs demonstrate a marked identification with the business:

"... the firm and me myself. That's one thing. I can't separate them." (Ms. P.)

"Because I live with and for the firm." (Ms. P.)

For all of the entrepreneurs grouped under the crisis label, a pronounced change occurred over time in their view of the image of an entrepreneur, because the critical life event for these women meant their initiation into becoming an entrepreneur was like "jumping into cold water":

"It's a really a tremendous amount of work. I have to say that you don't have any idea of that beforehand." (Ms. B.)

Those who have become entrepreneurs through the advent of a critical life event — especially the family entrepreneurs — place high demands on themselves and others. They developed an entrepreneurial personality that follows criteria of economic

efficiency, criteria that apply to the whole of the self. This type receives and revitalises a business, as can be shown in the case of the quasi-forced taking over of a family business, in which previously non-entrepreneurially oriented actors develop their enterprising self through their daily work. A similar situation can be found in the special case of businesses that were “phased out” in the aftermath of the GDR, parts of which were taken over by previous employees and given a new direction. For Germany, this type of entrepreneur is important in view of the ca. 350 000 companies in need of new owners in the future (Freund, 2004) and in connection with the ongoing integration of the new German states. The success factors of this group are thus deserving of more investigation.

**Bricoleurs**<sup>8</sup> use elements of their biography (key experiences, specific qualifications: internal bricolage) associating those to the pool of resources immediately available in the external environment (external bricolage), thus constructing resources and business opportunities. Joan Winkel distinguishes explicitly between internal and external bricolage, interpreting bricolage as a moderator of the relationship between opportunity discovery and opportunity development on the one hand and between opportunity development and opportunity exploitation on the other hand. Bricolage is seen as a means of leveraging the entrepreneur’s prior knowledge and other existing resources to navigate the entrepreneurial process (Winkel 2007: 5). A typical experience has been expressed by one of our interviewees:

“I had the luck of getting a film in my first year that had already been very successful at other festivals. That was obviously the best thing that could’ve happened to me. At the same time, I felt that my colleagues were suspicious of me, that they were wondering how I got this film, which others had also tried to get.” (Ms. D.)

In contrast to the step-by-step entrepreneurs, the bricolage type entrepreneurs are more pro-active in the founding and formation of the business:

“For me, it was important at first [...] to have enough energy to do it and pave my own way exactly. I knew precisely where I wanted to go. And I took along the others who were with me.” (Ms. G.)

In the later development of the business, exploiting opportunities also proves to be an effective strategy of opening up the developmental possibilities of the company. The positive experiences with this approach lead the entrepreneurs to be open to new chances and to seizing opportunities:

“In that case I didn’t think twice. Maybe, if a good opportunity arises ...” (Ms. C.)

Moreover bricoleurs make good use of impetus from the environment to successfully

navigate the business:

"Then I came into contact with "Gourmet of the Day", from the paper Feinschmecker. They wanted to do a cooking show for this day and they wanted me to do it. I did that and then came up with the idea to offer cooking courses there. That's what I'm doing now. That developed like that in a year and I've gotten new customers through the cooking course and it's progressed like a snowball effect." (Ms. C.)

Most of the bricoleur entrepreneurs have developed a distinctive enterprising self, even if they would not be inclined to call it that. They take an entrepreneurial approach both to their workday as well as their private lives:

"As soon as I walk out the door, I think about how I'm being perceived. I'm private at my own place but when I go out I think, the person you meet on the street could be your customer." (Ms. L.)

The bricolage entrepreneurs are often motivated by the pressure of self-realisation. They truly want to be 'independent' and in a position to realise their own ideas and visions.

Interviewer: "Was there something you wanted to achieve by being self-employed?

Yes, just what that word expresses, to be self-employed, to never have to encounter a boss who pushes me around. It's nice to know I can decide for myself where I'm going, how I'm going to do something, definitely." (Ms. Q.)

For bricoleurs the topic of "economic capital" was rather marginal.<sup>9</sup> They assess ideas as crucial, instead, and make use of social capital (networks) to leverage their impact. The majority of bricolage entrepreneurs in our sample are well educated, thus having access to this form of cultural capital as well as to role-models in family.

The image of the entrepreneur plays a subordinate role in this group, however, because the status "entrepreneur" is not a decisive factor for them in founding a business. The self-perception of these entrepreneurs often deviates significantly from the rather hegemonic-oriented idea of the "entrepreneur in general." This type exhibited the tendency to reject the entrepreneur status but to identify closely with their respective profession. A salient facet of this group was their distinguishing between the "entrepreneur as such (an sich)" and "oneself as entrepreneur."

"But I would also question whether I'm an entrepreneur because I work in the field of social work. I don't know. You don't use that word there. I think that more knowledge about entrepreneurship is useful. And I see too that I'm undertaking things that have to do with being an entrepreneur but I actually wouldn't really

call it that, not really. You don't ever use that word in the field of social work.

Interviewer: How would you refer to yourself then?

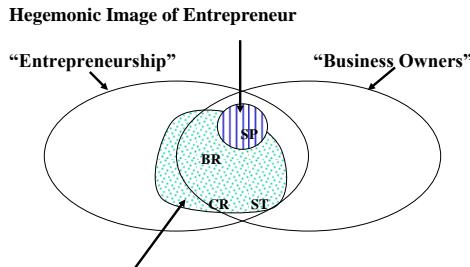
I have a large practise." (Ms. R.)

The strength of the bricolage type is being able to "create something from nothing" (Baker/ Nelson, 2005) and thus to set new impetuses in motion. This correlates exactly with the political will and economic necessity of regions that are subject to structural change without access to a generous amount of capital resources. To that extent, the bricolage type should take up a more central position among prevailing entrepreneurial images.

## Conclusions

One can not simply assume that business owners have necessarily developed entrepreneurial characteristics. Therefore, we have to be careful not to mingle both categories. In our framework we distinguish "entrepreneurship" as a concept to be set apart from existing (male and female) "business owners" (see diagram 2). As we showed in our project, crisis and step-by-step entrepreneurs slowly grow into the role of an entrepreneur, thereby developing specific profiles as "enterprising selves". This highlights the necessity to further research on the processes of developing entrepreneurial qualities before or after becoming business owners. On the other hand, those qualities are also called on, developed and required when the individuals in question are managers, employees, teachers, researchers and students – or unfurl their entrepreneurial skills in the "underground economy" (Williams 2006). This implies expanding the currently dominating understanding of entrepreneurship which is mostly related to business owners. Therefore, the border areas of both zones as well as the overlapping part should be looked at more closely in full shape.

Diagram 2: Mapping Entrepreneurship



**Entrepreneurial Diversity**

BR: Type Bricoleur  
 CR: Type Crisis  
 SP: Type Strategic Planner  
 ST: Type Step-by-Step

In the overlapping area, we position the hegemonic image of the entrepreneur at the core, an image that continues to take its bearings from the classical type of business persona described in the first part of this chapter. This 'normal entrepreneur' is primarily seen as one who evinces entrepreneurial qualities through the growth and expansion of his/her business. Success indicators for this type are sales and number of employees, figures relied on to demonstrate the expansion of the entrepreneurship. This hegemonic image of the entrepreneurship reflects only a portion of the actual entrepreneurial activities found in the intersecting field of 'entrepreneurship' and 'business owners.' Nevertheless, this image can make it difficult for potential, female entrepreneurs or others to regard themselves as 'entrepreneurs' and to act accordingly. For that reason, we are calling for a more diverse image, based on a comprehensive understanding of 'value added'. In order to really understand the growth of an enterprise, one must go beyond management ratios, highlighting how growth influences different stakeholders and the society. Not an individual entrepreneur but rather the interplay of actors should be focused. (see e.g. Bierbaum 2008) Sustainability of the firm's existence and impacts should be closer examined as well.

Moreover, non-linear processes due to complex relations among success factors have to be taken into consideration (see Kollmann, Herr & Kuckertz 2008) Growing enterprises generate their own complexities; successfully negotiating these complexities can only come about through a learning process. This must also be incorporated into the (male and female) image of the entrepreneur, thereby focussing cognitive aspects as well as affective ones and the interactions of both systems. (see Baron 2008)

<sup>1</sup> As Vishal Gupta, Daniel Turban and Nachiket Bhawe (2007) show, this effect is supposed to be strong in the case of implicitly presenting a masculine stereotyped image of entrepreneurs, which encourages men's intent to found a business and discourages female potential founders even if both groups have had similar entrepreneurial intentions. If those stereotypes are presented explicitly, the effect went in the opposite direction. Insofar, we argue that "political correctness" in presenting images of the entrepreneur will be counterproductive as long stereotypes are still active in the consultant's minds and therefore expressed only implicitly.

<sup>2</sup> This includes as well analysing differences among female entrepreneurs, thereby following Patricia Lewis who considers this being an under researched field (2006: 461). As Cheryl Tibus (2007) shows, there exist clear leadership profiles distinguishing female business owners from business executives, the former scoring higher on transformation a leadership behaviours and characteristics than the latter ones. If "context does matter" (Tibus 2007: 13) this point of view should be a fruitful one when analysing our types of entrepreneurs further.

<sup>3</sup> See for methodology and method of discourse analysis e.g. Chilton: 2004; Gee: 2005, Fairclough: 2004.

<sup>4</sup> These types are to be understood as Weberian pure types ('Idealtypus'). They are abstractions but claimed nonetheless as essential to understand any particular social phenomena. (see Weber: 1903 – 1917 [1949].

<sup>5</sup> In detail, those types are analysed and described in Bührmann, Hansen, Schmeink & Schöttelndreier 2007.

<sup>6</sup> In this point we related our findings to the concept of Pierre Bourdieu (1979, 1983).

<sup>7</sup> This sentence characterises the attitude of the majority of small business owners, be they men or women, as Ahl points out (2006: 613).

<sup>8</sup> We refer concerning the concept of bricolage primarily to Ted Baker & Reed E. Nelson (2005). See also Levi Strauss 1962; Joan Winkel 2007.

<sup>9</sup> In order to avoid tension or inhibition during the interviews, questions concerning yearly sales, start-up capital, etc. were excluded from the interview questions.

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(receipt 2009.9.10, accepted 2009.12.20)

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**Archives of Complex Environmental Studies (ACES)1-2: 2010**

**(published 2010.11.30)**

**<http://iccef2009.viii>**