VILNIUS UNIVERSITY

LOLITA RAPOLIENĖ

EVALUATION AND PREVENTION OF LIFESTYLE AND PSYCHOEMOTIONAL STATE-MEDIATED INTEGRAL HEALTH RISK

Summary of Doctoral Dissertation

Biomedical Sciences, Public Health (09 B)

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VILNIAUS UNIVERSITETAS

LOLITA RAPOLIENĖ

INTEGRALI GYVENSENOS IR PSICHOEMOCINĖS BŪKLĖS LEMIAMA SVEIKATOS RIZIKA, JOS VERTINIMAS IR PREVENCIJA

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ABBREVIATIONS

CI – confidence interval

CFI – confidence function index

CFQ – cognitive failure questionnaire

DBP – diastolic blood pressure

df - degrees of freedom

EI – emotion index

FI – fatigue index

GSDS – general symptoms distress scale

HI – health index

HR – heart rate

ITT – intention to treat analysis

KMO – Kaiser-Meyer-Olkin test

LI – lifestyle index

MFI - multidimensional fatigue inventory

MI – morbidity index

OR – odds ratio

p - statistical significance

RR – respiratory rate

SBP – systolic blood pressure

SI- stress index

SD – standard deviation

t – statistical value

VAS – visual analogue scale

χ^2 – Chi-squared test

DEFINITIONS

Factor weight –the relationship(correlation) ofa latent factor with the character.

Factor value - the estimate of alatent factorcalculated foreach observational.

Health risk-is an integral latent factor that is the result of several destroying results of health interaction.

Integral health risk- health risk determined by total integral latent factors.

Latent factor- animmeasurable integral factor directly formedbya number of factors which are correlating in the inteaction relationship.

Management parameters - signs of latent factor (the variables of thefactorial analyses) having the highest weight factor.

Risk expression – a correlation consolidation of the signs into the integral latent risk factors.

Risk exposure level - the percentage of negative value of laternt factor.

Risk exposure intensity – the estimate of latent factor value.

Risk - resources dissemination – the estimate range of a latent factor change from positive to negative.

1. INTRODUCTION

1.1. Research problem and its relevance

Over the last few years, due to the increasing pace of life, changes and instability, various accompanying processes are viewed as complex, open, *non-linear systems*. Public health, being an integral part of social life, also belongs to this group of systems, while its concept has some non-linear systemic features. This is testified by a lot of important contemporary health policy strategic documents and health theories.

It is a conceptually new challenge for public health science and practice, since health is now viewed as a *process, an activity and a potential*. Scientific health risk assessment becomes a priority, while investment in effective health systems and greater prevention should ensure better health, higher productivity, lower costs and reduced health disparities. Health is *power*, providing an opportunity to do the job, to perform certain tasks in the community, to overcome physical, biological and social stress, to pursue wellbeing, to avoid diseases and premature death risk. The systemic concept of health means that health of an individual or a population is determined by the *system* of environmental factors, simultaneously *interacting* with an individual or a population. It has been proved that the outcome of such interaction is not the total sum of individual interactions; we are dealing here with holistic principle, which claims that "the whole is more than the total amount of its parts". The behaviour of the system and its qualities are also determined by the synergy effect, which is applied to the examination of complex social, economic, medical as well as public health systems.

Although the importance of systemic approach to public health and especially to its risks is on the increase in such spheres as lifestyle and psycho-emotional state, most of the research is still based on biomedical models, which focus more on the causality of individual risk factors rather than on integral correlations.

While solving this problem, the present Doctoral Dissertation offers a health system, based on the concept of targeted systems, which says that a system consists of a set of elements, each of which is directly or indirectly related to each other, while any two sub-systems cannot be independent. The elements of the system analysed in the Doctoral Dissertation are health, lifestyle, psycho-emotional state and

balneotherapy, and the subsystems are the structures of risk and resources. The target subsystem is *health risk*.

On the basis that obvious factors shaping health risks and resources simultaneously, that is why latent factors in our Dissertation have risk and resources components. Depending on the intensity of obvious health strengthening or ruining factors, latent factors have either a positive or a negative tendency, to which the synergetic self-organisation principle applies. Due to self-organisation, the process of health can deteriorate or improve by itself. For us it is important to know what management parameters should be introduced from the outside in order to decrease risk and increase health resources (evidence based health policy).

In research literature, health resources are understood as health strengthening and supporting factors, while health risk is defined as factors, conditions and processes negatively affecting health. We view *integral health risks* as an integral systemic factor, which develops through an *interaction* of physical, social, natural, technogenic, environmental, lifestyle conditions with physical, social and spiritual health. This is a latent directly immeasurable factor.

The lifestyle and psychoemotional state, which are also characterized by systemic patterns, play a significant role in the development of health resources and risks. Specific lifestyle factors on health have been widely studied; however, no studies on the impact of *a social organization* on the structure of health risk-resources of an individual and a group have been found. In order to verify the impact of the factor, two different social status and social role groups − seamen and urban residents − were examined in the present Dissertation.

The Dissertation offers balneotherapy procedures as risk reduction and resource increasing factor, the effect of which is undoubtedly systemic. Balneotherapy effect is based on an integrated impact of mechanical, thermal, chemical, immunological and psychological mechanisms on the functional systems of the organism. Our study was designed to prove that by stimulating the body's self-healing by means of balneotherapy, the ratio between health resources and health-risks can be managed, which has an impact on the improvement of systemic health risk state.

Research problem

The relevance of a systematic approach makes it possible to formulate the research problem as a set of questions:how can integral health risk, determined by

one's lifestyle and psychoemotional state, be identified and assessed? What are its causes and developmental tendencies?

The answer to these questions is relevant and of great importance to public health risk research, which is based on a health management process moving from individual health risk factors to the assessment of the systemic impact of multiple risk factors on public health process.

The dissertation looks for the answer to these questions on the basis of synergy principles and application of factorial analysis method, while health risk is modelled as an integral latent structure, developing through the interaction of health and social factors.

1.2. Aim and objectives of the research

Research aim

To evaluate the systemic features of integral health risk, determined by the lifestyle and psycho-emotional conditions of people of different social status (seamen and urban residents) and the impact of balneotherapy on health risk prevention.

Research objectives:

1. To prepare a *conceptual* health risk-resource *systemic* interaction model and on its basis to evaluate the integral health risk *expression*, determined by the lifestyle and psycho-emotional state of different social status groups (seamen and urban residents).

2. To identify integral health risk exposure *levels and intensity,* determined by the lifestyle and psycho-emotional state of different social groups (seamen and urban residents)

3. To evaluate the integral health risk development trends and differences in social groups.

4. To establish the impact of balneotherapy on health risk prevention.

1.3. The scientific novelty of the study

From the point-of-view of Public Health theory, the Dissertation is innovative in the sense that it offers a *systemic-synergetic* conception of health risk-resources development and its empirical realisation.

The Dissertation presents a new integral health risk concept, possibilities for its identification and evaluation indicators, which could also be used in evaluating integral public health risk.

The Dissertation proves that the lack of social relationships increases the intensity of the impact of public health risk.

The Dissertation describes the use of natural high mineralization geothermal water in order to find an efficient correctional intervention means to reduce health risk, which was done for the first time in Europe.

1.4. Practical applicability of the study

The results obtained by the present research can be used for developing a more efficient public health policy, corresponding to the strategic aims of the European Union programme *Horizon 2020*. The systemic approach and integral method are suitable for the solution of strategic issues of public health, because they allow establishing long-term levels and causes of health risks and resources. 5

Positive results obtained by using balneotherapy with geothermal water to improve psychoemotional state encourage using this method for a greater part of population as the tendency of mental illnesses is on the increase.

The research helped to reveal opportunities for using super-high mineralization geothermal water, its usefulness and safety; that is why it is possible to create recipes and methodologies of geothermal water by adjusting them to concrete needs and by designing preventive and rehabilitation programmes. All this is likely to strengthen spa tourism in Lithuania.

1.5. Statements to defend

1. Holistic principle holds true for integral health risk: integral health risk is not a total amount of separate health risk factors constituting it (it is a non-linear dependence).
2. Integral health risk depends on the character of social relations.
3. Lifestyle and psychoemotional state-mediated integral health risk has a tendency to increase.
4. Balneotherapy by geothermal water can reduce the impact of separate health risk factors and integral health risk.

2. RESEARCH MATERIAL AND METHODS

2.1. Research subject

Research subject was 600 working residents of Klaipėda region between 25 and 65 years of age. It was a random probability sample considering quota system by sex. Two social groups were singled out in order to check the impact of *people's interpersonal relations* on their health. The groups were formed on the basis of the concept of social stratification, arguing that social status and roles in society determine differences in social relationships. On this assumption, one group was selected, in which the status and roles are strictly defined (the seamen), while another group consisted of people, whose status and roles are freely chosen (the urban residents).

The research was carried out in two stages: Stage 1 was a written survey. It involved 380 urban residents and 220 seamen. Stage 2 was dedicated to a preventive balneotherapy research, involving 130 seamen.

The selection of research subjects for balneotherapy procedures. The selection of research subjects consisted of two parts: first of all, *risk expression*, calculated in Stage 1, was compared between the seamen and urban residents, and it was established that in the seamen's group risk exposure and intensity levels were higher. On this basis, balneotherapy procedures were allocated to the group with a greater risk. In selecting participants within this group, the following *inclusion criteria* were applied: age – over 25 years, working experience – over 5 years, stable hemodynamics and psyche, and a wish to participate in the intervention. *Exclusion criteria for participation in balneotherapy procedure:* progressing inflammatory or oncological diseases, decompensated cardiovascular disease (life-threatening disturbance of cardiac rhythm; unstable *angina pectoris*; hypotension and hypertension crises), unstable metabolic diseases; fever; epilepsy; infectious skin, fungal, purulent diseases; open wounds; acute organic neurological deficit; inflammatory eyes, ears and other processes; bronchial asthma with frequent attacks.

Research object − lifestyle and psycho-emotional state-mediated integral health risk and its prevention.

2.2. Research methods

The theoretical basis of the research was the concept of targeted systems. The elements of our proposed health system were the state of health, lifestyle, psychoemotional state, balneotherapy, while the sub-systems were the structures of health resources and risk. The targeted sub-system was health risk.

For developing health resources and risk identification and evaluation possibilities, the idea of a synergetic balance between health resources and risk was employed. The application of this idea is demonstrated in Fig.1.
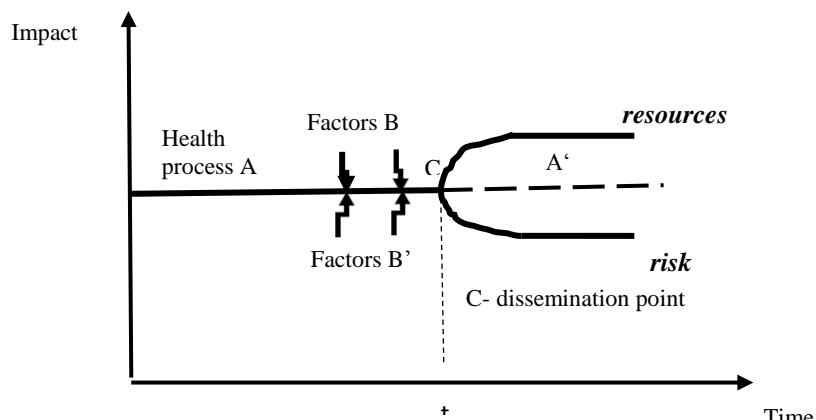

Figure 1. A synergetic model of the external impact on the process of

In the fig. 1 *A* stands for a person's or social subject's health process, which is in the state of balance, i.e. health resources counterbalance health risk. At a certain moment of time *t*, health process (*A*) is exposed to external factors *B* at point *C*. Point *C* is called the starting point of dissemination (bifurcation) and is important because at that moment the balance of health process is upset and the domination of risk or resources starts showing. Then health process *A'* becomes instable, because two new unbalanced health risk and health resources structures are created. They are made of the so-called integral latent health resources and health risk factors. The values of the latent factor, which fluctuated between +3 and -3, were termed *exposure intensity*; the percentage of negative values of the factor was identified with *health risk level*, while the percentage of positive values was identified with *resources level*. The correlation link of the latent factor with each *B* factor, constituting that latent factor, was termed *factor weight*.

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Health system examined in the Dissertation is made of the data blocks of lifestyle, health, psycho-emotional state and prevention (Fig.2).
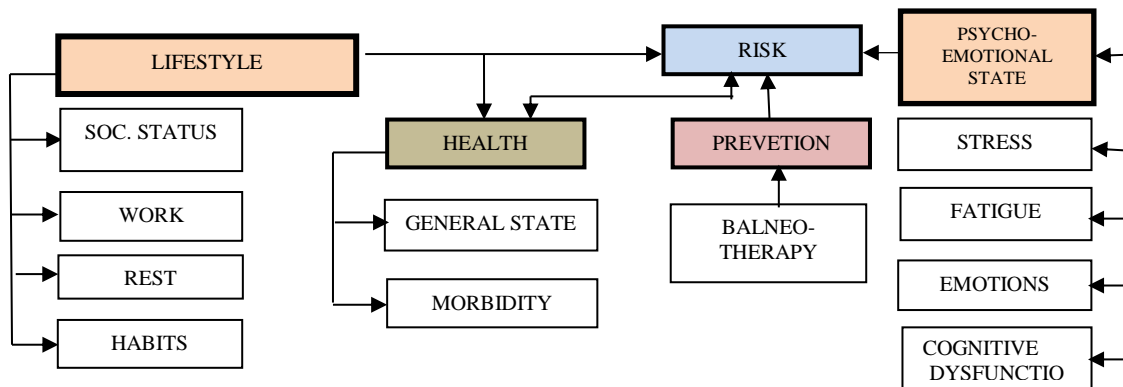

Figure 2. Research diagram

Lifestyle block included data on social status, work, rest, and habits. Health block reflected subjectively viewed health state and morbidity in terms of the most popular diseases. Psycho-emotional state was assessed according to the specially prepared stress, fatigue, mood, and cognitive function scales. Prevention block consisted of balneotherapy procedures.

2.3. Research procedure

Stage 1 – A survey. 700 questionnaires were distributed in the Nautical Centre of Klaipėda Seamen's Hospital and Klaipėda Seamen's Health Centre – 285 for seamen and 415 for urban residents. 634 questionnaires were returned: 235 by seamen and 399 by urban residents. Response frequency among the seamen was 78. %, among urban residents – 99.8 %, for both groups it was 90.6 %.220 seamen's and 380 urban residents' questionnaires were analysed.

Lifestyle questions were prepared on the basis of the questionnaire on stress at work, designed by the Finnish Institute of Occupational Health, VBBA, and seamen's fatigue, health and injuries questionnaire prepared by Cardiff University.The questionnaire consisted of 4 parts: socio-demographic data, perceived environment, stress and fatigue, the need for the improvement of work, health and support. 4 scales were chosen for the evaluation of psycho-emotional state: stress (GSDS), fatigue (MFI), mood and their impact on the memory, attention and actions (CFQ).

By using questions related to the lifestyle and psycho-emotional state, integral indexes of lifestyle (LI), emotions (EI), stress (SI), fatigue (FI), cognitive functions (CFI), health (HI) and morbidity (MI) were calculated.

Stage 2 - Balneotherapy procedures. In October-November 2012, an open controlled pilot research was carried out for the selected 65 research participants at the Rehabilitation Department of Klaipėda Seamen's Health Centre. Balneotherapy procedures were prescribed in an out-patients' clinic, without changing participants' everyday activities. Initial outcomes of the research were an impact on stress according GSDS, MFI and mood (Mood Scale). Secondary outcomes were changes in cognitive functions (CFQ), cardio-pulmonic and musculoskeletal system state and use of medicines. Balneotherapy group participants were given very high mineralisation (108 g/l) 34-36° temperature Na-Cl-Ca-Mg-SO4 geothermal mineral water baths from 2P borehole of Klaipėda's "*Geoterma*" base (1,135 m deep, lower Devon geologic stratum). The length of the procedure was 15 minutes every day 5 days a week for two weeks.

2.4. Statistical data analysis

Factorial analysis method was employed for the analysis of health risk and resources. Features whose total was below 0.4 were excluded from the analysis. The suitability of features for factor analysis was checked by KMO and Bartlett's sphericity criteria.For singling out latent factors, basic components' method was used by employing *Varimax* method for the turning of coordinates. Latent factors were measured by two values:factor weight and factor value. Factor weight shows the link (correlation) of the latent factor with the observed feature. Factor value is a special latent factor value, calculated *for each research participant*. Its value fluctuates between -3 and +3. In our research, the negative values of the factor are attributed to *a risk level,* while positive values are ascribed to *a resource level*. The value of either positive or negative value showed *exposure intensity*. Statistical relationship of qualitative features was examined by the method of related tables. On the basis of the values of the table, the statistics of χ^2 and the number of its degrees of freedom were calculated, Fisher's test was also used. The equality of independent samples was tested by Student's t criterion. The hypothesis about the equality of probability distribution was checked against Mann-Whitney-Wilcoxon U nonparametric criterion. To evaluate the interrelations among the factors, the method of logistic

regression was used. While establishing the size of the difference between preventive interventions groups, ITT was assessed by calculating Cohen's effect size. By applying factor analysis, integral lifestyle, health, stress, emotions, fatigue, and cognitive activity disorder indices were calculated. The research data were analysed by SPSS software (version 21.0; SPSS Inc., Chicago, IL, USA).

3. RESULTS OF THE STUDY

3.1. LIFESTYLE-MEDIATED HEALTH RISK

Lifestyle index

By applying factorial analysis, 16 lifestyle attributes were joined into one integral variable – LI. The calculated values of the index fluctuated between − 2.347 and 2.670. Positive values indicted healthier lifestyle, while negative ones showed a risky lifestyle.

According to LI, seamen and urban residents are social groups with statistically significant differences: the lifestyle of seamen is dominated by health resources (55.7 %), while that of urban residents' is characterised by health risk (52 %).Taken together, health resources (51.5 %) only slightly exceed health risk (Table 1). The values of the index support the holistic principle − the integral index is not equal to the total amount of the seamen's and urban residents' indices, i.e. the non-linearity principle applies.

Table 1. Lifestyle-mediated integral risk – LI

	Total LI	Seamen's LI	Urban residents' LI
Minimal	−2.347	1.671	−2.321
Maximal	2.670	2.589	2.020
Resources (percentage)	51.5	**55.7**	**48.0**
Risk (percentage)	48.5	**44.3**	**52.0**
LI difference between seamen and urban residents		Z= −2.833; *p*=0.020	

Lifestyle latent factors expression

17 lifestyle features were used for the analysis of the lifestyle of seamen. 14 of them corresponded to the conditions of factor analysis. Three latent lifestyle factors were singled out: working environment, hazardous habits and self-expression, which explained 48.8 % of total dispersion (Table 2).

For the analysis of the lifestyle of urban residents, 13 features were singled out, the correlation of which allowed singling out three latent factors, accounting for 48.8 % of total dispersion.

In the seamen's group, the most important latent lifestyle factor was working environment (dispersion 16.6 %), followed by hazardous habits and self-expression. The most important features of the working environment latent factor (management parameters) were stress experienced at work and in life and the length of work. The most important features of hazardous habits were the use of alcohol at work and at home and the number of consumed units of alcohol per week. The most important features of the self-expression factor were the number of working hours and cigarettes per day.

Table 2. Lifestyle -mediated health risk exposure levels

Latent factors	Social groups					
	Seamen			Urban residents		
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Working environment	56.6	16.6	Self-expression	45.8	16.6
F2	Hazardous habits	48.2	16.3	Working environment	57.6	16.3
F3	Self-expression	47.2	15.9	Hazardous habits	47.2	15.9

Lifestyle risk for the seamen was determined by the latent factor of *working environment*, the exposure level to which was 56.6 %, and management parameters were negative exposure to stress experienced at work and at home and the danger of the length of work to safety.

The most important latent factor of lifestyle for urban residents was self-expression, followed by working environment and hazardous habits. The most important features of the self-expression factor (management parameters) were education, family status, and intellectual and emotional fatigue at work. The most important features of working environment were stress experienced at work and at home, general feeling at work and the length of work.The most important features of hazardous habits are the number of units of alcohol and cigarettes consumed per week, also the frequency of smoking.

Lifestyle risk for the urban residents was determined by the latent factor of *working environment,* the exposure level to which was 57.6 %, and management parameters were stress experienced at work and at home, wellbeing at work and the length of work.

Lifestyle latent factors exposure intensity

The analysis of the integral lifestyle factors demonstrated statistically significantly difference between the average exposure intensity of the latent factors of hazardous habits and working environment of seamen and urban residents (Table 3). The intensity of the seamen's hazardous habits factor didn't determine risks, while that of the urban residents was negative, i.e. it caused risk. The exposure intensity values of working environment and self-expression for the seamen were negative, i.e. risk mediating. Thus hazardous habits had a negative impact on the urban residents, while working environment and self-expression had the same influence on the seamen.

Table 3. Lifestyle- mediated risk exposure intensity

Latent factors	Social group	Intensity average	Standard deviation	t	df	p
1.Hazardous habits	seamen	0.4562	0.8204	5.249	134	<0.001
	urban residents	-0.3710	0.9835			
2.Working environment	seamen	-0.2783	0.7938	-3.014	134	0.003
	urban residents	0.2263	1.0943			
3. Self-expression	seamen	-0.0938	0.7264	-0.986	134	0.326
	urban residents	0.0762	1.1761			

Attention should be drawn to the sufficiently wide dissemination of the standard deviation, which shows that exposure intensity of latent factors for separate individuals was very different.

3.2. HEALTH STATE-MEDIATED HEALTH RISK

Health index

HI is calculated by subjectively assessing the general state of health: *risk* is considered when the general state of health is worse than "good", while *resources* are considered when the general state of health is better than "satisfactory". HI expresses an integral health state. In our case, HI was significantly worse for the urban residents. Their health state risk level was 57.3 %, while seamen's was 40.9 % (Table 4).

Table 4. Health state integrated risk –HI

Social groups	Health risk (percentage)	Health resources (percentage)
Seamen	40.9	59.1
Urban residents	**57.3**	42.7
Average	51.3	48.7

3.3. MORBIDITY-MEDIATED HEALTH RISK

Morbidity index

By applying factor analysis of 9 attributes, an integral variable –MI – was calculated, the values of which fluctuated between -1.2 and 4.2. The calculated MI between the seamen and urban residents showed that morbidity risk in both groups exceeded resources, while for the seamen it was significantly higher (Table 5).

Table 5. Integrated morbidity risk – MI

	MI total	MI seamen	MI urban residents
Minimal	−1.1614	−1.1373	−1.1783
Maximal	4.2037	3.8612	4.6957
Resources (percentage)	45.2	**42.7**	**47.2**
Risk (percentage)	54.8	**57.3**	**52.8**
Average range		327.56	284.83
MI difference between the seamen and urban residents	Z= −2.926; *p*=0.003		

Expression of morbidity latent factors

9 attributes of the questionnaire – diseases – were used for the latent expression analysis of the seamen's morbidity. 8 attributes met feature affinity and factor weight requirements. Two latent morbidity factors were singled out during the analysis: multi-profile and nervous, which explained 38.49 % of the total dispersions (Table 6).

Latent morbidity factors for urban residents were formulated on the basis of 7 features (respiratory and skin diseases were not significant), some features re-grouped. Latent factors explained 30.42 % of the total dispersion.

Table 6. Morbidity-mediated risk exposure levels

Latent factors	Social groups					
	Seamen			Urban residents		
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Multi-profile	67.5	21.41	Multi-profile	61.0	15.56
F2	Nervous	60.0	17.08	Nervous	57.6	14.86

The analysis demonstrated that for both groups health risk is determined by both latent factors. It was established that co-morbidity is more typical for seamen; their morbidity management parameters were urologic, heart and aural diseases. Morbidity management parameters for urban residents were heart and endocrine diseases. The most important implication for morbidity management in both groups was nervous

system diseases. The higher percentage of negative values in the group of seamen showed a higher negative morbidity tendency.

While assessing the intensity of morbidity risk it was established that the intensity of both latent risk factors was greater for the group of seamen, and their nervous factor was significantly different from that of the urban residents' (Table 7).

Table 7. Morbidity latent factors exposure intensity

Latent factors	Group	Intensity average	Standard deviation	t	df	p
1. Multi-profile	seamen	-0.0013	1.0293	-0.374	598	0.709
	urban residents	0.2744	0.8355			
2. Nervous	seamen	-0.3035	1.0559	-6.051	798	0.001
	urban residents	0.1871	0.8948			

3.4. PSYCHOEMOTIONAL STATUS-MEDIATED INTEGRAL HEALTH RISK

3.4.1. Emotion-Mediated Health Risk

Emotion Index

While performing factorial analysis, 12 emotion attributes were joined in to one integral variable, i.e. EI. The calculated index values ranged from -2.9 to 3.0. Positive values showed a good emotional state, negative values showed risky state.

According to our estimate of EI, seamen and urban residents are social groups that do not differ statistically but in both social groups emotion-mediated health risk is higher than emotion-mediated health resources (Table 8).

Table 8. Emotion- mediated integral risk – EI

	Total EI	Seamen's EI	Urban residents' EI
Minimum	−2.9190	−2.8158	−2.9190
Maximum	3.0372	2.0246	3.0372
Resources (percentage)	49.2	**49.1**	**49.2**
Risk (percentage)	50.8	**50.9**	**50.8**
Average range		298.18	298.68
EI difference between sailors and urban residents		Z= −0.034; *p*=0.973	

Emotion latent factors expression

For the analysis of integrated expression of seamen' emotional state 12 questionnaire attributes were used. The analysis allowed distinguishing three latent factors: energy, tension, and depression that explained 57.1 % of the total dispersion (Table 9).

Table 9. Emotion -mediated risk exposure levels

Latent factors	Social groups					
	Seamen			Urban residents		
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Energy	47.7	23.7	Exuberance	47.7	21.0
F2	Tension	47.7	18.9	Depression	47.7	20.2
F3	Depression	50.9	14.5	Tension	50.9	18.4

The assessment ofthe structure of emotion latent factors and the risk caused by it demonstrated that the chosen emotional state indicators are the same latent factors in the groups of seamen and urban residents, but with different priorities. The most important factor in both groups was energy latent factor that was caused by optimism, enthusiasm, and satisfaction indicators.The second most important factor for seamen was tension that was caused by restlessness, tension, and anxiety indicators; for urban residents it was depression caused by unhappiness, sadness, and depression. In the third place for seamen was depression latent factor caused by sadness, unhappiness, depression, and relaxation; for urban residents the third place was occupied by latent factors of tension caused by concern, tension, peace, relaxation indicators.

The risk of emotional state for seamen was caused by the latent factor of *depression*, its impact rate was 50.9 %, and management parameters, i.e. sadness and unhappiness.*The risk of urban residents* was caused by the latent factor of *tension* whose management parameters are concern and stress.

Emotion latent factors exposure intensity

The impact intensity of emotion latent factors for seamen and urban residents did not differ significantly, however the risk of all latent factors for urban residents was more intense (Table 10).

Table 10. Emotion latent factors **e**xposure intensity

Emotion latent factors	Group	Average intensity	Standard deviation	t	df	*p*
1. Energy	seamen	0.0594	1.0207	1.094	594	0.274
	urban residents	−0.0337	0.9877			
2. Tension	seamen	0.0461	0.9631	0.850	594	0.396
	urban residents	−0.0262	1.0206			
3. Depression	seamen	0.0231	1.0250	0.426	594	0.671
	urban residents	−0.0131	0.9865			

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3.4.2. Stress-mediated health risk

Stress index

In factorial analysis, 29 stress risk attributes were combined into one integral variable, i.e. SI. The calculated index values varied from −2.41 to 2.96. Positive values of the index showed that the persons, to whom they are characteristic, are more resistant to stress; negative values showed a deeper stress.

Calculation of integral SI allowed distinguishing that the average range of stress impact on seamen statistically was significantly lower than on urban residents, which showed a larger number of negative values, i.e. the higher risk intensity (Table 11). Due to this fact SI of seamen was estimated as higher.

Table 11. Integral stress risk – SI index

	Total SI	**Seamen' SI**	**Urban residents' SI**
Minimum	−2.407	−2.423	−2.555
Maximum	2.958	4.538	3.009
Resources (percentage)	49.2	**42.0**	**41.3**
Risk (percentage)	50.8	**58.0**	**58.7**
Average range		**219**	366
SI difference between sailors and urban residents		Z= −15.907; *p*<0.001	

Stress latent factors expression

For the analysis of work-related stress of urban residents 29 attributes were used. The conditions of factorial analysis were met by 21 attributes. All attributes, in correlation with each other, created three latent factors whose expression amounted to 48.59 % of total dispersion. In the analysis of work-related stress for seamen the same 29 attributes were used.

24 attributes of work- related stress of seamen met the conditions of factor analysis. In the analysis three latent factors were distinguished and they explained 41.6 % of total dispersion (Table 12). The latent factors were formed of different indicators than those for urban residents, especially the indicators of 1-2 factors re-grouped.

Table 12. Stress- mediated risk exposure levels

Latent factors	Social groups					
	Seamen			Urban residents		
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Social security	55.3	15.1	Social security	55.4	17.8
F2	Social environment	54.8	14.0	Social environment	36.8	16.7
F3	Working conditions	51.1	12.5	Working conditions	55.7	14.4

It was found that the main stress latent factor in both social groups was the factor of social security. For seamen it was caused by the indicators of small crews, social isolation, economic insecurity and other indicators. For urban residents social security was caused by high work requirements, rush, responsibility for people, long working hours, conflicts and other indicators. In the second place was the factor of social environment that for seaman was caused by conflicts, harmful substances, heavy physical work, lack of sleep, night work and other indicators; for urban residents it was caused by social isolation, multi-ethnic environment and other indicators. The third factor was the factor of working conditions which for seamen was caused by vibration, noise, electromagnetic field, heat, isolation from family; for urban residents it was caused by shifts, harmful substances, night work, electromagnetic field and other indicators.

Stress risk for seamen was caused by *all* three latent factors: social security, social environment, and working conditions whose impact levels were 55.3 %, 54.8 %, 51.1 % respectively. The main indicators (management parameters) were small crews, social isolation, conflicts, harmful substances, heavy physical work, noise, and vibration. *The risk for urban residents* was caused by the latent factors of social security and working conditions whose impact levels were 55.4 % and 55.7 % respectively, and management parameters: high work requirements, rush, shifts, and harmful substances.

Stress latent factors exposure intensity

Stress-mediated risk intensity for seamen was significantly higher in the sphere of social security and social environment, for urban residents it was higher in the sphere of working conditions (Table 13).

Table 13. Stress latent factors exposure intensity

Latent factors	Group	Average intensity	Standard deviation	t	df	*p*
1. Social security	seamen	−0.9084	0.5013	−23.717	587	<0.001
	urban residents	0.5377	0.8156			
2. Social environment	seamen	−0.2895	0.7324	−5.540	586	<0.001
	urban residents	0.1713	0.0942			
3. Working conditions	seamen	0.1693	0.8190	3.186	587	0.002
	urban residents	−0.1002	1.0817			

3.4.3. Fatigue-mediated health risk

Fatigue index

In factorial analysis, 20 attributes of fatigue were combined into single variable, i.e. fatigue index (further – FI). The calculated index values varied from -2.05 to 3.6. The established FI differed significantly between social groups. For seamen it showed risk dominance, while for urban residents resources offset risk, i.e. balance was received (Table 14). This was also confirmed by the mid-level value: for seamen it was lower.

Table 14. Fatigue integral risk – FI

	Total FI	**Seamen' FI**	**Urban residents' FI**
Minimum	−2.0508	−1.9410	−2.8699
Maximum	3.6040	3.6675	2.1154
Resources (percentage)	49.2	**48.4**	**50.0**
Risk (percentage)	50.8	**51.6**	**50.0**
Average range		265.68	295.36
FI difference between sailors and urban residents	Z= −2.096; *p*=0.036		

Fatigue latent factors expression

Analysing the structure of seamen' fatigue latent factors 20 attributes of fatigue were used. All 20 attributes were relevant to the factorial analysis conditions. Three latent factors of fatigue were distinguished that explained 51.19 % of total dispersion (Table 15). Analysing the impact of fatigue for health risk of urban residents 19 attributes were used, three latent factors were distinguished that explained 51.62 % of total dispersion. In both social groups latent factors according to their importance took the same position: the first was the factor of physical capacity, the second was mental capacity, and the third was the factor of activity.

Table 15. Fatigue-mediated risk exposure levels

Latent factors	Social groups					
	Seamen			**Urban residents**		
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Physical capacity	53.0	21.18	Physical capacity	49.1	21.61
F2	Mental capacity	56.7	15.39	Mental capacity	46.0	15.39
F3	Activity	50.2	14.62	Activity	50.9	14.62

Fatigue-mediated *health risk for seamen* was caused by all latent factors: the impact level of *physical capacity* was 53.0 %, the impact level of *mental capacity* was 56.7 %, and the impact level of *activity* was 50.2 %. The main parameters managing

risk for seamen were physical well-being and power, ability to concentrate and poor evaluation of one's capacity. For urban residents fatigue risk was caused only by *activity* latent factor whose impact level was 50.9 %, while managing parameters were the underestimation of fulfilled activities.

Fatigue latent factors exposure intensity

The impact intensity analysis of fatigue latent factors showed that risk intensity of physical capacity and activity factors was higher for seamen and risk intensity of mental capacity was higher for urban residents (Table 16). The impact intensity of physical capacity and activity factors between social groups differed significantly.

Table 16. Fatigue latent factors **e**xposure intensity

Latent factors	Group	Average intensity	Standard deviation	t	df	*p*
1. Physical capacity	seamen	−0.1672	0.9445	−3.161	565	0.002
	urban residents	0.1037	1.0204			
2. Mental capacity	seamen	0.0441	0.9451	0.827	565	0.409
	urban residents	−0.0273	1.0329			
3. Activity	seamen	−0.1155	0.9711	−2.173	565	0.030
	urban residents	0.0716	1.0122			

3.4.4. Cognitive function-mediated health risk

Cognitive function index

25 attributes of cognitive dysfunction were combined into one integral variable, i.e.CFI. The index values differed from −2.40 to 3.66. Positive values showed better cognitive activities, negative values showed impaired cognitive activities. The calculated CI value for seamen was significantly lower than urban residents and did not reach the level of risk although average range was lower (more risky) in seamen group (Table 17).

Table 17. Integral risk of cognitive functions – CFI

	Total CFI	Seamen' CFI	Urban residents' CFI
Minimum	−2.4067	−2.2997	−2.4995
Maximum	3.6623	4.1904	3.5440
Resources (percentage)	49.1	**61.7**	**43.7**
Risk (percentage)	50.9	**38.3**	**56.3**
Average range		250.0	308.64
CI difference between sailors and urban residents		Z= −4.114; *p*<0.001	

Cognitive function latent factors expression

For the analysis of cognitive function latent factors for seamen 25 attributes of cognitive activities were used. 25 attributes were relevant for the factorial analysis conditions. Three latent factors for cognitive dysfunction were distinguished, i.e. memory, perception, and actions that explained 41.06 % of total dispersion (Table 18).

Table 18. Exposure levels of cognitive function risk

| Latent Factors | Social groups | | | | | |
| | Seamen | | | Urban residents | | |
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Memory	43.5	15.42	Memory	57.9	20.4
F2	Perception	47.4	14.48	Perception	62.8	12.48
F3	Actions	51.4	11.16	Actions	51.2	11.29

Cognitive function health risk for seamen was caused by only one latent *action* factor and its risk exposure level was 51.4 %. The most important indicators of the factor (management parameters) were unconscious actions (accidentally disposing of the item you need and keep what you intended to throw away) and memory defect for priority work (leave important letters unanswered for several days).

The cognitive function latent factors of urban residents were caused by the same attributes and they explained 43.88 % of total dispersion. The *cognitive risk of urban residents* was caused by all three latent factors: *perception, memory,* and *actions*. The most significant indicators (management parameters) of latent factors were the lack of awareness (doubt if the word was appropriately used, inability to express thoughts), unconscious actions (falling objects), and memory defects (forgetting names or familiar way, forgetting to fulfil important tasks).

Exposure intensity of cognitive functions latent factors

Exposure intensity of memory and perception latent factors between social groups differed significantly. For seamen the exposure intensity of three factors was associated with risk (Table 19). Meanwhile, the risk exposure intensity of action latent factor was slightly higher for urban residents.

Table 19. Exposure intensity of cognitive functions latent factors

Latent factors	Group	Average intensity	Standard deviation	t	df	p
1. Memory	seamen	−0.125	0.916	−2.355	570	0.019
	urban residents	0.076	1.041			
2. Perception	seamen	−0.280	0.832	−5.356	570	0.001
	urban residents	0.170	1.054			
3. Actions	seamen	0.059	0.901	1.110	670	0.287
	urban residents	−0.036	1.054			

3.5. INTEGRAL EXPRESSION AND DEVELOPMENT TENDENCIES OF LIFESTYLE AND PSYCHOEMOTIONAL STATE-MEDIATED HEALTH RISK

In providing systemic concept of health risk and resources attention was drawn to the importance of balance between resources and risk. As public health system is attributed to the group of nonlinear, non-balanced systems, the situation of balance between health resources and risk becomes eligible important because when the system is very close to balance even slight external effects can tilt the system at higher risk or more resources.

In the present dissertation the balance state and risk- resource starting point is defined by 50 % exposure level. The starting point of impact effectiveness of latent factors is 0 value of the factor, positive values are attributed to resources, and negative values are attributed to risks.

To define the integrity function in the present work LI, MI, SI, EI, FI, CFI indices were used. Figure 3 shows the integral risk levels of lifestyle and psycho-emotional state indices that were analysed in the work: the total level for seamen and urban residents and separate levels for seamen and urban residents.

The analysis of the integral health risk of lifestyle and psycho-emotional state shows that the balance between risk and resources is common only in the group of seamen (Figure 3).

In the case of urban residents and the total group the state between health resources and risk was non-balanced: in the total group health risk exceeded resources by 1 %, in the group of urban residents health risk exceeded resources by 3 %. It was also observed that there is no linear dependence between the risk of the total group and the risks taken separately.
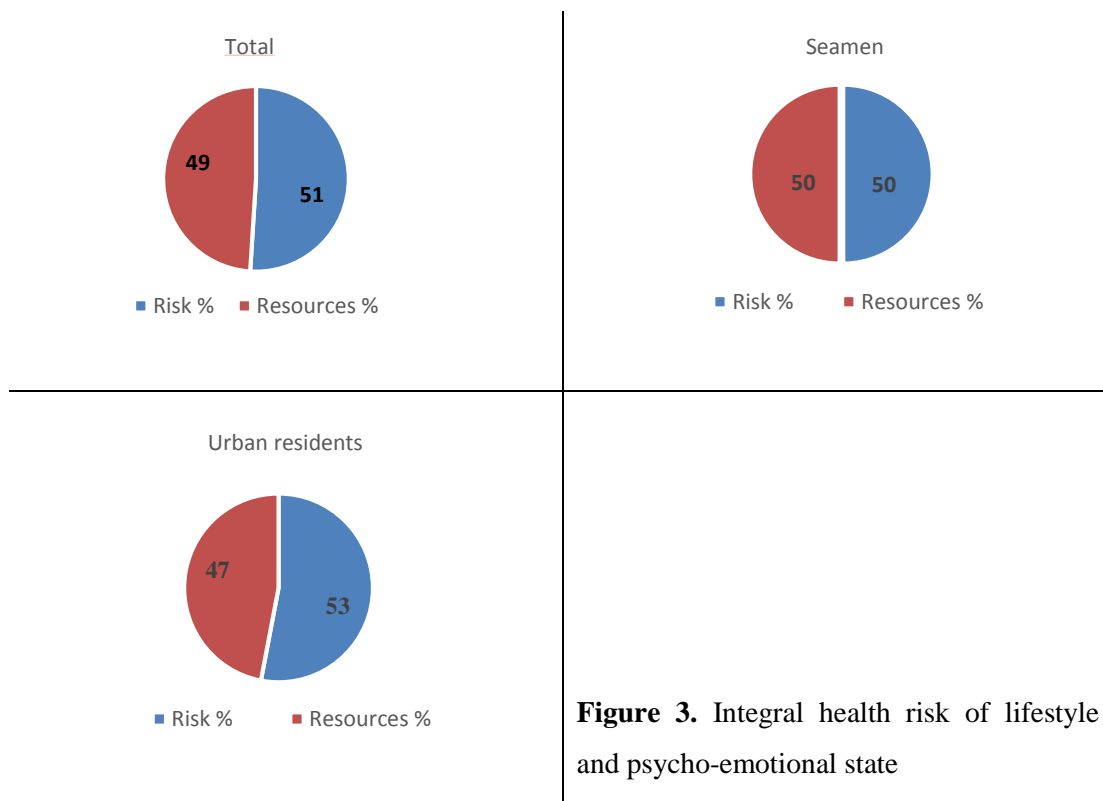
Figure 3. Integral health risk of lifestyle and psycho-emotional state

Developmental tendencies of health integral risk

The exposure levels of the most important latent factors presented in Table 20 show the differences of the health risk dependence on social status. Of the seventeen latent factors seven factors were affected by risk in both social groups. The risk impact of the remaining risk factors distributed differently. The group of seamen experience risk in 65 % of spheres, while urban residents in 59 % of spheres. The assessment of risk of all factors under investigation allows defining the impact of the majority of factors as risk (88 %). The fact that the risk levels of health risk spheres exceed the status of balance shows that the health risk in the spheres under investigation have a tendency to increase. This confirms the hypothesis that integral health risk has a tendency to increase.

Table 21 shows the differences of risk exposure of latent factors intensity between the social groups. The research showed that the risk impact intensity in selected social areas differed significantly (in 59 % of cases). And it was higher in the group of seamen (in 80 % of seamen and 20 % of urban residents spheres risk intensity was higher). This may be related to differences in social relations between seamen and urban residents. According to the specificity of work seamen belong to more socially isolated social group, their

social relationships are restricted by isolated work. All this leads to a lack of social relationships. This means that the lack of social relationships is related to health risk and confirms the hypothesis that the lack of social relations increases health risks.

Table 20. Risk levels of latent factors in social groups

Spheres of health risk	Latent factors	Risk levels (percentage)	
		Seamen	Urban residents
Lifestyle	Hazardous habits	47.8	48.2
	Work environment	**57.4**	**56.6**
	Self-expression	45.6	44.7
Stress	Social security	**55.3**	**55.4**
	Social environment	**54.8**	36.8
	Working conditions	**51.1**	**55.7**
Emotions	Energy	47.7	47.7
	Tension	47.7	**50.9**
	Depression	**50.9**	47.7
Fatigue	Physical capacity	**53.0**	49.1
	Mental capacity	**56.7**	46.0
	Activeness	**50.2**	**50.9**
Cognitive functions	Memory	43.5	**57.9**
	Perception	47.4	**62.8**
	Actions	**51.4**	**51.2**
Morbidity	Multi-profiled	**67.5**	**61.0**
	Nervous	**60.0**	**57.5**

Table 21. Impact intensity of latent factors in social groups

Spheres of health risk	Latent factors	Average risk intensity values		
		Seamen	Urban residents	p
Lifestyle	Hazardous habits	0.4562	**−0.3710**	**0.001**
	Work environment	**−0.2783**	0.2263	**0.003**
	Self-expression	**−0.0938**	0.0762	0.326
Morbidity	Multi-profiled	**−0.0013**	0.2744	0.709
	Nervous	**−0.3035**	0.1871	**0.001**
Stress	Social security	**−0.9084**	0.5377	**0.001**
	Social environment	**−0.2895**	0.1713	**0.001**
	Working conditions	0.1693	**−0.1002**	**0.002**
Emotions	Energy	0.0594	**−0.0337**	0.274
	Tension	0.0461	**−0.0262**	0.396
	Depression	0.0231	**−0.0131**	0.671
Fatigue	Physical capacity	**−0.1672**	0.1087	**0.002**
	Mental opportunities	0.0441	**−0.0273**	0.409
	Activeness	**−0.1155**	0.0713	**0.030**
Cognitive functions	Memory	**−0.1258**	0.0767	**0.019**
	Perception	**−0.2807**	0.1703	**0.001**
	Actions	0.0595	**−0.0361**	0.287

The total risk was higher in seamen (−1.7063) than in urban residents (1.2924). Comparing lifestyle and psycho-emotional state-mediated risk intensity seamen have

experienced bigger psycho-emotional risk (–1.5 vs 0.9) and urban residents- bigger lifestyle-mediated risk (–0.07 vs 0.08).

3.6. HEALTH RISK PREVENTION POSSIBILITIES

3.6.1. Balneotherapy effects on individual health risk factors

After two weeks of balneotherapy of geothermal water a decrease in SBP (p=0,001), DBP (p<0,001), HR (p=0,004) and RR (p=0,001) was observed. Significant changes in the control group were not observed. The differences between groups were significant (p<0,001) (Table 22).

Table 22. Changes of blood pressure, heart rate and respiratory rate in prevention groups

Functional indicators	Geothermal group, n=55		Control group, n=50		
	Before	After	Before	After	*p*
SBP, mmHg, average (SD)	136.4 (21,1)	129.5*** (12,8)	144.2 (12,6)	142.8 (12,2)	<0,001
DBP, mmHg, average (SD)	84.3 (10,3)	78.0*** (7,7)	83.0 (8,4)	82.2 (6,4)	<0,001
HR, k/min, average (SD)	87.3 (8,4)	72.4 *** (7,9)	75.1 (6,4)	74.4 (5,2)	<0,001
RR, k/min, average (SD)	15.7 (2,0)	14.3*** (1,0)	14.7 (1.5)	14.3 (0,9)	<0,001

Note: before – before investigation, after – after investigation; ** - p<0.01, *** - p<0.001 comparing before and after two-week course.

After each geothermal water bath procedure positive effects on musculoskeletal system were observed: finger- floor distance (in cm) decreased significantly and in some cases the decrease amounted to 14 cm; the average decrease was 3.2 cm (SD 5.0, 95 %, CI 0.94 to 5.5, p=0.008). At the end of the course the distance from the initial value was reduced by 2 cm. In the control group, finger-floor distance during two weeks increased not significantly. After the course of balneotherapy positive effects on the mobility of shoulders, knees, hip joints were observed. Joint motion amplitude increased by an average of 6.2 degrees (p<0.001). In the control group the impact on joint mobility was not observed. The difference between groups was significant (p<0.001). After the course of procedures in the geothermal group the decrease in the use of medicine (p=0.047, z=2.0) was detected; changes in the use of medicine in the control group was not observed.

After two weeks of investigation, the participants who underwent the course of geothermal water baths showed a significant therapeutic response in all health risk factors under investigation (Table 23).

Table 23. The change of stress, fatigue, cognitive functions, and pain in the group under investigation and between groups

Indi-cator	Geothermal group, n=55			Control group, n=50			Differences between groups	
	Initial / After	Changes comparing with the initial		Initial / After	Changes comparing with the initial		Bias corrected (Hedges) G-C	p
	Average (SD)	Effect size [a] 95% CI	p	Average (SD)	Effect size [a] 95% CI	p	Average 95% CI	Initial / After
NSS	4.35 (1.85)	2.25	<0.001	3.32 (1.77)	-0.05	0.722	-1.23	0.010
	1.71 (1.38)	1.94 to 2.55		3.38 (1.31)	-0.36 to 0.25		-1.65 to -0.81	<0.001
SI	5.41 (1.78)	1.31	<0.001	3.82 (1.83)	0.02	0.894	-0.38	<0.001
	3.16 (1.95)	0.96 to 1.66		3.80 (1.29)	-0.29 to 0.33		-0.77 to 0.01	0.05
SM	5.64 (1.99)	-0.82	<0.001	6.44 (2.05)	0.32	0.033	0.81	0.179
	7.62 (2.21)	-1.21 to -0.43		6.00 (1.68)	-0.05 to 0.69		0.42 to 1.21	<0.001
GF	46.36 (26.34)	1.22	<0.001	35.38 (19.75)	-0.63	<0.001	-1.06	0.05
	22.61 (17.45)	-2.95 to 5.40		40.50 (15.94)	-4.15 to 2.89		-1.47 to -0.65	<0.001
PF	37.62 (25.54)	0.88	<0.001	27.63 (17.99)	-0.87	<0.001	-0.73	0.053
	20.83 (18.85)	-3.32 to 5.07		33.50 (15.14)	-4.13 to 2.39		-1.13 to -0.34	<0.001
DA	44.43 (20.86)	1.17	<0.001	34.88 (18.60)	-0.74	<0.001	-0.89	0.040
	25.11 (16.99)	-2.39 to 4.72		39.38 (14.79)	-4.04 to 2.55		-1.29 to -0.48	<0.001
DM	40.28 (19.97)	1.06	<0.001	28.63 (18.17)	-0.56	<0.001	-0.65	0.007
	21.41 (16.31)	-2.35 to 4.46		32.00 (16.25)	-3.93 to 2.82		-1.04 to -0.25	0.001
MF	33.9 (23.3)	0.78	<0.001	23.38 (16.41)	-0.75	<0.001	-0.53	0.011
	19.9 (17.6)	-3.08 to 4.63		28.38 (13.55)	-3.70 to 2.20		-0.92 to -0.14	0.007
CF	31.52 (11.45)	1.09	<0.001	26.02 (9.50)	-0.58	0.005	-0.30	0.054
	24.54 (10.40)	-0.96 to 3.13		27.32 (7.36)	-2.25 to 1.08		-0.69 to 0.08	0.121
M	2.52 (0.87)	-1.03	<0.001	3.08 (0.53)	0.05	0.766	1.16	<0.001
	3.62 (0.59)	-1.16 to -0.89		3.06 (0.32)	-0.04 to 0.13		0.74 to 1.57	<0.001
P	4.10 (2.74)	1.95	<0.001	2.06 (1.61)	0.13	0.399	-1.05	0.001
	0.71 (1.06)	1.56 to 2.34		1.98 (1.33)	-0.16 to 0.42		-1.46 to -0.65	<0.001

Note: NSS- number of stress symptoms, SI- stress intensity, SM- stress management, GF- general fatigue, PF- physical fatigue, DA- decreased activeness, DM- decreased motivation, MF- mental fatigue, PF- cognitive function, M- mood, P- pain VAS. Initial - status before therapy, After– status after therapy, G-C- geothermal vs control group.

The analysis within the geothermal group showed a positive effect on stress, fatigue, cognitive functions, mood, and pain. The size of impact (according to *Cohen*) ranged from 0.78 to 2.25 (p<0.001).

Comparing changes after two weeks in geothermal and control groups significant differences in favour of geothermal water in the number of most indicators (except cognitive functions) were obtained.

Side effects in the course of balneotherapy were rare and resolved spontaneously: skin reactions (blush, itching) – 4.6 % (3) and exacerbation of psoriasis – 1.5 % (1). None of the participants cancelled the treatment due to side effects.

3.6.2. Impact of balneotherapy on integral health risk

Expression of stress before and after balneotherapy sessions

While analysing the expression of latent factors of seamen before balneology procedures 12 GSDS distress attributes were used. Four latent factors were investigated that explained 57.22 % of total dispersion. According to the same distress attributes factorial distribution of distress was analysed after balneotherapy course. During the analysis 4 latent factors were identified that explained 59.24 % of total dispersion. After therapy the factors were formed of the groups with slightly different indicators (Table 24). After balneotherapy course the indicators of anxiety and depression lost their influence on health risks. Dyspeptic factor became the most important risk factor indicating that balneotherapy procedures have a greater impact on the separate changes of risk-resources than on integral risk.

Table 24. Expression of distress latent factors before and after balneotherapy procedures

| Latent factors | Balneotherapy | | | | | |
| | Before balneotherapy | | | After balneotherapy | | |
	Title	Risk percentage	Dispersion percentage	Title	Risk percentage	Dispersion percentage
F1	Mental	67.3	15.75	Dyspeptic	72.0	17.1
F2	Dyspeptic	64.8	15.52	Mental	76.0	15.2
F3	**Respiratory**	81.0	14.76	**Respiratory**	64.0	14.1
F4	Asthenic	73.5	11.19	Asthenic	73.7	12.9

Assessing the impact of the change of distress symptoms after balneotherapy course on health risk and resources dissemination it was found that balneotherapy increased the resources of mental and dyspeptic factors and reduced the health risk caused by dyspeptic, respiratoryand asthenic factors (Figure 4). After the geothermal water treatment the common impact of distress on health risk decreased by 1.4 times (from 7 to 5) or 26 %, and health resources increased by 1.1 times (from 24 to 27) or 12 %.
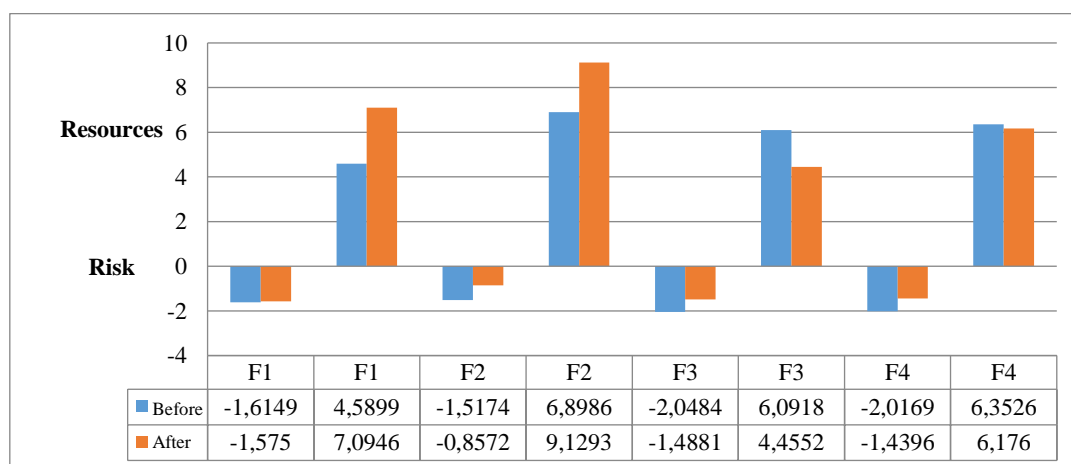
Figure 4. Dissemination of resource-risk of distress
latent factors after balneotherapy course
Note: Factors: F1- mental, F2- dyspeptic, F3- respiratory, F4- asthenic.

	F1	F1	F2	F2	F3	F3	F4	F4
Before	-1,6149	4,5899	-1,5174	6,8986	-2,0484	6,0918	-2,0169	6,3526
After	-1,575	7,0946	-0,8572	9,1293	-1,4881	4,4552	-1,4396	6,176

Integral exposure of balneotherapy on health status

In investigation of the possibilities of the impact on the health status logistic regression analysis was applied. The HI for seamen before and after treatment was taken as a dichotomous dependent variable. The dependent variable is Y=1 if after balneology impact resources for health status are possible; Y=0 if there is potential risk. Independent variables are SBP, DBP, HR, pain, muscle strength and mood before and after balneolotherapy treatment course. The column OD of Tables 25 and 26 presents the ratio of possibilities that shows the exposure of each indicator on the change of health status.

It was found that balneotherapy had almost no integral impact on health risk related to SBP, slightly reducing DBP, slightly increasing HR and mood-related risk, almost twice reduced the risk caused by pain, the risk related to muscle strength decreased even more. p>0.05 for all variables, therefore there is no reason to reject the zero hypothesis of coefficients B≠0 which means that their risk predictive value is questionable.

Table 25. Possibilities for health status before the balneotherapy procedures

Independent variables*	B	S.E	Wold criterion	df	p	OR	95 % ORCI
FSBP	0.020	0.078	0.066	1	0.797	**1.020**	0.876-1.189
FDBP	0.237	0.185	1.637	1	0.201	**1.267**	0.882-1.822
FHR	−0.080	0.065	1.506	1	0.220	0,923	0.813-1.049
FP	0.175	0.519	0.113	1	0.736	**1.191**	0.430-3.295
FMS	−1.092	2.407	0.206	1	0.650	**0.335**	0.003-37.536
FM	−1.742	2.428	0.515	1	0.473	0.175	0.002-20.442
Constant	−9.492	9.823	0.934	1	0.334	0.000	

Note:*before balneo procedures, FSBP- factor systolic blood pressure, FDBP- factor diatolic blood pressure, FHR- heart rate, FP- factor pain, FMS- factor muscle strength, FM- factor mood.

Table 26. Possibilities for health status after the balneotherapy procedures

Independent variables**	B	S.E	Wold criterion	df	*p*	OR	95 % OR CI
FSBP	0.019	0.072	0.070	1	0.791	**1.019**	0.885-1.174
FDBP	0.201	0.142	2.006	1	0.157	**1.223**	0.926-1.615
FP	−0.427	0.692	0.381	1	0.537	**0.653**	0.168-2.531
FMS	−3.929	3.295	1.421	1	0.233	**0.020**	0.000-12.551
FM	−1.185	2.265	0.274	1	0.601	0.306	0.004-25.902
FHR	0.016	0.072	0.048	1	0.827	1.016	0.883-1.169
Constant	−4.462	11.356	0.154	1	0.694	0.012	

Note: *after balneo procedures, FSBP- factor systolic blood pressure, FDBP- factor diatolic blood pressure, FHR- heart rate, FP- factor pain, FMS- factor muscle strength, FM- factor mood.

The analysis of the impact change of distress on systemic health risk after balneotherapy course showed that balneotherapy significantly reduced systemic health risk caused by distress symptoms (before the course by 1.802 time, after by 1.475 time) (Tables 27 and 28).

Table 27. Impact of distress on the health status before balneotherapy procedures

Independent indicators*	B	S.E	Wold criterion	df	*p*	OR	95 % OR CI
NSS_1	0.589	0.116	25.816	1	**<0.001**	**1.802**	1.436-2.262
SI_1	−0.210	0.105	4.021	1	0.045	0.810	0.660-0.995
SM_1	−0.087	0.081	1.154	1	0.283	0.917	0.783-1.074
Constant	−0.959	0.806	1.416	1	0.234	0.383	

*Note:*before procedures, NSS_1- number of distress symptoms, SI_1- intensity of distress symptoms (VAS), SM_1- management of distress symptoms (VAS).

Table 28. Impact of distress on the health status after balneotherapy procedures

Independent indicators**	B	S.E.	Wold criterion	df	*p*	OR	95 % OR CI
NSS_2	0.388	0.150	6.706	1	**0.010**	**1.475**	1.099-1.978
SI_2_	−0.048	0.130	0.134	1	0.714	0.953	0.739-1.231
SM_2	−0.161	0.095	2.849	1	0.091	0.851	0.706-1.026
Constant	−0.079	0.929	0.007	1	0.932	0.924	

*Note:*after procedures, NSS_2- number of distress symptoms; SI_2- intensity of distress symptoms (VAS); SM_2- management of distress symptoms (VAS).

When checking the hypothesis of variable coefficients B≠0 by Wold statistics, it was found that for risk prediction the indicator of symptom number is well suited, and it shows that after the treatment the possibility to decrease integral health risk is 18 %. The predictive value of other variables is questionable (Table 28).

CONCLUSIONS

1. The proposed *conceptual* systemic interaction model of health risk- resources is based on the synergetic dissipation characteristic. The total integral health risk, identified by the indices of lifestyle and psycho-emotional state, was close to balance (health risk exceeded resources by 1 %); seamen's state of health was in balance, while the risk of urban residents exceeded the resources by 3 %. The values of integral indices confirmed the principle of holism and nonlinearity: the total index is not equal to the sum of indices of seamen and urban residents.

2. *Lifestyle-mediated* integral health risk for urban residents was higher; for both groups risk was caused by the factor of *work environment*. The risk of *psycho-emotional state* for both groups was caused by *stress*: for seamen it was *fatigue* and for urban residents it was *cognitive functions*. For seamen stress risk exposure level was increased by *social insecurity*, for urban residents it was increased by *working conditions*. For seamen fatigue risk was caused by the factor of *mental capacity*, for urban residents the factor of *perception* caused cognitive activity impairment. Lifestyle- mediated risk intensity was experienced more by urban residents, and psycho-emotional state risk intensity – by seamen.

3. Estimating the *risk- resources situation* of all integral health risk factors risk exposure level of the majority of the factors was higher. This confirms the hypothesis that risk development tends to increase. Risk exposure intensity caused by lifestyle and psycho-emotional state in the social group of seamen was significantly higher than in the group of urban residents. Risk intensity for seamen was caused by the latent factors of social nature (*work environment, self-expression, social security, social environment*). It can be assumed that health risk for seamen results from *the lack of social relations*. This confirms the hypothesis that the lack of social relations increases health risk intensity.

4. Balneotherapy reduces risk exposure intensity of health risk factors: stress, fatigue, mood, cognitive functions, pain, blood pressure, heart rate, respiratory rate, common health state, musculoskeletal state, thus reducing stress-mediated integral health risk.

PRACTICAL RECOMMENDATIONS

With regard to the outcomes of the present research dealing with establishing and managing health risks factors and integral risk, the following recommendations are provided for the representatives of public health policy makers, public health centres and medical professionals:

I. **Advice for public health policy makers:**

1. While implementing evidence based health policy, the application of the integral health risk calculation, evaluation and management method as a way of proof, which can be relied upon in the process of health risk management, could be considered.

2. In developing health models, feasible management parameters, which would make a basis for making decisions regarding universal health strengthening intervention, should be found.

II. **Advice for representatives of public health centres:**

1. During various events and courses, with the help of media representatives, encourage people to pay attention to the main lifestyle factors, which increase health risk in their environment: psycho-emotional stress, work and rest mode, fatigue, body weight and bad habits, and motivate them to actively control these factors.

2. Integral health risk establishing method should be applied for public health computerised modelling in concrete lifestyle situations. This way high risk patients would be singled out, contacts with target population established, and means to restore their state offered.

3. Pay more attention to examining stress at work and encourage employers to create healthy jobs.

4. Encourage using natural means (balneotherapy, etc.) for decreasing stress and fatigue.

III. **Advice for medical professionals:**

1. In assessing the patient's situation, adhere to the holistic principle by paying attention to the existence of the established factors determining main health risks: stress, fatigue, and bad habits.

2. Encourage people's health literacy, self-observation, pursuing work and rest mode and healthy lifestyle.

3. Recommend health strengthening and risk reducing method – balneotherapy by geothermal water.

PUBLICATIONS ON THE THEME OF THE DISSERTATION

1. Rapolienė L, Sąlyga J. Psichoemocinis stresas jūrininko darbe ir jo mažinimo galimybės. Sveikatos mokslai 2012; 22(3): 83-87.

2. Rapolienė L, Jurgelėnas A. Sinergetika ir medicina. Lietuvos bendrosios praktikos gydytojas 2014; 4 (18): 244-254.

3. Rapolienė L, Jurgelėnas A. Balneoterapijos efektyvumas ir perspektyvos. Medicinos teorija ir praktika 2014; 2(20):141-151. http://webcache.googleusercontent.com/search?q=cache:http://www.mtp.lt/files/8str.pdf

4. Rapolienė L, Jurgelėnas A. Jūrininkų ir kranto darbuotojų streso formuojama sveikatos rizika. Visuomenės sveikata 2015, priedas 1: 81-89.

5. Rapolienė L, Jurgelėnas A, Sąlyga J. Gyvensenos skirtumų įtaka sveikatai. Sveikatos mokslai 2014; 24(4): 57-62.

6. Rapolienė L, Sąlyga J, Žiliukas G, Norkienė S. Streso ir nuovargio paplitimas tarp jūrinės ir kranto profesijų atstovų. Sveikatos mokslai veikatos mokslai 2014; 24 (4): 75-94.

7. Rapolienė L, Razbadauskas A, Sąlyga J, Martinkėnas A. The balneotherapy links with seafarer's health in randomized clinical trial. Sveikatos mokslai 2014; 6 (97):119-127.

8. Rapolienė L, Razbadauskas A, Jurgelėnas A. The Reduction of Distress Using Therapeutic Geothermal Water Procedures in a Randomized Controlled Clinical Trial," Advances in Preventive Medicine, 2015, Article ID 749417, 10 pages, 2015. doi:10.1155/2015/749417.

9. Rapolienė L. Geoterminio vandens ir sapropelio procedūrų įtaka gyvenimo kokybei. Sveikatos mokslai 2015; 25 (5):157-163. DOI: http://doi.org/10.5200/sm-hs.2015.105

10. Rapolienė L, Razbadauskas A, Sąlyga J, Martinkėnas A. Stress and Fatigue Management Using Balneotherapy in a Short-Time Randomized Controlled Trial. Evidence based complementary and alternative medicine. Volume 2016 (2016), Article ID 9631684, http://dx.doi.org/10.1155/2016/9631684

11. Rapolienė L. The Effect of Geothermal Water on Skin Condition and Body Fat. British Journal of Medicine & Medical Research 18(10): 1-13, 2016; Article no.BJMMR.29892 ISSN: 2231-0614, NLM ID: 101570965.

PRESENTATIONS AND THESES

1. Rapolienė L, Sąlyga J. Psichoemocinis stresas jūrininko darbe ir jo mažinimo galimybės. Vydūnas conference. Palanga, 2012 (summary).

2. Rapolienė L, Žiliukas G, Martinkėnas A, Grakauskaite L. Geoterminio vandens panaudojimas sveikatinimui. The effectiveness of the rehabilitation methods and measures. Birštonas, 2013: 288–294 (theses, presentation).

3. Rapolienė L, Žiliukas G. Geoterminio vandens balneoprocedūrų ir muzikos terapijos poveikis sveikatai. Reabilitacijos metodų ir priemonių efektyvumas. Birštonas, 2013: 295–297 (theses).

4. Rapolienė L. Geothermal water for human health promotion. Klaipėdos mokslo ir technologijų parkas. International conference on geothermal energy *GeoDirect.* Klaipėda, 2013 10 22-24. (presentation).

5. Rapolienė L. Water and life. GeoDirect project – *international conference –* study tour. Reikjavik, April 28–30, 2014 (presentation).

6. Rapolienė L. Balneoterapijos ir peloidoterapijos nauda sergančiųjų kaulų-raumenų ligomis reabilitacijai. Respublikos Reabilitologų asociacijos konferencija, Palanga, 2014 11 28 (presentation).

7. Rapolienė L, Žiliukas G, Razbadauskas A, Martinkėnas A. The balneotherapy with geothermal water links with human health in randomized controlled clinical trial. Move for health 2014. International conference, Kaunas, 2014 12 04 (Theses, poster).

8. Rapolienė L, Razbadauskas A, Jurgelėnas A. 10th *ORPHEUS Conference* Challenges in evaluation of research outcomes in PhD education (poster). Belgrade, Serbia, April 16–18, 2015.

9. Rapolienė L, Razbadauskas A, Petrauskas S, Martinkėnas A. Balneoterapija panaudojant geoterminį vandenį. Konferencija *Virtualūs instrumentai biomedicinoje* 2015. Klaipėda, 2015 05 29 (Pranešimas).

10. Rapolienė L, Razbadauskas A. Gamtos dovana žmogaus sveikatai. 9-oji Lietuvos geotermijos asociacijos (LGA) konferencija. Geoterminio vandens panaudojimo galimybės, Klaipėda, 2015 11 27 (Pranešimas).

11. Rapolienė L. Geoterminis vanduo ir sapropelis: nauda žmogaus sveikatai. Sveikata 2016, Klaipėda, 2016 03 19 (Pranešimas).

12. http://www.ve.lt/naujienos/nuomones/nuomones/geoterminiai-vandenys-atveria-naujas-perspektyvas-sveikatos-turizmui-1446805.

13. Rapolienė L. Geoterminio vandens poveikis žmogaus sveikatai. Mokslinė-praktinė konferencija *Į sveiką gyvenseną ir skaidrią būtį Vydūno keliu: Vydūnas jaunystei*. Klaipėda, 2016 04 06 (Pranešimas).

14. Rapolienė L, Razbadauskas A, Martinkėnas A. Balneotherapy with geothermal water. Quantitative assessment of health effect. Bagni caldi in acque geotermiche. Valutazioni quantitative degli effetti sulla salu. Notizario UGI – Unione Geotermica Italia. Anno XV – Aprile 2016 – nn. 43-44.

CURRICULUM VITAE

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   Seamen health care center
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2014- now – lecturer- Klaipėda University
2016- now – medical advisor- UAB Orkla Health
2008- now – lecturer- Individual activity with business license for professional
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2015- 2016 – director for medicine – UAB Northway medical and surgery centers
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2013- 2015 – lecturer- Institute of Continuous Studies of Klaipeda's University
2008- 2012 – doctor of internal diseases/ manager- N. Imbrasienės private clinic
2006- 2007 – trainer- KRKA d.d. Novo Mesto representative office in Vilnius
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1997- 1999 – Klaipėda- Šiauliai region medical representative
2000- 2006 – doctor of internal diseases - Klaipėda Seamen Hospital
1993- 1995– nurse- Kaunas Psychoneurological hospital
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Education
Kaunas Medical University
2004-2005   – family doctor resident (Kaunas)
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1996-1997 – doctor- resident of general medicine (Klaipeda)
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Trainer courses (STRATOS), Slovenia- communication, selling, and leadership skills.
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INTEGRALI GYVENSENOS IR PSICHOEMOCINĖS BŪKLĖS LEMIAMA SVEIKATOS RIZIKA, JOS VERTINIMAS IR PREVENCIJA

REZIUMĖ

Darbo aktualumas

Per pastaruosius keliolika metų dėl vis didėjančio gyvenimo tempo, situacijų kaitos ir nestabilumo, gyvenime vykstančius procesus bandoma suvokti kaip sudėtingas, atviras, *netiesines sistemas*. Visuomenės sveikata, kaip neatskiriama socialinio gyvenimo sritis, taip pat priklauso šiai sistemų grupei ir jos samprata turi *netiesinių sisteminių* bruožų. Tą patvirtina daugelis svarbių šiuolaikinių sveikatos politikos strateginių dokumentų ir sveikatos mokslines teorijos teiginių. Tai konceptualiai naujas iššūkis visuomenės sveikatos mokslui ir praktikai, nes į sveikatą dabar žiūrima kaip į *procesą, veiklą*, *potencialą*, ir prioritetiniais darbais tampa mokslinis rizikos sveikatai vertinimas, o investavimas į efektyvias sveikatos sistemas bei didesnę prevenciją turėtų teikti geresnę sveikatą, didesnį žmogaus produktyvumą, leisti taupyti ir mažinti sveikatos netolygumus. Sveikata yra *galia*, turinti galimybę atlikti darbą, tam tikras užduotis bendruomenėje, nugalėti fizinį, biologinį ir socialinį stresą, siekti gerovės, vengti ligų ir priešlaikinės mirties rizikos. Sveikatos sisteminė koncepcija reiškia, kad individo ar populiacijos sveikatą lemia vienu metu su individu ar populiacija *sąveikaujančių* aplinkos veiksnių *sistema*. Įrodyta, kad tokios sąveikos rezultatas nėra atskirų sąveikų suma, čia veikia holizmo principas, kuris sako, kad „visuma yra daugiau nei jos dalių suma". Sistemos elgesį ir savybes lemia ir atsirandantis sinergijos efektas, kuris taikomas tiriant sudėtingas socialines, ekonomines ir medicinos bei visuomenės sveikatos sistemas.

Nors sisteminio požiūrio į visuomenės sveikatą ir ypač į jos riziką aktualumas didėja, ypač tokiose srityse kaip gyvenimo būdas ir psichoemocinė būsena, tačiau dauguma tyrimų vis dar remiasi biomedicininiais modeliais, kai ieškoma ne integralių sąsajų, bet priežastingumo tarp atskirų rizikos veiksnių.

Spręsdami šią problemą, mes daktaro disertacijoje konstruojame sveikatos sistemą, besiremiančią tikslingų sistemų koncepcija, kuri sako, kad sistemą sudaro aibė elementų, kurių kiekvienas tiesiogiai ar netiesiogiai yra susijęs su kiekvienu kitu elementu, ir dvi bet kurios posistemės negali būti nepriklausomos. Mūsų daktaro disertacijoje gvildenamos sistemos elementai yra sveikata, gyvensena, psichoemocinė

būsena, balneoterapija, o posistemės – išteklių ir rizikos struktūros. Tikslinė posistemė – *sveikatos rizika.*

Integralią sveikatos riziką mes suvokiame kaip *integralų* s*isteminį veiksnį,* kuris formuojasi fizinėms, socialinėms, gamtos, technogeninėms, aplinkos, gyvensenos sąlygoms *sąveikaujant* su fizine, socialine ir dvasine sveikata. Tai latentinis *tiesiogiai* neišmatuojamas veiksnys.

Sveikatos išteklių ir rizikos formavimui didelę įtaką daro žmonių gyvenimo būdas ir psichoemocinė būklė, kuriems taip pat būdingi sisteminiai dėsningumai. Konkrečių gyvensenos veiksnių poveikis sveikatai plačiai tyrinėtas, tačiau nerasta tyrimų apie *socialinės organizacijos* poveikį individo ir grupės sveikatos išteklių ir rizikos struktūrai. Šio veiksnio poveikiui patikrinti mūsų daktaro disertacijoje suformuotos dvi skirtingos socialinės padėties ir socialinių vaidmenų – jūrininkų ir miesto gyventojų – tiriamųjų grupės.

Siekiant sumažinti riziką sveikatai ir kartu padidinti jos išteklius, disertaciniame darbe vykdytas tyrimas, kokią įtaką sveikatą turi balneoterapijos procedūros, kurių poveikis neabejotinai yra sisteminis. Balneoterapijos poveikis remiasi integruota mechaninio, terminio, cheminio, imunologinio ir psichologinio mechanizmų poveikiu funkcinėms organizmo sistemoms. Mūsų tyrimu siekta įrodyti, kad balneoterapijos poveikiu stimuliuojant savaiminį organizmo sveikimą, subalansuotai valdomas sveikatos išteklių ir rizikos santykis, kuris turi įtakos gerinant sisteminę sveikatos rizikos būklę.

Tiriama problema. Sisteminio požiūrio aktualumas sukuria prielaidas suformuluoti mokslinę problemą kaip klausimą – *kaip identifikuoti ir vertinti gyvensenos ir psichoemocinės būklės lemiamą integralią sveikatos riziką, jos plėtros tendencijas ir priežastis?*

Atsakymas į šį klausimą yra aktualus ir turi labai didelę reikšmę visuomenės sveikatos rizikos tyrimais pagrįstam sveikatos proceso valdymui pereinant nuo atskirų rizikos veiksnių poveikio sveikatai prie daugelio rizikos veiksnių sisteminio poveikio visuomenės sveikatos procesui vertinimo.

Darbo tikslas

Įvertinti skirtingų socialinių grupių (jūrininkų ir miesto gyventojų) gyvensenos ir psichoemocinės būklės lemiamos sveikatos integralios rizikos sisteminius bruožus ir balneoterapijos poveikį rizikos prevencijai.

Darbo uždaviniai:

1. Parengti *konceptualų* sveikatos išteklių ir rizikos *sisteminės* sąveikos modelį ir juo remiantis įvertinti skirtingos socialinės padėties grupių (jūrininkų ir miesto gyventojų) sveikatos integralios rizikos *raišką,* kurią lemia gyvensena bei psichoemocinė būklė.

2. Nustatyti skirtingų socialinių grupių (jūrininkų ir miesto gyventojų) sveikatos integralios rizikos *poveikio lygius ir intensyvumą, kuriuos lemia* gyvensenos ir psichoemocinės būklės veiksniai.

3. Įvertinti sveikatos integralios rizikos plėtros tendencijas ir skirtumus socialinėse grupėse.

4. Nustatyti *balneoterapijos* poveikį sveikatos rizikos prevencijai.

Mokslinis darbo naujumas

- Visuomenės sveikatos mokslo požiūriu, darbas inovatyvus tuo, kad jame pateikiama *sisteminė sinergetinė* sveikatos rizikos – išteklių plėtros koncepcija ir jos empirinė realizacija.

- Darbe pateikta nauja integrali visuomenės sveikatos rizikos samprata, jos identifikavimo galimybė ir vertinimo rodikliai.

- Darbe įrodyta, kad socialinių santykių trūkumas didina sveikatos rizikos poveikio intensyvumą.

- Nustatyta, kad pirmą kartą Europoje naudotas natūralus ypač didelės mineralizacijos geoterminės kilmės vanduo mažina sisteminę sveikatos riziką

Darbo praktinė vertė

- Gauti rezultatai gali būti naudojami formuojant efektyvesnę visuomenės sveikatos politiką, atitinkančią Europos Sąjungos programos „Horizontas 2020" strateginius tikslus. Sisteminis požiūris ir integralus metodas tinka strateginiams sveikatos politikos klausimams spręsti, nes leidžia nustatyti ilgalaikius sveikatos išteklių ir rizikos lygius bei jų priežastis.

- Teigiami balneoterapijos geoterminiu vandeniu psichoemocinės būklės gerinimo rezultatai skatina taikyti ši metodą didesnei populiacijos daliai, kadangi stebima psichikos ligų augimo tendencija.

- Tyrimas padėjo atskleisti ypač aukštos mineralizacijos geoterminio vandens naudojimo galimybes, jo naudą ir saugumą, todėl galima kurti geoterminio

vandens receptūras ir metodikas, pritaikant jas konkrečiam poreikiui, sudarant prevencines ir reabilitacines programas. Visa tai prisidės stiprinant gydomąjį turizmą Lietuvoje.

Disertacijos struktūra ir apimtys

Darbą sudaro pagrindiniai skyriai: Įvadas, Literatūros apžvalga, Tyrimo medžiaga ir metodai, Rezultatai, Rezultatų aptarimas, Išvados ir praktinės rekomendacijos; 47 lentelės ir 26 paveikslai. Įvade pateikiamas tyrimo aktualumas, tiriamoji problema, tyrimo tikslas ir uždaviniai, disertacinio darbo naujumas. Literatūros apžvalgoje aprašomi sveikatos rizikos veiksniai, jų raiška, situacija Lietuvoje ir užsienyje, rizikos nustatymo bei vertinimo galimybės ir balneoterapijos geoterminiu vandeniu naudojimo sveikatos rizikos prevencijai teorinės įžvalgos. Skyriuje Tyrimo medžiaga ir metodai aprašoma tiriamoji populiacija ir jos pasirinkimo kriterijai, tyrimo metodai ir etapai bei statistinė analizė. Tyrimo teorinis pagrindas buvo tikslingų sistemų koncepcija. Formuojant sveikatos išteklių ir rizikos identifikavimo bei vertinimo galimybę, buvo remtasi sinergetinės pusiausvyros tarp sveikatos išteklių ir rizikos idėja. Balneoterapijai naudotas labai aukštos mineralizacijos – 108 g/l – Na-Cl-Ca-Mg-SO4 geoterminis mineralinis vanduo.

Rezultatų skyriuje pateikiami gauti rezultatai, nurodomas jų patikimumas. Rezultatų aptarimo skyriuje gauti rezultatai lyginami su kitų tyrėjų duomenimis. Disertacinio darbo pabaigoje, atsižvelgiant į iškeltus uždavinius, pateikiamos išvados ir praktinės rekomendacijos. Literatūros sąraše yra 305 bibliografiniai šaltiniai. Visa disertacijos apimtis sudaro 186 puslapius.

Išvados

1. Pasiūlytas konceptualus sveikatos išteklių ir rizikos sisteminės sąveikos modelis remiasi sinergetine disipacijos savybe. Bendra integrali gyvensenos ir psichoemocinės būklės indeksais identifikuota sveikatos rizika buvo arti pusiausvyros (sveikatos rizika viršijo išteklius 1 proc.); jūrininkų sveikatos būklė buvo pusiausvira, o miesto gyventojų rizika viršijo išteklius 3 proc. Integralių indeksų reikšmės patvirtino holizmo ir netiesiškumo principą – bendras indeksas nėra lygus jūrininkų ir miesto gyventojų indeksų sumai.

2. *Gyvensenos* lemiamos sveikatos integralios rizikos poveikio lygis miesto gyventojams buvo didesnis; abiem grupėms riziką lėmė *darbo aplinkos* veiksnys. *Psichoemocinės būklės* riziką abiem grupėms lėmė *stresas*, tik jūrininkams – *nuovargis*, o miesto gyventojams – *pažintinės veiklos sutrikimai*. Jūrininkams streso rizikos poveikio lygį didino *socialinis nesaugumas*, o miesto gyventojams – *darbo sąlygos*. Jūrininkų nuovargio riziką lėmė *protinių galimybių* veiksnys, miesto gyventojų pažintinės veiklos sutrikimą – *suvokimo* veiksnys. Miesto gyventojai patyrė didesnį gyvensenos, o jūrininkai- psichoemocinės būklės veiksnių lemiamą *rizikos intensyvumą*.

3. Vertinant visų integralių sveikatos rizikos veiksnių *išteklių* ir *rizikos* situaciją, nustatyta, kad daugumos rizikos veiksnių poveikio lygis didesnis, o tai patvirtina hipotezę, jog rizikos plėtra turi tendenciją didėti. Gyvensenos ir psichoemocinės būklės lemiamas rizikos poveikio intensyvumas jūrininkų socialinėje grupėje buvo reikšmingai didesnis nei miesto gyventojų. Rizikos intensyvumą jūrininkams lėmė socialinio pobūdžio latentiniai veiksniai (*darbo aplinkos, saviraiškos, socialinio saugumo, socialinės aplinkos*). Galima teigti, kad jūrininkų sveikatai rizika kyla dėl *socialinių santykių trūkumo*. Tai patvirtina mūsų hipotezę, jog socialinių santykių trūkumas didina sveikatos integralios rizikos intensyvumą.

4. Balneoterapija mažina paskirų sveikatos rizikos veiksnių – streso, nuovargio, nuotaikos, pažintinės veiklos, skausmo, kraujo spaudimo, širdies susitraukimų dažnio, kvėpavimo dažnio, bendros savijautos, kaulų ir raumenų būklės – poveikio intensyvumą, kartu mažindama streso lemiamą sveikatos integralią riziką.

Praktinės rekomendacijos

I. Patarimai sveikatos stiprinimo politiką kuriantiems atstovams:

1. Vykdant įrodymais grįstą sveikatos politiką, įvertinti disertacijoje pateikto integralios sveikatos rizikos skaičiavimo, vertinimo ir valdymo metodo taikymą kaip įrodymo būdą, kuriuo galima remtis sveikatos rizikos valdymo procese.

2. Kuriant sveikatos modelius, rasti galimus valdymo rodiklius (parametrus), kurie būtų pagrindas sprendimams dėl visuotinių sveikatinimo intervencijų priimti.

II. Patarimai visuomenės sveikatos centrų atstovams:

1. Renginių ir mokymų metu, spaudos priemonėmis skatinti gyventojus atkreipti dėmesį į pagrindinius jų aplinkoje gyvensenos veiksnius, kurie didina sveikatos riziką: psichoemocinį stresą, darbo ir poilsio režimą, nuovargį, kūno svorį ir žalingus įpročius, bei skatinti aktyviai juos valdyti.

2. Integralų sveikatos rizikos nustatymo metodą taikyti visuomenės sveikatos kompiuteriniam modeliavimui konkrečios gyvensenos situacijose. Taip būtų atrinkti didelės rizikos pacientai, kontaktuojama su tiksline populiacija, ieškoma priemonių jų būklei atstatyti.

3. Skirti didesnį dėmesį streso darbe ištyrimui ir skatinti darbdavius kurti sveikas darbo vietas.

4. Skatinti natūralių priemonių stresui ir nuovargiui mažinti naudojimą (balneoterapija ir kt.).

III. Patarimai medikams:

1. Vertinant paciento situaciją, laikytis holistinio požiūrio, atkreipiant dėmesį į nustatytų pagrindinių sveikatos rizikos determinantų buvimą: streso, nuovargio ir žalingų įpročių.

2. Skatinti žmonių sveikatos raštingumą, savistabą, darbo ir poilsio režimo bei sveikos gyvensenos laikymąsi.

3. Rekomenduoti sveikatą stiprinantį ir riziką mažinantį metodą – balneoterapiją geoterminiu vandeniu.

GYVENIMO APRAŠYMAS

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Darbinė patirtis
2007- dabar – šeimos gydytoja, I skyriaus vedėja – Klaipėdos jūrininkų sveikatos
priežiūros centras
2015- dabar – šeimos gydytoja, vidaus ligų gydytoja, echoskopuotoja – UAB
„Northway" medicinos centrai
2014- dabar – lektorė – Klaipėdos universitetas
2016- dabar – medicinos konsultantė – UAB „Orkla Health"
2008- dabar – lektorė – Individuali papildomo mokymo ir tobulinimo veikla pagal
verslo liudijimą
2015- 2016 – direktorė medicinai – UAB „Northway"medicinos ir chirurgijos centrai
2014- 2015 – padalinio vadovė – UAB „Atostogų parkas"
2013- 2015 – lektorė – Klaipėdos universiteto Tęstinių studijų institutas
2008- 2012 – vidaus ligų gydytoja ir vadybininkė – N. Imbrasienės privati klinika
2006- 2007 – mokymo vadovė – KRKA d. d. Novo Mesto atstovybė Vilniuje
1999- 2006 – Klaipėdos – Šiaulių regiono vadovė – KRKA d. d. Novo Mesto
atstovybė Vilniuje
1997- 1999 – Klaipėdos – Šiaulių regiono atstovė – KRKA d. d. Novo Mesto
atstovybė Vilniuje
2000- 2006 – vidaus ligų gydytoja – Klaipėdos jūrininkų ligoninė
1993- 1995 – slaugytoja – Kauno psichoneurologinė ligoninė
1988- 1990 – slaugytojos padėjėja-administratorė – Raseinių centrinė ligoninė

Išsilavinimas
Kauno medicinos universitetas
2004–2005 – Šeimos gydytojo rezidentūra (Kaunas)
1997–1999 – Vidaus ligų rezidentūra (Klaipėda)
1996–1997 – Pirminė rezidentūra (Klaipėda)
1990–1996 – medicinos studentė

Kursai

2005–2006 – Treinerio kursai (STRATOS), Slovėnija – bendravimas, pardavimas, lyderiavimas.

Koučingas (Verslo poligonas)

Lyderiavimas (Medicinos verslo akademija)

Psichohigiena (Medicinos verslo akademija)

Licencijos

MPL-09149 (2007.03.07) – šeimos gydytojo profesinė kvalifikacija

MPL-04834 (2004.12.16) – vidaus ligų profesinė kvalifikacija

Kraujagyslių ir vidaus organų echoskopijų pažymėjimai