Advances in Social Science, Education and Humanities Research (ASSEHR), volume 312
International Conference "Topical Problems of Philology and Didactics:
Interdisciplinary Approach in Humanities and Social Sciences" (TPHD 2018)

Personal Peculiarities as a Factor of Arctic Workers' Socio-Psychological Well-Being

Veronika Sharok
Saint-Petersburg Mining University
St. Petersburg, Russia
sharok_vv@pers.spmi.ru

Iuliia Iakovleva
Saint-Petersburg Mining University
St. Petersburg, Russia
yakovleva_yua@pers.spmi.ru

***Abstract*—The purpose of this study was to identify differences in the aptitude of sprinters, stayers, and mixters for work in the Arctic. For this purpose, a questionnaire survey was used. The study enrolled 618 people who were considering work in the Arctic with different degrees of probability. The respondents were divided into three groups: sprinters, stayers, and mixters. It was found that stayers had the following social and psychological characteristics which have a positive effect on their aptitude for work in the Arctic: friendliness, sociability, calmness, tranquillity, steadiness, perseverance, decisiveness, and strength. Moreover, they are self-possessed persons and less concerned with the climate and other unfavourable factors of the Arctic region. In this regard they more often (in comparison with other types) admit the possibility of work in the Arctic. Although mixters are thought to be intermediate types, it is not always so. In some cases they have the positive personal traits of stayers, while in other cases they bear more resemblance to sprinters, which is not always compatible with the manifestation of positive psychological characteristics. Therefore, mixters, similarly to sprinters, are less suitable for work in the Arctic than stayers. So, if we know the weaknesses and strengths of each type and peculiarities of their adaptation to different conditions, it will be possible to improve the appeal of the Arctic Region for young talents who would use then their professional knowledge and skills to develop the Arctic.**

Keywords—sprinters; stayers; mixters; arctic; adaptation

I. INTRODUCTION

The study of differences in aptitude for work in the Arctic region among sprinters, stayers, and mixters is relevant since there is still a question to answer: what is the most effective period to stay and work in the Arctic without health impairment?

Since sprinters adapt to extreme conditions faster than stayers, while stayers show higher adaptivity during long-term stays in extreme conditions, we must determine which of them would be the most suitable type to be employed in the Arctic. We need to focus on the psychological traits of these types.

Furthermore, researchers comment that mixters have the qualities of both these types and might be more successful in adaptation if they demonstrate appropriate features.

Some researchers comment that the permanent living of in-migrants from other regions of the country in the polar region is a major challenge in view of physiology and medicine due to very severe climate and unfavourable impact of a number of factors, including uncontrolled ones, on human well-being, productivity, and health as well as the duration of active life [6, 17].

Adaptation to high-latitude conditions is shown to be bought at a high price through significant morphological and functional shifts, while the most unfavourable changes in our body protection occur in the first year of living and working in high-latitude conditions [16].

However, with short-term or shift-based development of the Arctic, a priority is high-quality medical, psychological, and physiological screening of people, and the next step is to create normal sanitary and hygiene as well as social and economic conditions [5, 17].

Moreover, various constitutional types can be identified in the human population that differ from each other by their ability to adapt to new conditions due to differences in their genotypic characteristics. The most distinct difference is between stayers and sprinters. The stayer's body is rather weakly adapted to sustain powerful short-term loads, but this type is capable of bearing long-lasting evenly distributed environmental factors in inadequate conditions after a relatively short alteration [2, 10, 14, 15].

The sprinter type is capable of powerful functional reactions to respond to strong but short-term exposures to the environment. Sprinters have poor tolerance of long-term exposure to unfavourable factors of even relatively low intensity [2, 10, 14, 15]. There is an intermediate type between these two extremities, a mixed type, that features average adaptation capability [2].

The sprinter type is better adapted in extreme environments over the first months and years when exposed to such conditions. The stayers' characteristics are less advantageous during acclimatisation followed by a significantly improved condition later [2, 8].

Researchers noted that the share of stayers was significantly larger than that of sprinters among the population living in an uncomfortable climate in the North. Thus, the share of stayers in Norilsk was 42.8% versus 15.8% of sprinters. The remaining 41.4% of studied Norilsk residents were of mixed adaptive response type, the so-called mixters. The share of stayers in Arkhangelsk was 66.3% versus a mere 33.7% of sprinters. Unlike in northern territories, 22.0% of studied people were of sprinter adaptive type and 12.0% were

stayers in the mid-latitudes of Siberia. Predisposition to pathological disorders in people with the stayer adaptive strategy in the North was significantly lower than that in residents of middle latitudes. Overall maladaptation in stayers is less expressed, their mental capacity is significantly better, and adaptive and restorative potential is higher [6, 7].

The psychological characteristics of sprinters and stayers differ, too. Sprinters have enhanced activation of central nervous system functions, mobility, balance of mind, extroversion, and neuroticism [19]. This determines such qualities as high resistance to intensive short-term loads, fatigue during monotonous work, impulsiveness, and mood swings. Clinical trials showed a high level of prevalence of functional neurological pathology, including vegetovascular dystonia (VSD) (83%) and emotional-volitional disorders (17%), among such people. When exposed to chronic psychoemotional stresses, sprinters may develop maladaptation, neurotic and autonomic disturbances [4].

Psychological well-being may be reduced during adaptation to the extreme north environment since adaptation involves negative psychological effects: growing depression, irritation, impaired cognitive functions, social withdrawal, worsening interpersonal relationships, hostility, fast developing anger, sleeping disorder, loss of appetite, anxiety, and apathy [1, 3, 9, 11-13]. Therefore, it is important that people who choose to work in the Arctic Region do not have such conditions.

In view of such potential harmful personal changes in the Extreme North, people must clearly understand their motivation to work in the Arctic which could include not only financial incentives but the understanding of their role in society and the role of humans towards the nature [18].

II. Problem Statement

Research problems are to evaluate the students' readiness to work in the Arctic Region, to identify their attitude to various aspects of Arctic work, expectations regarding their work and living there, psychological traits that impact their willingness to work in the Arctic and to identify the psychological traits of stayers, sprinters, and mixters.

III. Research Questions

The research questions are:

1. Social and psychological traits of stayers that have a positive impact on their aptitude for work in the Arctic Region.

2. Social and psychological traits of mixters related to their willingness to work in the Arctic in between the two opposite types of sprinters and stayers

IV. Purpose of the Study

The purpose of this study is to identify differences in the aptitude of sprinters, stayers, and mixters for work in the Arctic Region

V. Research Methods

A. Materials.

A questionnaire survey was used to achieve the goal and to test the hypothesis. The respondents were offered to complete a questionnaire to identify the following parameters:

eagerness to work in the Arctic;

approximate period of work in the Arctic;

expected income immediately upon arrival and in three years;

importance of various infrastructure facilities;

concern about unfavourable factors and climate;

importance of a safe environmental situation;

importance of access to high-tech medical services locally;

any chronic medical conditions;

probability of rejecting a job in the Arctic in case of exacerbation of chronic diseases;

implicit perception of the factors that would promote successful adaptation in the Polar region;

expected difficulty when adapting to the working conditions in the Arctic;

causes that could make the respondent reject a job in the Arctic;

12 personality traits that impact successful adaptation to the Arctic working conditions (using the personality differential method with opposite personality traits placed on different sides of the scale when a respondent is offered to choose the side which characterises him/her best by assessing the degree of manifestation of each trait on the scale from 0 (no specific side chosen) to 3 (one side fully describes his/her personality);

assessment of the impact of prior job placement on the desire to work in the Arctic region;

implicit perception of work in the Arctic region;

demographics, including: gender, age, marital status, children (if any), course of training, and future profession.

This article deals with social and psychological factors that make work in the Arctic attractive for sprinters, stayers, and mixters.

B. Data analysis.

The statistics processing methods applied to data included: analysis of primary statistics, analysis of cross-tables (for nominative data), and analysis of variance (for metric data). Statistics processing was done using the Statistica 10.0 software.

C. Participants.

The study enrolled 618 people who were considering work in the Arctic region with different degrees of probability. The average age of respondents was 19.7 years old, 335 being male and 283 being female respondents, including 194 first-year students, 132 second-year students, 118 third-year students, 111 fourth-year students, 38 fifth-year students, and 25 sixth-year students.

The respondents were divided into three groups: sprinters, stayers, and mixters. Groups were formed taking into account the review of the distribution of the participants' responses to the questionnaire pertaining to their self-assessment as a sprinter or a stayer (Table I): 25% of responses with low values on the scale (1 to 2 scores) accounted for sprinters and 25% of responses with high values (6 to 7 scores) represented stayers. The remaining 50% of responses corresponded to mean values and the mixter group was formed only from the respondents who commented that they found it difficult to answer whether they were sprinters or stayers since they had the qualities of both (4 scores). The sprinter group included 158 people with 86 men and 72 women of an average age of 19.69 years old. The stayer group included 188 respondents with 107 men and 81 women of an average age of 19.62 years old, and the mixter group consisted of 116 people with 60 men and 56 women aged 19.86 years old on the average.

TABLE I. ANALYSIS OF RESPONSE DISTRIBUTION BASED ON SELF-ASSESSMENT OF SPRINTER OR STAYER TRAITS

Indicators	Values
MEAN case 1-618	4.08
MEDIAN case 1-618	4
SD case 1-618	1.95
MIN case 1-618	1
MAX case 1-618	7
25th% case 1-618	2
75th% case 1-618	6

VI. FINDINGS

The review of cross-tables revealed that sprinters and mixters were less willing to work in the Arctic ($\chi2 = 20.12$; $p \leq .01$) (Table II).

TABLE II. WILLINGNESS TO WORK IN THE ARCTIC AMONG SPRINTERS, MIXTERS, AND STAYERS

Willingness	Sprinters	Mixters	Stayers
Yes	26.58%	26.72%	41.49%
Very likely	32.91%	30.17%	32.45%
Very unlikely	29.11%	28.45%	19.15%
No	7.59%	9.48%	2.13%
Hard to answer	3.80%	5.17%	4.79%

Sprinters and mixters were also found to experience concerns about climate and unfavourable conditions in the Arctic Region more often. In particular, as Table III shows, sprinters and mixtres are more often concerned about lack of warmth and sunlight, low temperatures, poor infrastructure at their living locations, heavy clothes and shoes, aggressive timetables (rotation shifts), monotonous environment, low availability of transport, and issues with recreation opportunities. However, stayers and mixters are less concerned about snowstorms or harms and/or hazards in the workplace. Mixters would more likely refuse to take up work in the Arctic due to the local climate (8.92% of sprinters, 17.59% of mixters, and 8.29% of stayers; $\chi2 = 6.95$; $p \leq .05$), while stayers would be held back by family circumstances (7.64% of sprinters, 4.63% of mixters, and 14.92% of stayers; $\chi2 = 9.39$; $p \leq .01$).

TABLE III. CONCERNS ABOUT WORK IN THE ARCTIC AMONG SPRINTERS, MIXTERS, AND STAYERS

Factors	Sprinters	Mixters	Stayers	χ2	p≤
Insufficiently warm climate and insufficient sun light	40.51%	44.83%	27.13%	11.71	.01
Low temperatures	39.24%	45.69%	26.60%	12.69	.01
Snowstorms	56.96%	43.97%	44.68%	6.57	.05
Poor infrastructure in th community	62.66%	61.21%	48.94%	7.86	.05
Harms and/or hazards i the workplace	72.78%	66.38%	60.11%	6.16	.05
Heavy clothes and shoe	25.32%	25.86%	14.36%	8.42	.05
Aggressive timetables (rotation shifts)	38.61%	43.10%	20.74%	20.48	.001
Monotonous environme	45.57%	44.83%	32.45%	7.63	.05
Low availability of transport	67.09%	67.24%	52.13%	10.58	.01
Issues with recreation opportunities	62.66%	63.79%	49.47%	8.56	.05

A one-factor analysis of variance showed that the "mixed" type was not always an intermediate one (Table 4). People of this type had the same psychological traits as those of extreme types, e.g., somewhat less expressed friendliness, sociability, and permanence shared by sprinters and mixters. However, stayers and mixters have similar self-command. It is interesting that mixters describe themselves as less cheerful, resolute, or strong but more restless as compared to sprinters or stayers. Stayers feature such traits as calmness and perseverance to a greater degree than mixters and more so than sprinters.

TABLE IV. PSYCHOLOGICAL TRAITS OF SPRINTERS, MIXTERS, AND STAYERS

Personal traits	Sprinters	Mixters	Stayers	F	p≤
(1) Hostile / (7) Friendly	5.85	5.86	6.22	6.50	.01
(1) Unsociable/ (7) Easy-going	5.18	5.01	5.60	6.23	.01
(1) Cold-headed / (7) Irritable	3.74	3.46	3.02	10.24	.001
(1) Impulsive / (7) Self-possessed	4.74	5.30	5.39	7.87	.001
(1) Sad / (7) Cheerful	5.03	4.67	5.14	3.65	.05
(1) Composed / (7) Restless	2.89	3.09	2.31	11.83	.001
(1) Shifty / (7) Steady	4.37	4.37	5.01	7.89	.001
(1) Fidgety / (7) Diligent	4.55	4.73	5.16	6.16	.01
(1) Indecisive / (7) Decisive	4.99	4.59	5.58	15.86	.001
(1) Weak / (7) Strong	5.15	4.93	5.68	12.19	.001

Therefore, the analysis of interrelations between studied types, their willingness to work in the Arctic and related concerns allowed one to partially confirm the first hypothesis of the research: stayers are more suitable for work in the Arctic than other types. They are less concerned about climate issues or unfavourable factors in the Arctic Region and are more likely to consider employment there. Current data are consistent with the ideas expressed by many authors [2, 10, 14, 15] but are somewhat contradictory to the data suggesting that long-term stay in the extreme conditions of the Extreme North is not desirable [16]. Since stayers need more time for adaptation, they would experience more stress when staying in the Arctic for short periods of time rather than staying longer.

The update of the first hypothesis and testing of the second one required to review the differences between the psychological traits of studied groups. As a result, we found out that mixters were not always an intermediate type. In some cases they had the positive traits of stayers, while in other cases they bore more resemblance to sprinters, which was not always consistent with brightly expressive positive psychology. Current data help to refine the second research hypothesis and prove that the mixter's psychology required for successful adaptation to work in the Arctic, although being in-between that of sprinters and stayers, is close to one of the extremes and not always to the best adaptive one. Therefore, it would not be correct to say that mixters have average parameters and it is an update on the current perception of the type [2].

VII. Conclusion

The following conclusions can be made based on this research. Stayers have the following social and psychological characteristics that have a positive effect on their aptitude for work in the Arctic Region, which are friendliness, sociability, calmness, tranquillity, steadiness, perseverance, decisiveness, and strength. Moreover, they are self-possessed persons and less concerned with the climate and other unfavourable factors of the Arctic region. In this regard they more often (in comparison with other types) admit the possibility of work in the Arctic.

Although mixters are thought to be intermediate types, it is not always so. In some cases they have the positive personal traits of stayers, while in other cases they bear more resemblance to sprinters, that is not always compatible with the bright expression of the positive psychological characteristics. Therefore, mixters, similarly to sprinters, are less suitable for work in the Arctic than stayers.

Research results expand our perception of the social and psychological traits of sprinters, stayers, and mixters that have a favourable effect on their aptitude for work in the Arctic. So, if we know the weaknesses and strengths of each type and peculiarities of their adaptation to different conditions, it will be possible to improve the appeal of the Arctic Region for young talents who would use then their professional knowledge and skills to develop the Arctic and thus strengthen Russia's global position against the backdrop of increasing fight for resources and economic and political independence.

It is an exciting idea to test further a similar trend on a sample that includes people who work or have worked in the Arctic Region.

Acknowledgment

The paper is based on the research carried out with the financial support of the grant of the Russian Science Foundation (Project No. 17-78-20145) in Saint-Petersburg Mining University.

References

[1] J.P. Brandt, M.D. Flannigan, D.G. Maynard, I.D. Thompson, W.J.A. Volney, “An introduction to Canada's boreal zone: Ecosystem processes, health, sustainability, and environmental issues”, Environmental Reviews, vol. 21(4), pp. 207-226, 2013.

[2] V.V., Davydov, “Life safety”. Moscow: Academia, 2003.

[3] G. Décamps, E. Rosnet, “A longitudinal assessment of psychological adaptation during a winter-over in Antarctica”, Environment and Behavior, vol. 37(3), pp. 418-435, 2005.

[4] E.I. Finogenko, “Individual and typological aspects of students' learning adaptation”, Vestnik IrGTU, No. 1(60), pp. 308-312, 2012.

[5] V.I. Hasnulin, V.D. Vilgelm, M.I. Voevoda, B.N. Zyrjanov, V.G. Seljatickaja, V.J. Kulikov, G.M. Egorova, “Medical and environmental principles of formation, treatment and prevention of diseases in indigenous population of Khanty-Mansiysk Autonomous Area”. Novosibirsk: SO RAMN, 2004.

[6] V.I. Hasnulin, “Introduction to polar medicine”. Novosibirsk: SO RAMN, 1998.

[7] V.I. Hasnulin, O.G. Artamonova, A.V. Hasnulina, A.N. Pavlov, “Adaptive types of mobilization of adaptive reserves of the organism and resistance to arterial hypertension in the North”, Ekologiya Cheloveka, No.7, pp. 24-29, 2014.

[8] V.P. Kaznacheev, S.V. Kaznacheev, “Adaptation and the human constitution”. Novosibirsk: Nauka, 1986.

[9] J. Leach, “Psychological factors in exceptional, extreme and torturous environments”. Extreme Physiology & Medicine, No. 5, pp. 7, 2016.

[10] M.A. Lyahova, “Psychological components of a person's life strategy”, Vestnik KemGU, No. 3, pp. 83-90, 2010.

[11] S. Martin, “Indigenous social and economic adaptations in northern Alaska as measures of resilience”, Ecology and Society, No. 20(4), 2015.

[12] A. Nikulin, A.Y. Nikulina, “Assessment of occupational health and safety effectiveness at a mining company”, Ecology, Environment and Conservation, No. 23(1), pp. 351-355, 2017.

[13] J. Petrasek MacDonald, A. Cunsolo Willox, J.D. Ford, I. Shiwak, M. Wood, C. Wolfrey, “Protective factors for mental health and well-being in a changing climate: Perspectives from inuit youth in nunatsiavut, labrador”, Social Science and Medicine, No. 141, pp. 133-141, 2015.

[14] L.G. Dikaya, A.L. Zhuravlev, “Psychology of adaptation and social environment: modern approaches, problems, prospects”, Moscow: Institut psihologii RAN, 2007.

[15] A.A. Rean, A.R. Kudashev, A.A. Baranov, “Psychology of adaptation of the personality”. St. Petersburg: Prajm-EVROZNAK, 2008.

[16] I.A. Sapov, V.S. Novikov, “Non-specific mechanisms of human adaptation”. Leningrad: Nauka, 1984.

[17] Y.G. Solonin, E.R. Bojko, “Medical and physiological aspects of life in the Arctic”, Arktika: Ehkologiya i Ehkonomika, No. 1(17), pp. 70-75, 2015.

[18] N.A. Vakhnin, “Human, nature, society: synergetic dimension”, Journal of Mining Institute, No. 221, pp. 761-765, 2017.

[19] I.A. Yurov, “Interrelation of physical qualities and psychological properties of athletes”, Vestnik Sportivnoj Nauki, No. 3, pp. 23-28, 2013.