

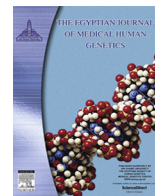
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Original article

Impact of migration on the expression of aggression and empathy in urban populations

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ABSTRACT

Background: Migration is a very important and powerful factor of population dynamics. It can lead to evident genetic consequences, like allele frequency change, as well to non-direct effects by creating new environment for migrant genes to be realized, and different personality and somatic traits, governed by these genes, to be expressed, accordingly.

Aim: The aim of this research was to assess the impact of migration on the level of empathy and aggression among native population and migrants of the Ukrainian megapolis.

Subjects and methods: Altogether 444 males and 597 females – permanent residents of Kharkov aged 45–65 years passed a test for the level of aggression by Assinger's questionnaire and for the level of empathy by Mehrabian-Epstein's questionnaire.

Results: Place of birth of both subjects and their parents was taken into account. The migration and the "alien" genes appear to increase the level of aggression and reduce the level of empathy. Combined action of these factors resulted in an average level of empathy by 15–16% and aggression by 5–6%.

Conclusion: Variation in the level of aggression is much more dependent on the genetic factor (4%) rather than on the environmental (1.8%). The rate of the environmental factor in the empathy variation is 9%, when the genetic – 7%.

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1. Introduction

Migration as a demographic process is reflected in various aspects of human life. It affects politics, culture, economy, causes changes in the epidemiological and environmental situation, and changes the level of public health [1].

The population of different countries, including the countries of the former Soviet Union [2–10] demonstrated the dependence of basic population and genetic parameters on the intensity and the direction of migration flows. The migration is also reflected in the phenotypic characteristics of the population, which is expressed in physical and mental symptoms of migrants [11,12]. Typically conjugated with the deterioration of the quality of life,

migration steps up the aggression, enhances the depression and suicidal tendencies [13]. Migrants slide into bad habits more often than the native population [14,15]. They are more likely to get into hospitals in the acute phase of mental disorders. At the same time the difference in the incidence of diseases in migrants depends on the parent population [16–21]. Adaptability to the new environment depends on the sex [22,23]: females tend to show greater psychological vulnerability than males [16,24–26]. In the representatives of different ethnic groups the frequency of maladjustment symptoms is also variable [22,27,28]. Migrants who came to Europe had a higher incidence of schizophrenia, suicides, alcoholism, drug abuse, increased anxiety and depression compared with the native population [25]. The migrant teenagers from Latin America who entered the USA have shown a higher level of aggression, and more often than their peers of native origin, became addicted to smoking and alcohol [29], practice risky sexual behavior [30] and characterized by hyperactivity and focus problems [31].

Over the last years the problem of forced migration has gained in significance for Ukraine. Social and psychological difficulties were encountered by migrants [32]. There is the increase in the number of post-traumatic stress disorders among the civilian

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population and the persons who participated in hostilities [33]. Kharkov population shows that in the indigenous inhabitants the average level of aggression is lower, while the level of empathy is higher than in the migrants [34]. The surface explanation that the increased aggression and the decreased empathy of the migrants compared with the indigenous persons is a reaction to the adverse life events, looks like an excuse, rather than an explanation. It has also been suggested that the migrants represent a biased sampling of more active individuals from the donor population [34], although the test of this hypothesis has not been done yet.

The objective of this research was to assess the impact of migration on the level of empathy and aggression among native population and migrants of the Ukrainian megapolis.

2. Subjects and methods

Residents of Kharkov aged 45–65 years, 444 males and 597 females, participated in the research. Place of birth of the subjects and their parents was the controlling matter. The level of aggression was assessed by Assinger's questionnaire, and the level of empathy – by Mehrabian-Epstein's questionnaire [35]. The aggression and empathy was assessed in points, which are the whole positive integers, directly reflecting the degree of development of the trait. The collection of information was conducted taking into account the ethical principles when dealing with a person in accordance with the Declaration of Helsinki. All participants of the experiment gave the written consent to participate in the study, completed the questionnaire, which included a list of issues of the demographic nature, and their personality traits were tested.

Using the scheme developed by us we made an analysis to separate the hereditary and environmental factors forming a quantitative diversity in the level of aggression and empathy in subjects. It is based on the presentation of population genetics that the gene pools of different populations during the previous evolution have adapted to the local physical, biological and social conditions and are different from genetic pools of other populations evolution of which developed in the different conditions that modified population-genetic processes [36].

The subjects were divided into the groups “indigenous” (born in Kharkov) and migrants (born in other places). The birthplace of parents indicates the belonging of the genes derived by our subjects: local (if the parents were born in Kharkov) and alien (if the parents come from other places).

The database was created using *Microsoft Excel* software. Analysis of aggression and empathy points distribution conducted by Kolmogorov-Smirnov's test showed its compliance with the Gauss's law. Data analysis was made using one-dimensional method of parametric statistics. Arithmetic mean, standard deviation, and 95% confidence intervals were calculated. Null hypotheses testing was performed at a 0.05 significance level. The calculations were made using *Statistica 6.0* software. A sufficient amount of groups were allowed to provide the necessary power

of study, so a significant difference was obtained in most comparisons, as is evidenced by the non-overlapping 95% confidence intervals.

3. Results and discussion

It is important to understand how the compared groups of subjects differ to discuss the findings thereof. The distribution of the surveyed using our scheme allows to separate the genetic and environmental factor in the formation of a level of aggression and empathy. Thus, migrants, in contrast to the indigenous people, experienced the stressful effect of geographical displacement. People with local genes are more adapted to living conditions than the possessors of alien genes. At the same time, the representatives of group I are indigenous people. They were born in Kharkov and inherited local genes since their parents were also born in Kharkov. This group possess the genes adapted to local conditions and has not experienced the stressful effect of migration. The indigenous inhabitants of group II received from their parents genes adapted to different conditions. This group did not experience the stress factor of migration. Group III includes migrants. They are permanent residents of Kharkov, but were born in other places. They possess local genes, since their parents originate from Kharkov, but because of studies or work they lived in another place where they had a child. This is the way “Kharkov” genes repassed to their native population. This group of subjects has genes adapted to local conditions, but has experienced a stressful effect of migration. Group IV consists of migrants who arrived in Kharkov with genes adapted to the conditions where their parents were born. These people experience the effect of the following two stress factors: the genes that are not adapted to local conditions and migration.

In male the lowest level of aggression (40.0 points) was recorded in the group of natives of Kharkov who had inherited “native” genes (I). The highest level of aggression (42.2 points) is common to migrants who came to Kharkov with the “alien” genes for this population (Table 1). The same pattern was observed in female: the lowest level of aggression (37.2 points) is expressed by the natives of Kharkov with native genes, the highest (39.7 points) – by the migrants with “alien” genes (Table 2). As for the empathy there is quite an opposite situation. The lowest value of this characteristic in male (4.7 points) is common to the group of migrants with alien genes, the highest one (5.6 points) – to the natives of Kharkov with “native” genes. The same pattern was marked in the female group. Comparison of the first and last groups for the aggression and empathy had suggested that the empathy index is more exposed to variation under the influence of alien genes and migration. The variation of this index is 15–16%, while the average level of aggression is varying under the combined influence of alien genes and migration for 5–6%.

To separate the genetic and environmental factors were compared the indexes in Table 3 “in horizontal direction” and “in vertical direction”. Place of birth of parents was considered as a population and genetic characteristics, whereas the presence or

Table 1
Points of aggression and empathy in males, depending on their demographic status and parents' origin.

Group	Parents' origin	Points of aggression		Points of empathy	
		\bar{x} (s)	95% CI	\bar{x} (s)	95% CI
Native of Kharkov $N = 273$	Both natives of Kharkov, $n = 91$	40.0 (2.0)	39.6–40.4	5.6 (2.7)	5.1–6.1
	One non-resident, $n = 140$	40.7 (2.3)	40.3–41.1	5.2 (2.6)	4.8–5.6
	Both non-residents, $n = 42$	41.8 (2.0)	41.4–42.2	5.0 (2.4)	4.5–5.5
Migrant $N = 171$	Both natives of Kharkov, $n = 62$	41.1 (2.1)	40.6–41.6	5.0 (2.2)	4.5–5.5
	One non-resident, $n = 82$	40.4 (2.7)	39.8–41.0	5.5 (2.6)	4.9–6.1
	Both non-residents, $n = 27$	42.2 (2.1)	41.7–42.7	4.7 (2.0)	4.2–5.2

Note: N , n – number of subjects, \bar{x} – arithmetic mean, s – standard deviation, CI – confidential interval.

Table 2

Points of aggression and empathy in females, depending on their demographic status and parents' origin.

Group	Parents' origin	Points of aggression		Points of empathy	
		\bar{x} (s)	95% CI	\bar{x} (s)	95% CI
Native of Kharkov N = 394	Both natives of Kharkov, n = 149	37.4 (2.2)	36.9–37.8	5.2 (2.5)	4.7–5.7
	One non-residents, n = 189	38.4 (2.3)	38.1–38.7	5.0 (2.7)	4.6–5.4
	Both non-residents, n = 56	39.4 (2.3)	38.9–39.9	4.9 (2.9)	4.4–5.4
Migrant N = 203	Both natives of Kharkov, n = 71	38.4 (2.1)	37.9–38.9	4.8 (2.4)	4.3–5.3
	One non-residents, n = 95	38.2 (2.3)	37.7–38.7	5.0 (2.7)	4.4–5.6
	Both non-residents, n = 37	39.7 (2.1)	39.2–40.2	4.4 (2.5)	4.0–4.8

Note: N, n – number of subjects, \bar{x} – arithmetic mean, s – standard deviation, CI – confidential interval.**Table 3**

Genetic and environmental effects of migration in the formation of personal characteristics.

<i>Aggression</i>			
Origin of a male	Origin of his parents		Effect of alien genes
	Natives of Kharkov	Non-residents	
Native of Kharkov	40.0	41.8	+4.5%
Migrant	41.1	42.2	+2.7%
Effect of geographical shift	+2.8%	+1.0%	Combined effect: +5.5%
<i>Empathy</i>			
Origin of a male	Origin of his parents		Effect of alien genes
	Natives of Kharkov	Non-residents	
Native of Kharkov	5.6	5.0	–10.7%
Migrant	5.0	4.7	–6.0%
Effect of geographical shift	–10.7%	–6.0%	Combined effect: –16.1%
<i>Aggression</i>			
Origin of a female	Origin of her parents		Effect of alien genes
	Natives of Kharkov	Non-residents	
Native of Kharkov	37.4	39.4	+5.3%
Migrant	38.4	39.7	+3.4%
Effect of geographical shift	+2.7%	+0.8%	Combined effect: +6.1%
<i>Empathy</i>			
Origin of a female	Origin of her parents		Effect of alien genes
	Natives of Kharkov	Non-residents	
Native of Kharkov	5.2	4.9	–5.8%
Migrant	4.8	4.4	–8.3%
Effect of geographical shift	–7.7%	–10.2%	Combined effect: –15.4%

absence of migration – as an environmental factor. It was found, that in male – natives of Kharkov with the “alien” genes relative level of aggression was by 4.5% higher, than in natives of Kharkov with the “native” genes (Table 3) and this difference can be attributed to the genetic influence. In the group of male migrants effect of alien genes is the same, however, it is lower and equals to 2.7%. The impact of alien genes on aggression in female is more expressed. The increase in the average point of aggression is 5.3% in the natives of Kharkov and 3.4% in migrants. The impact of genetic factor on the aggression (2.7–5.3%) is much more expressed, than the environmental (0.8–2.8%).

In general, change of the level of aggression depends more on the genetic (3.5%), than on environmental (1–3%). The migration has the greater impact (6–12%) on the level of empathy, than the alien genes (1–12%), although the difference is not clearly expressed.

The recent study has reached the following conclusion. “Alien” genes and geographical relocation raise the level of aggression and reduce the level of empathy. Under the influence of the factors the level of empathy varies to a greater extent, than the level of aggression. The effect of these factors in male and female is unidirectional, and the differences are quantitative. The genetic factor

increasingly influences the level of aggression, however, the level of empathy depends more on the environment.

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