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# Researchers of Ukrainian universities in wartime conditions: Needs, challenges and opportunities

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ABSTRACT

Against the backdrop of the ongoing war conflict between Russia and Ukraine, the article explores the needs, challenges, and opportunities that researchers affiliated with Ukrainian relocated university experienced. In the study, we investigated the impact of the war and the safety situation on the scientific activity of Ukrainian university researchers based on their geographical circumstances: those who living in occupied territories, those who had relocated to Ukrainian-controlled areas, or those who had temporarily moved abroad. We also analyzed the relationship between the unique challenges and needs faced by these researchers in light of their security predicaments and explored the extent to which they capitalized on available opportunities. The study identifies a notable decrease in scientific activity among those who temporarily moved abroad. The widespread uncertainty and instability within Ukraine due to the conflict compel researchers to seek novel avenues for resuming scientific undertakings. Overall, the study underscores the evident impact of the war on researchers' scientific activities, necessitating immediate attention and effective actions. The decline in scientific activity and projected loss of academic potential pose political consequences demanding focused strategies for supporting university researchers during wartime.

## 1. Introduction

On 24 February 2022, the Russian Federation launched the large-scale war against Ukraine. This war almost completely destroyed people's life and professional plans, leading to new unexpected obstacles and trials, which undoubtedly affected all types of scientists as well (Maryl et al., 2022; McNutt and Hildebrand, 2022; Moroz, 2022). Dobiesz et al. (2022), have analyzed the factors that affect scientific activity, the diversion of funds intended for science to military spending, and the lack of communication and internet access significantly affect the research effectiveness.

In Ukraine, universities play an integral role in scientific activities. On February 24, 2022, there were 336 higher education institutions of various profiles and different types in Ukraine. The working hours in Ukrainian higher education institutions include time for educational, methodical, research, organizational work, and other work duties. Therefore, research work is an extremely important and integral component of the functioning and development of any Ukrainian university and science as a whole.

Understanding the diverse external context of the war's impact on university operations, it becomes apparent that Ukraine's security conditions are not uniform across its territory. This dynamic is manifested in a gradient of security conditions spanning from regions directly impacted by active hostilities to zones where the escalation of hostilities is less pronounced. Moreover, certain territories find themselves temporarily under external occupation, thereby presenting unique challenges that both institutions and researchers must grapple with. Those regions that do not suffer from active hostilities have resumed their activities rather quickly (Kvyetnyy et al., 2023; Nestulya et al., 2023). The researchers had recovered from the initial shock of the

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war, returned to their workplaces, and were able to continue their previously started research (Kaplenko et al., 2023; Tsos and Makaruk, 2023). The cities that are dealing with the active hostilities or cities close to them suffered from the greatest destruction (Nifatova et al., 2023). The Russian military destroyed many universities and research institutions. Some of the institutions that have not been destroyed remain at constant risk of destruction (Stone, 2022a; Greshta et al., 2023). These institutions cannot continue their activities in their usual format, and many researchers have left for safer cities of Ukraine or have temporarily moved abroad (Stone, 2022b; Polishchuk et al., 2023). Temporarily occupied territories by the Russian invaders do not have active hostilities and life seems to be calm. The Russian invaders create the illusion of safety. However, conducting scientific activities in the usual format is impossible in these territories due to physical danger to the people themselves (Suchikova et al., 2023b). Therefore, universities have decided to temporarily relocate to Ukrainian-controlled territory to resume their activities (Lopatina et al., 2023; Porkuian et al., 2023). After all, the success of researchers has direct consequences for the institution itself, the state, and society (Harris and Ogbonna., 2006; Petrushenko et al., 2023).

Research results have presented a certain experience of institutions relocating due to military actions. For instance, Lopes' study (Lopes, 2021) examines the transfer of schools from China and Hong Kong to neutral Macau during World War II in East Asia. The study analyzes the ambivalent experience of asylum and exchange during World War II based on archival materials, using the relocation of dozens of schools to neutral territory as an example. However, the context of this research differs significantly from the modern realities and specifics of scientific activity in the 21st century (Kozmenko et al., 2023; Suchikova, 2023d; Falko & Zhukov, 2023). Therefore, the impact of Russia's large-scale war against Ukraine on the ability to conduct scientific activity by researchers of a relocated university needs to be studied in order to better understand the challenges and opportunities for resuming research work.

Temporary relocation of the university to a new location during martial law does not mean physical relocation of the university staff (Suchikova and Tsybuliak, 2023c). During the war, individuals determine for themself where they feel safest. As pointed out by Kurapov et al. (2022), the safety situation affects the mental health of the civilian population, including fear, use of psychoactive substances, stress, exhaustion, and other related conditions. Today, many studies dedicated to exploring the impact of the Russian-Ukrainian war on the mental health of Ukrainians (Buchcik et al., 2023; Dzhus and Golovach, 2023; Chudzicka-Czupała et al., 2023; Liebrenz et al., 2023; Sheather, 2022). Therefore, the war caused a violation of the basic need for safety resulting in the dispersion of university researchers throughout the territory of Ukraine and the whole world (Kałdonek-Crnjaković and Czopek, 2023; Lee et al., 2023).

This has had a fundamental influence on the operation of universities. Nowadays, education in almost all institutions across Ukraine takes place online (Martyniuk et al., 2023; Hrynkevych et al., 2023; Novick and Kachkovska, 2023). The situation is significantly exacerbated by the collapse of Ukraine's electrical grid due to constant shelling, leading to prolonged power and internet outages (Nehrey et al., 2023; Kuzheliev et al., 2023). Importantly, this also has an impact on the scientific activity of the Ukrainian academic community (Arbuzova, 2023; Shulga, 2023; Irwin, 2023).

In this context, it is crucial to consider universities not only as providers of educational and scientific services, but also as central players in regional development. They play a key role in knowledge-creation processes that promote economic growth and social progress (Karlsen and Larrea, 2019; Salomaa, 2019; Knudsen et al., 2019), fulfilling a vital function in the creation, transmission, and application of knowledge that directly influences societal and political life in the region (Radinger-Peer, 2019; Valero and Van Reenen, 2019; Lendel, 2010; Cowan and Zinovyeva, 2013). Currently, many studies focus on the third mission of universities, which concerns the economic and social contributions they make to communities and territories beyond their traditional research and teaching functions (Petersen et al., 2022; Compagnucci and Spigarelli, 2020; Jaeger and Kopper, 2014). It is important to note that universities often serve as city-forming entities by concentrating human and economic resources, facilitating the flow of innovations and investments, ensuring the investment of intellectual, financial, and social capital, creating a network of knowledge, and promoting workforce development (Shatilo, 2021; Yigitcanlar and Sarimin., 2011; Henderson and Venables, 2009; Pu, 2019). In the context of Ukraine, it is crucial for universities to become magnets that will bring young people back to the cities and towns of Ukraine after the end of the war. It is essential to understand that this will only be possible if universities preserve their academic potential.

Drawing on the example of the [Anonymous university], we investigate how the change in the external work context of the university researchers affects their scientific activity. We examine the challenges faced by Ukrainian researchers working in relocated universities. We analyze the dependence of career needs, challenges, and opportunities during the war on age, professional roles, academic stages.

Using the example of [Anonymous University], which has been temporarily relocated due to a full-scale war, we aim to answer the following research questions:

1) How has the safety situation affected the scientific activity of Ukrainian university researchers at the temporarily relocated university?
2) Does the safety situation for Ukrainian researchers affect their needs, challenges, and professional opportunities for continuing scientific activity?

To address these questions, after this introductory section, the paper is structured into five main sections. Section 2 describes materials and methods, encompassing a description of research participants, instruments, and procedures, as well as a characterization of research methods for evaluating the impact of safety situation on the scientific activity of Ukrainian academic staff based on dependent and independent variables. Section 3 presents the results from an individually descriptive perspective for each factor strongly and moderately influenced by the researchers' safety situation and their connection with scientific activity. Section 4 provides a comprehensive discussion of the study's outcomes, delving into the intricate interplay of the researchers' safety situation, geographical context, and their effectiveness in maintaining scientific pursuits amidst the ongoing conflict. Section 5 summarizes the main conclusions about the issues at hand.

## 2. Materials and methods

The study was conducted in July 2022. A total of 172 university academic staff of varying ages and academic degrees participated in the study on a voluntary basis. To ensure confidentiality and safety, the study was conducted anonymously. The sample comprised researchers from the temporarily relocated university. Table 1 summarizes the data of the participants.

It should be noted that the number of Doctor of Science, PhDs, and Masters in our study reflects the structure and percentage distribution of academic degrees in Ukraine: the Doctor of Science is an extension of the PhD and an additional, optional degree obtained by approximately 15% of researchers.

The main focus of evaluating the effectiveness and efficiency of university scientific activities is determined by their quantitative indicators. Therefore, the research group has developed a questionnaire for researchers that is based on the leading indicators of scientific activity among university's academic staff.

The questionnaire template contained 11 closed questions and 6 opened-ended questions. These questions were thematically structured

**Table 1**
Participants' characteristics.

| Variable | Subcategory | % | N |
|---|---|---|---|
| Age | Under 35 | 19.8 | 34 |
| | 35–50 years | 44.8 | 77 |
| | 51–60 years | 26.2 | 45 |
| | 61 older | 9.3 | 16 |
| Stages of a researcher's career | Doctor of Science | 15.7 | 27 |
| | PhD degree | 61 | 105 |
| | Master | 23.3 | 40 |
| Safety situation of researchers | Temporarily moved to Ukrainian-controlled territories | 41.3 | 71 |
| | Temporarily moved abroad | 10.5 | 18 |
| | Remained in the temporarily occupied territory (permanent place of residence, which is temporarily occupied by Russian troops) | 48.3 | 83 |

on 4 blocks. The first block of questions aimed to collect general demographic information, including age and the career stage of the researchers. Additionally, the safety situation of researchers was assessed to understand the challenges posed by the crisis on personal security. The second block of questions revolved around basic needs crucial for scientific activity during the crisis. Researchers were asked about their access to the Internet, considering its vital role in maintaining communication and accessing research resources. Scientific activity after the temporary relocation of universities was probed to gauge the challenges faced during this transitional phase. Furthermore, information on opportunities to resume scientific activities provided insights into the possibilities for continuity amid the crisis. The third block delved into the main challenges confronted by researchers in the wake of the crisis. Participants were asked about the changes in their research interests since the war began and the directions in which these changes occurred. The possibility of conducting further research was examined to ascertain potential obstacles hindering ongoing scientific endeavours. Additionally, reasons why Ukrainian researchers could not continue their research during the crisis were explored. The level of foreign language proficiency was also included as a critical factor influencing international collaborations and publishing activities. The final block focused on identifying opportunities that emerged for researchers amidst the crisis. Participants were questioned about their grant activity and the stimulating and restraining factors influencing it during the large-scale war. Publishing activity was also assessed, and researchers were asked about personal factors that might prevent them from writing and submitting articles to scientific journals during this challenging period.

The survey of respondents was conducted using a self-administered questionnaire on Google Forms. The questionnaire template was sent via email. The total percentage of responses received was 82%. All participants gave their consent to use the data obtained in the study.

Mixed methods were utilized to investigate how the external context of university academic staff activities affects their research work. The study results were interpreted through a combination of quantitative methods (linear regression analysis) and qualitative methods, which provided a comprehensive understanding of the research problem. The integration of these methods compensated for the limitations of each individual approach and enhanced the reliability of the data through multiple research strategies (Turner et al., 2017).

In our study, we aimed to investigate how the safety situation affected the scientific activity of Ukrainian academic staff from a temporarily relocated university. The researchers' location during wartime was used as a basis for the study:

1. researchers who stayed in permanent places of residence (temporarily occupied territory by Russian troops);
2. researchers who were forced to move to Ukrainian-controlled territories temporarily;
3. researchers who have temporarily moved abroad.

To verify the research question, mathematical statistics methods and computer data processing were applied (MS Excel and SPSS (Statistical Package for the Social Sciences) software were used for statistical data analysis and graphics to represent and interpret the results visually.

The following variables were included in the analysis:

-dependent variable: safety situation of researchers (nominal);
-independent variables: information on opportunities to resume scientific activity (nominal); grant activity (nominal); Internet access (nominal); age (nominal); scientific activity after the relocation of the university (nominal); level of foreign language proficiency (ordinal); publishing activity (nominal); the change of research interests since the beginning of the war (nominal); stages of a researcher's career (nominal); possibility of conducting further research (nominal); how exactly did the war prevent the completion of previous research? (nominal).

In the context of the methodology of this study, our central hypothesis is that war significantly affects the scientific activity of academic staff in Ukraine. Precisely, we predict a direct correlation between the needs, challenges, and potential opportunities of Ukrainian researchers and the security situation in times of war. This includes the forced migration of Ukrainian academic staff abroad, where they are safe and can positively impact their scientific activity. Conversely, being in temporarily occupied territories leads to decreased scientific activity.

The ANOVA table (Table 2) presents the results of the variance analysis, Sig. = 0.000, indicating a significant difference from 0 in the coefficients.

The variance of each independent variable is more significant than zero. The Pearson correlation coefficients for all independent variables range from −0.260 to +0.309, with an F value of 7.228, significantly greater than one (Sig < 0.05). This confirms that the proportion of variability explained by the developed model is sub-store significantly more significant than what cannot be defined by it.

Table 3 contains the main practical results that can be used to construct a meaningful model. The tolerance level of all independent variables is higher than 0.01, and the VIF ranges from 1 to 5, indicating moderate correlation and confirming the absence of multicollinearity. Checking the distribution of standardized residuals for normality showed sufficient agreement between the histogram of residuals and normal distribution.

The standardized coefficients have shown that the safety situation of researchers is associated with the possibility of conducting further research (+0.214), and Internet access also has a significant impact (+0.513). Furthermore, a strong connection has been established between the location of researchers and the change of their research interests since the beginning of the war (-0.216), which confirms that active military operations on Ukraine's territory significantly impact the continuation of research. The researchers also noted that with the start of military operations, the development (improvement) of informing about opportunities to resume scientific activity (-0.209). However, indicators such as the age of researchers (+0.015), the

**Table 2**
Analysis of variance (ANOVA) to evaluate the impact of different factors on the safety situation of researchers.

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 60.026 | 14 | 4.288 | 7.228 | 0.000 |

**Table 3**
Standardized coefficients of the dependent variable residuals (Safety situation of researchers).

| Coefficients[a] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
| | B | Std. Error | Beta | | | Tolerance | VIF |
| (Constant) | 2.512 | 0.866 | | 2.899 | 0.004 | | |
| Internet access | 0.567 | 0.072 | 0.513 | 7.822 | 0.000 | 0.900 | 1.111 |
| The change of research interests since the beginning of the war | -0.323 | 0.104 | -0.216 | -3.106 | 0.002 | 0.801 | 1.248 |
| Information on opportunities to resume scientific activities | -0.179 | 0.057 | -0.209 | -3.158 | 0.002 | 0.888 | 1.126 |
| Possibility of conducting further research | 0.456 | 0.198 | 0.214 | 2.306 | 0.022 | 0.450 | 2.220 |
| Grant Activity | -0.126 | 0.095 | -0.098 | -1.334 | 0.184 | 0.713 | 1.403 |
| Publishing activity | -0.098 | 0.077 | -0.089 | -1.280 | 0.202 | 0.799 | 1.251 |
| How exactly did the war prevent the completion of your previous research? | 0.110 | 0.108 | 0.090 | 1.014 | 0.312 | 0.488 | 2.048 |
| Level of foreign language proficiency | -0.043 | 0.049 | -0.059 | -0.882 | 0.379 | 0.860 | 1.163 |
| Scientific activity after the temporary relocation of the university | 0.022 | 0.051 | 0.029 | 0.440 | 0.660 | 0.895 | 1.117 |
| Age | 0.017 | 0.077 | 0.015 | 0.218 | 0.828 | 0.766 | 1.306 |
| Stages of a researcher's career | -0.021 | 0.114 | -0.014 | -0.181 | 0.856 | 0.690 | 1.450 |

[a]Variable: Safety situation of researchers, where:
Unstandardized coefficients – unstandardized coefficients (B) indicate how much the value dependent variable depends on the independent variable value when all other independent variables remain constant;
Standardized Coefficients – standardized regression coefficients, coefficients that you would get if predictors and end variables were standardized before analysis;
t and Sig (p-value) – used to test the null hypothesis, which states that all coefficients in the model are equal to zero.
* "+" and "-" signs mean positive and negative influence, but the context of the question has a fundamental importance.

relocation of the university (+0.029), and stages of a researcher's career (-0.014) have a moderate impact.

However, to delve into the central question of the article, we also aimed to answer the following research question: "Does the safety situation of Ukrainian researchers impact their needs, challenges, and professional opportunities for continuing scientific activity?". Further analysis of the needs and challenges faced by Ukrainian researchers was necessary, depending on the safety situation.

-Temporarily moved to Ukrainian-controlled territories;
-Temporarily moved abroad;
-Remained in the temporarily occupied territory (permanent place of residence temporarily occupied by Russian troops).

To achieve this, a qualitative analysis was conducted on respondents' answers and critical indicators, which were dependent on the security situation of scientists during the survey. Two groups of factors were identified:

1) Those that were strongly influenced by the safety situation of researchers and their relationship with scientific activity;
2) Those that were moderately influenced by the safety situation and their relationship with scientific activity.

## 3. Results

### *3.1. Factors that are strongly influenced by the researchers' safety situation and their connection with scientific activity*

Among the factors strongly influenced by the safety situation, Internet access emerges as a critical lifeline for researchers conducting their scientific activities. The impact of Internet connectivity on research continuity and how challenges in Internet access during times of war present significant obstacles for researchers. We also investigate the possibility of conducting further research in times of the full scale-war depending on the safety situation, analyzing the challenges researchers face in continuing their scholarly pursuits amidst uncertainties and wartime conditions. Additionally, we delve into the transformation of research interests since the beginning of the war, examining how the conflict has reshaped the academic pursuits of Ukrainian researchers. Moreover, we study the significance of information on opportunities to resume scientific activities, understanding its role in empowering researchers to navigate the complexities of war and continue their essential contributions to the scientific community.

#### *3.1.1. Internet access*

In the realm of scientific activities, access to the Internet has emerged as a critical lifeline for enabling researchers to stay connected, collaborate, and conduct their work effectively. However, the onset of a large-scale war has introduced significant challenges in maintaining reliable Internet access for researchers in Ukraine. The impact of safety situations on Internet access for three distinct groups of respondents, shedding light on the varying degrees of difficulty they encounter in staying connected and productive during these war times. Problems with Internet access during the war are observed in the three groups of respondents (Fig. 1).

The situation for researchers who remained in the temporarily occupied territory is the most difficult. Only 10.8% of those researchers who remained in temporarily occupied territory reported having a good quality Internet access, while almost 64% stated that their internet connection was very poor. This is due to the fact that the occupying authorities initially blocked Ukrainian mobile and Internet communication networks for weeks and later took them to full control (actually occupied) in the temporarily occupied territories. Local operators were forcibly connected to the Russian network of the temporarily occupied Autonomous Republic of Crimea.

At the same time, the survey revealed that the vast majority of those who moved from the occupied territories to other regions of Ukraine have access to a high-quality Internet connection. Only 15.5% of the respondents experience significant problems with the Internet connection. This indicator is slightly higher among those researchers who have temporarily moved abroad, primarily due to the higher cost of Internet services in comparison to Ukraine and less favorable living conditions. After all, not all researchers have been able to settle well in other countries. Nevertheless, those who have access to the Internet note its

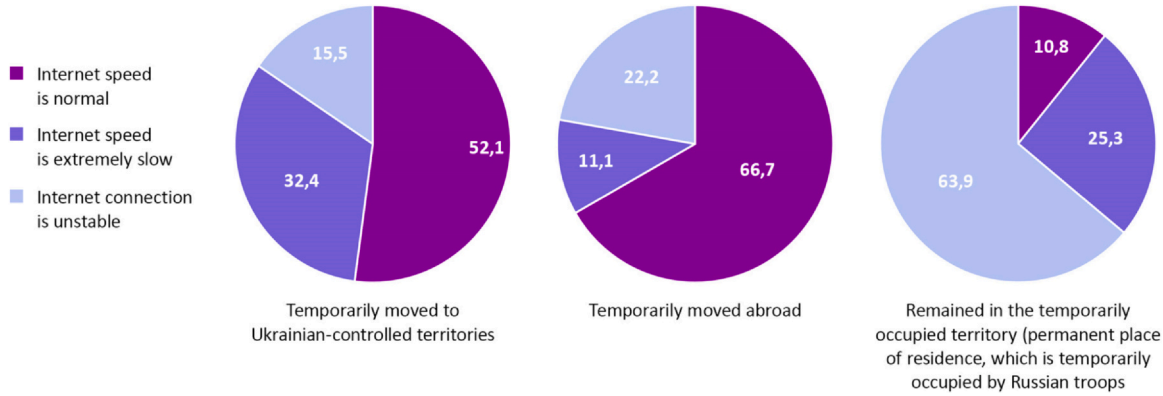


**Fig. 1.** The influence of the safety situation on the nature of Internet access.

high quality.

*3.1.2. Possibility of conducting further research in times of war*

The safety situation during times of war holds a crucial impact on the possibility of conducting further research for Ukrainian researchers. In this chapter, we delve into the data to identify key factors and analyze the challenges and obstacles faced by researchers in maintaining research continuity amidst uncertainties and wartimes. Fig. 2 illustrates the widespread nature of this challenge, affecting a significant majority of Ukrainian researchers across different safety situations.

We have also analyzed the most significant reasons regarding the influence of the war on the possibility of conducting further research. The data presented in Fig. 3 demonstrated that for all three groups of respondents, the loss of access to research equipment and resources necessary for scientific activity is the most significant.

At the same time, the difference in the impact of constant stress and poor psychological well-being of those researchers who have temporarily moved abroad is unexpected. A possible explanation for this outcome could be the new challenges facing researchers who have been forced to move abroad. These challenges may include:

- A significant financial burden is the cost arising from the need to rent an apartment and arrange household expenses;
- Difficulties in the process of adapting to a new place of residence out of necessity;
- Social deprivation (physical distance from colleagues, limited access to live communication with colleagues and familiar surroundings);
- A feeling of anxiety due to remoteness from relatives living under occupation on the territory of Ukraine, where active hostilities are taking place on the territory of Ukraine, which is not protected from bombing;
- A lack of parity between Ukrainian wage and European prices, which necessitates the search for additional work or income.
- Lack of time because of the need to spend it on paperwork, housing search, etc.;
- Language and cultural barrier;
- Arrangement of one's own home.

Similarly, we have recorded low indicators of the influence of this factor on the possibility of conducting further research among academic staff who remained in the temporarily occupied territory. Furthermore, this group demonstrates relatively high indicators of the influence of the lack of safety situation on the possibility of conducting further research.

*3.1.3. The change of research interests since the beginning of the war*

The full-scale war affected the scientific interests of researchers. The obtained data on how the beginning of the conflict has brought about significant shifts in the areas of research pursued by scholars. Through data analysis and exploration of key trends, it is possible to understand the transformative effect of war on the scientific priorities of researchers in response to crisis circumstances.

The results of the analysis show a connection between the location of the researchers and the change of their research interests since the beginning of the large-scale war (Table 2). The data presented in Fig. 4 demonstrated the impact of the unevenness of the safety situation on the initiated research.

To a greater extent, the change of research interests is observed among researchers who have been forced to move to the Ukrainian-controlled territories: 49.3% of respondents have noted that their research interests have slightly changed. Thus, researchers have noted that since the beginning of the war, the focus of their research, among others, has been:

- European integration processes;
- Overcoming crises in the war and postwar periods;

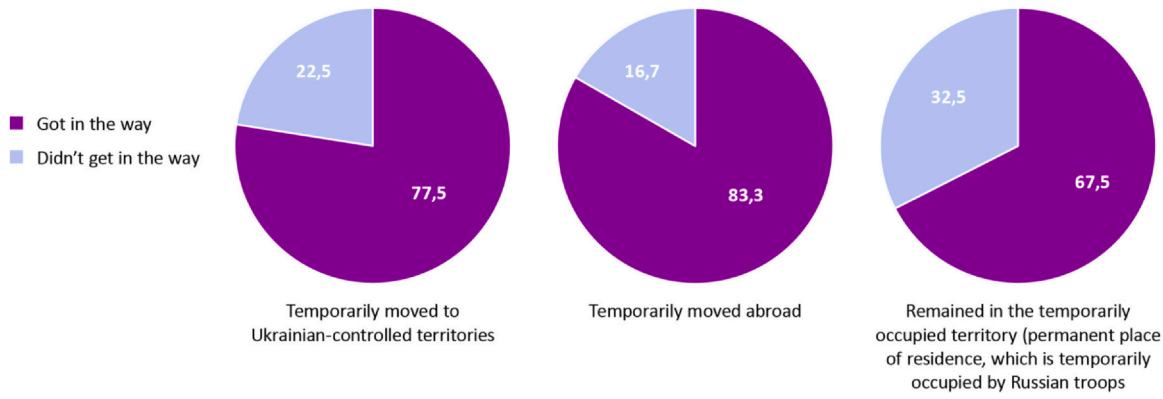


**Fig. 2.** The influence of the safety situation on the possibility of conducting further research.

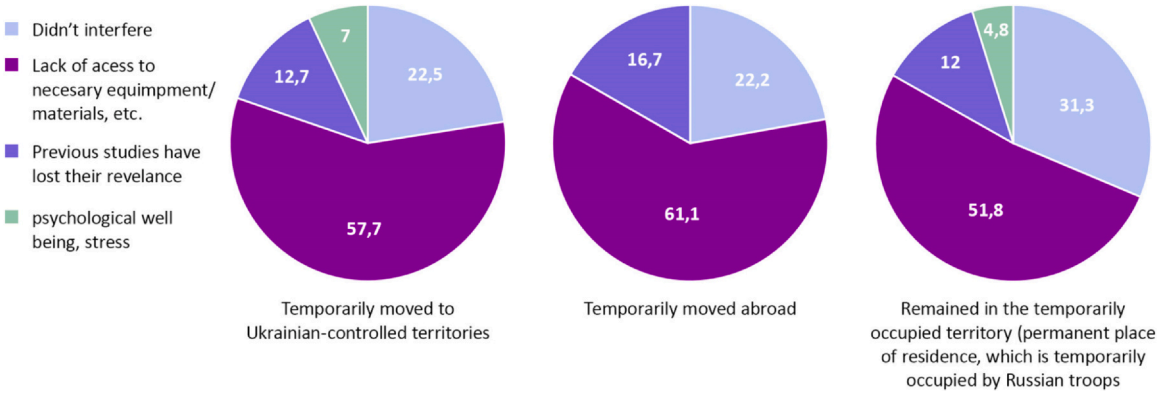


**Fig. 3.** Reasons why Ukrainian researchers cannot continue research.

- Support of the population affected by the war;
- The impact of war on occupational burnout;
- Traumatic and post-traumatic disorders;
- Materials and technologies.

The quantitative ratio of researchers who completely changed their research interests, because of the large-scale war of Russia against Ukraine, who moved to Ukrainian-controlled territories (11.3%) or temporarily moved abroad (11.1%) was found to be almost the same. However, among the researchers who remained in the temporarily occupied city, this percentage was much lower (3.6%).

Researchers are among the first to respond to the changes in society, striving for a better understanding of current phenomena and processes. However, the data obtained reveal a certain regularity. Thus, for researchers who remained in the temporarily occupied territory the change of their research interests is almost impossible. Conducting research on current Ukrainian issues in various fields poses a direct danger to life and health not only for researchers themselves but also for their families. In fact, being in a temporary occupation limits the right to academic freedom. On the other hand, those researchers among migrants (who have temporarily moved abroad) also face certain difficulties as they distance themselves from current issues. The researchers who moved from the temporarily occupied city to Ukrainian-controlled territories understand the irrelevance of their own research to a greater extent, which started before the large-scale war of Russia against Ukraine. As a result, they tend to change their research focus or consider the impact of martial law on the objects and phenomena under study. In other words, they are more sensitive to current events and have the opportunity to exercise their right to academic freedom.

### *3.1.4. Information on opportunities to resume scientific activities*

The scientific community has shown unprecedented support for Ukrainian researchers, offering them various opportunities to resume their scientific activities. But sometimes these opportunities are scattered, and difficulties with the Internet access also affect the search for opportunities from the international scientific community. Therefore, researchers have noted that with the beginning of a large-scale war of Russia against Ukraine, they require assistance in finding information about scientific research opportunities. The data in Fig. 5 demonstrate similar indicators in the group of researchers who have temporarily moved to Ukrainian-controlled territories and those who remained in the temporarily occupied territory. This demonstrates that they require current information about opportunities for Ukrainian researchers.

The graph's vertical axis represents the percentage frequency of responses, while the horizontal axis represents the level of need for access to up-to-date information. The horizontal axis range is from 0 to 5, where 0 indicates no need for information on scientific opportunities, and 5 indicates a high need for information on scientific opportunities.

Fig. 5 illustrates that researchers constantly need information on scientific opportunities. This need is particularly prominent among the researchers who have relocated to Ukrainian-controlled territories, with 49.3% expressing the strongest sentiment. Interestingly, the exact number of researchers who have been forced to move abroad is less interested in receiving information on the possibilities for Ukrainian researchers to restore their scientific activity (only 33% indicated that they have a very high need). This result is consistent with the challenges faced by researchers who have moved abroad, such as adaptation, household, financial stress, and more, which may make it difficult to continue or resuming their scientific activity.

### *3.2. Factors that are moderately influenced by the safety situation and the relationship with scientific activity*

In wartime, some factors displayed a moderate level of influence on scientific activity. Two key factors, namely the temporary relocation of the university to Ukrainian-controlled territories and grant activity, are

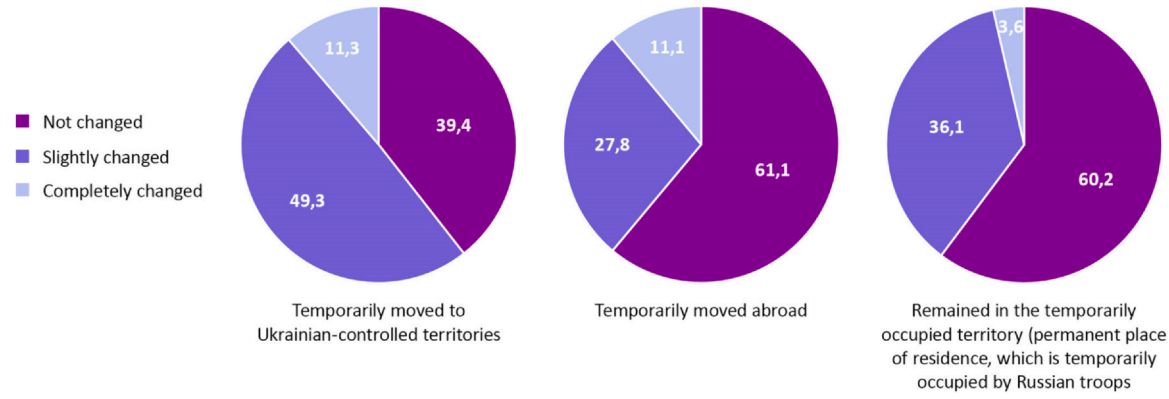


**Fig. 4.** The influence of the safety situation on the initiated research relevance.

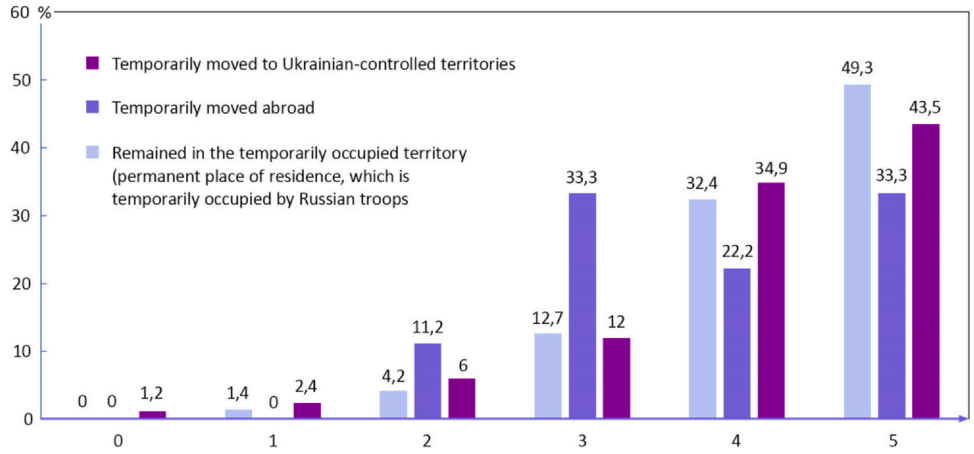


**Fig. 5.** The relationship between a researchers' safety situation and the need for access to up-to-date information.

analyzed in-depth. Examining their impact on research continuity and academic pursuits provides valuable insights into the challenges and opportunities researchers face during times of war.

*3.2.1. Temporary relocation of the university to Ukrainian-controlled territories*

In times of uncertainty, the pursuit of scientific research faces unprecedented challenges. The ongoing large-scale war in Ukraine has posed a myriad of obstacles for researchers, forcing them to adapt to rapidly changing circumstances while striving to maintain their academic endeavors. One significant aspect affecting scientific activity researchers from temporary occupied territory be Russian troops is the temporary relocation of universities to Ukrainian-controlled territories, which has profound implications for the researchers' safety situation and overall engagement in scholarly pursuits.

After the temporary relocation of the university to Ukrainian-controlled territories, the most significant decrease in scientific activity is observed in the group of those researchers who remained in the temporarily occupied territory (Fig. 6). To some extent, such indicators can be caused not only by the lack of necessary equipment, and the limitation of academic freedom but also by uncertainty in future professional development. For instance, instability in understanding one's place in the university team according to an established role and self-image as a sought-after specialist and researcher, and an uncertain perspective of further activity and professional development are destructive factors.

At the same time, an interesting tendency is observed among researchers who have temporarily moved abroad. Among respondents in this group, the highest percentage of answers was "Can't think about science" (22%). Despite the stable safety situation, access to the material and technical base, and the possibility of communication with the scientific community, they seem to be in a certain "frozen" state.

It is expected that there will be an increasing level of scientific activity among those researchers who have temporarily moved to Ukrainian-controlled territories after the temporary relocation of the university (31%).

No less interesting are the study results that present the publishing activity of the researchers. Researchers, who remained in the occupied territories gave the highest percentage of positive responses to the question, "Have you submitted articles to journals since the beginning of the war?" (Fig. 7).

Those researchers who temporarily moved abroad showed the lowest indicators of publishing activity, with only 50% of them having submitted articles to journals or being in the process of preparing one for submission.

At the same time, 28% of all respondents were unable to resume their scientific activities, they did not write or submit articles. When asked the question "What factors prevent you personally from writing and submitting articles to scientific journals?", 47 respondents answered "I cannot concentrate on science". Other responses also included:

- Lack of time;
- Problems with identifying relevant research;
- Impossibility of conducting experiments;
- Emotional state, etc.

The relocation of universities to controlled territories presents both challenges and opportunities for researchers, and their responses vary depending on their safety situation. The study underscores the importance of understanding these nuances to support researchers effectively and foster an environment conducive to scientific progress, even during uncertain times.

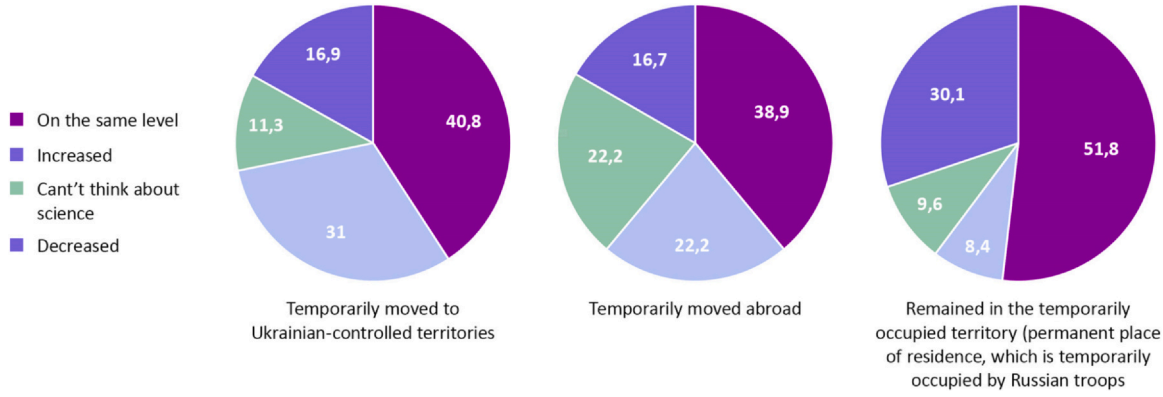


**Fig. 6.** The influence of the factor of university temporary relocation on the researchers' activity depending on the safety situation.

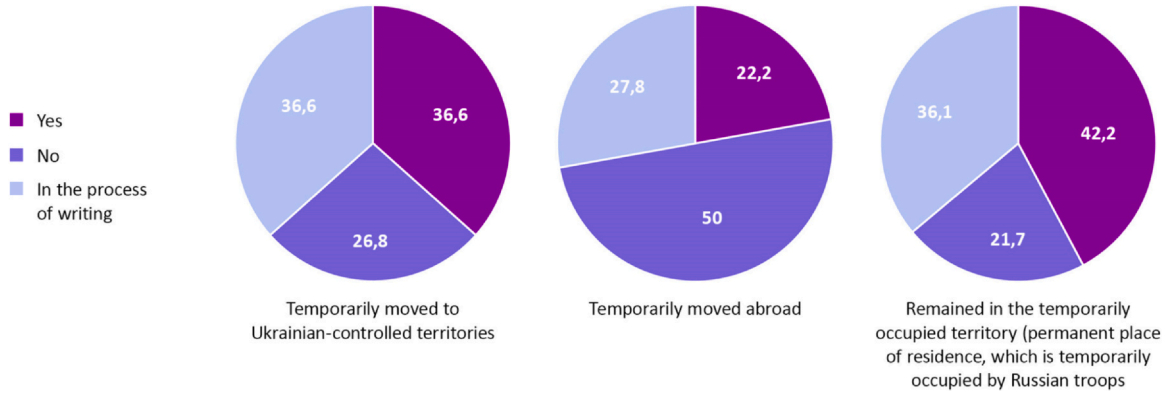


**Fig. 7.** Researchers' publishing activity depends on the safety situation.

*3.2.2. Grant activity*

Grant activity is a critical aspect of academic research, providing researchers with financial support and opportunities to further their scientific pursuits. However, the ongoing war has had significant implications for grant applications and participation. Our study indicates that only 22% of the total number of respondents have participated in writing and submitting grant applications since the beginning of the large-scale war (Fig. 8). We partially attribute these results to the suspension of all national competitions due to war. The world has offered Ukrainians numerous opportunities, including a large number of positions in European and world universities.

For those researchers who chose to stay in Ukraine, this support was irrelevant. It was expected that positions offered by universities worldwide would be in demand among those researchers who have temporarily moved abroad. However, as of July 2022, the results of the study indicated that only 22.2% of researchers who temporarily moved abroad have started looking for grant programs. We conclude that moving abroad during the war has not been a planned process but a spur-of-the-moment decision. The lowest rate is among those researchers who stayed to live in the occupied city. This is explained by the fact that banks do not work in the occupation, and accounts are blocked, making it nearly impossible to carry out grant activities.

It should also be noted that almost 50% of the respondents have expressed their desire to participate in grant programs but have no experience. Unfortunately, the Ukrainian scientific community is only at the beginning of the science grant funding path, which has resulted in researchers having a low level of expertise in grant matters.

The survey on motivating factors showed that researchers recognized the submission of grant applications as their contribution to the victory (Fig. 9).

According to the authors of the article, this demonstrates the researchers' awareness of their role and mission as warriors on the scientific front. The researchers have also noted that support from the global community, the availability of new grant opportunities, and a sense of safety are important to them.

Among the restraining factors, the researchers identified the low-quality Internet access and a constant feeling of danger. The answer with the highest percentage was "uncertainty about the future". Grant programs are designed for a specific period of time. The occupation, the constant displacement of the front line, the daily shelling of the civilian infrastructure lead to the feeling that planning for the future is unreliable and inappropriate. As one of the researchers noted: "I used to have a five-year planning horizon, but now it's only one day".

## 4. Discussion

The Ukrainian researchers had plans, perspectives, and an understanding of their scientific activities trajectory. But it was until February 24, 2022. Due to the large-scale war of Russia against Ukraine, researchers were forced to freeze their research, leave the places of work to which they had devoted many years, leave their homes, and seek refuge in safer cities and countries.

The large-scale war of Russia against Ukraine has also impacted the circumstances in which all researchers find themselves. Typically, researchers have high intrinsic work motivation and a 'taste for science," they are more willing to accept a relatively lower salary and prioritize working conditions that provide more independence and flexibility (Roach and Sauermann, 2010; Zacher et al., 2018). However, as Fortunato et al. (2018) pointed out, crisis situations full of uncertainty can have a destructive effect on a person. It is quite clear that to continue research work, all researchers should have had time to adapt to new realities.

Currently, Ukrainian researchers are experiencing a unique violation of their basic human need for safety (Suchikova and Kovachov, 2023; Peregudova, 2023). We agree with the Javanbakht's (2022) work, which defines the complexity of the experience that Ukrainians

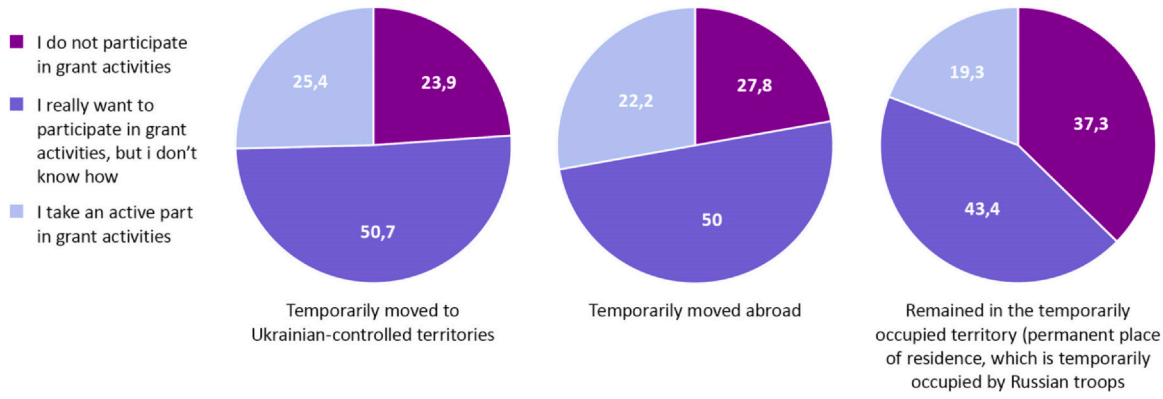


**Fig. 8.** Researchers' grant activity depending on the safety situation.

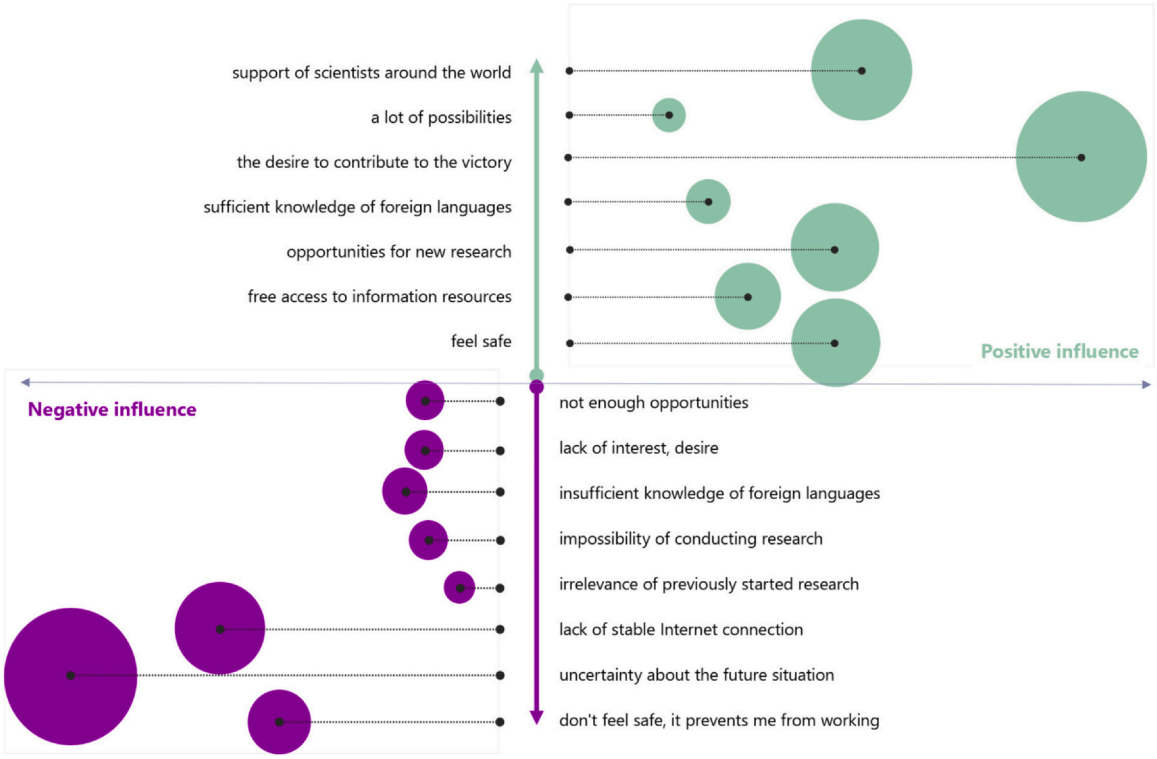


**Fig. 9.** Stimulating and restraining factors of grant activity by Ukrainian researchers during the lagre-scale war.

are facing in this large-scale war. As civilians, researchers lack means of self-defense and adequate physical and psychological training, making them vulnerable to constant military injuries. The traumatizing factors of the war have been in effect for a long time, and therefore there is a lack of internal resources necessary for recovery.

This is extremely important because science involves creativity and creation, which can only occur in the presence of internal resources and creative inspiration. In addition, the situation is worsened by enormous personal, material, psychosocial, specific, and symbolic losses, including family members and loved ones, homes, socioeconomic status, and persistent horrific memories. The uniqueness of the experience of Ukrainian researchers appears through the simultaneous impact of psychosocial stress (acquaintance with the news and anxiety about the loss of family members who still live in the zone of active hostilities and in the temporarily occupied territory), economic difficulties, and the lack of necessary resources for survival and scientific activity.

However, the results of the conducted study demonstrate different effects of the researchers' safety situation on their scientific activities. At certain points, these results were not obvious to the authors. Thus, the level of scientific activity decreased the most among those who moved temporarily abroad, the least among those who remained to live in the occupied city. Such a result is not recognized to be trivial because it was expected that researchers would feel safer and have the opportunity to quickly resume their scientific activities after moving, especially abroad. A possible explanation is the financial needs of migrant researchers and their physical isolation from colleagues and like-minded people, which increases social deprivation and, as a result, decreases scientific activity.

Financial difficulties have caused the solvency of researchers to deteriorate, hindering their scientific activity. Consequently, the lack of money has become a personal problem for every researcher. In addition, all researchers (both those who remained in the occupied territory; and those who moved to the Ukrainian-controlled territories; and those who moved temporarily abroad) do not have access to the university material and technical resources, laboratory equipment, and consumables essential for conducting research.

Undoubtedly, the large-scale war of Russia against Ukraine has a strong destructive effect on scientific activity. However, the actions of the Ukrainian scientific community and the global increase in support of Ukraine are opening up new opportunities for Ukrainian researchers to engage in further research activities.

The analysis of the study's findings shows that the factors that have been most affected by the war and the safety situation are the challenges faced by researchers and the necessary needs for the full scientific activity. The safety situation is known to be a basic need for a person, and the university researchers who have been temporarily relocated to the front-line zone are not exceptions. In particular, most of the researchers continued to reside in the temporarily occupied territories at the time of the survey. The loss of relevance of ongoing research projects, feeling of danger, and the lack of interest in science are the challenges for the Ukrainian scientific community, and we have been living with these problems every day for more than six months.

However, the opportunities available to researchers during wartime are slightly less affected by the safety situation and location. The total uncertainty and instability in Ukraine due to the war force researchers to seek new opportunities for resuming scientific activities. After all, as observed by Baruch and Vardi (2016), the lack of opportunities is especially acutely experienced in these periods of instability and uncertainty. Hall (2004) justifies the involvement of new resources and the search for opportunities that allow one to overcome unexpected challenges and traumas as crucial to achieving favorable outcomes.

In times of war, it is crucial for researchers to remain open to opportunities that allow them to resume their scientific activities. We agree with Tee's et al. (2022) opinion that in times of crisis, researchers should not be conservative and resistant to change, but should be self-directed, proactive, flexible, and adaptable in managing their capabilities. The temporary relocation of the university, opportunities for publication of one's own research, the opportunity to participate in grant activities, and information on the available opportunities for researchers make it possible to partially resume and continue scientific activity in times of the large-scale war of Russia against Ukraine.

The obtained results also demonstrate that the desire to contribute to victory is one of the important factors in resuming scientific activity for university researchers. These findings are consistent with the Blokker et al. (2019) study, which suggests that researchers' positive progress is driven by personal objectives. So, recovery of the state is a personal goal for every Ukrainian researcher during the period of the large-scale war.

According to the results of the study, the Ukrainian scientific community is supported by the entire world, which is recognized as a significant stimulus for the “reset” of Ukrainian researchers' activity during the large-scale war of Russia against Ukraine. These findings are consistent with Owusu-Agyeman (2021) research, which established a relationship between research support by providing access to necessary resources, opportunities for continuing projects, support from the scientific community, and positive changes in scientific activity.

At the same time, as a result of the study, it was established that the safety situation not only causes a number of challenges but opens up new opportunities for researchers regardless of age, career stages, or knowledge of a foreign language. Although some studies indicate that researchers respond differently to career outcomes at different stages (Tee et al., 2022); different professional roles in the academic environment also affect scientific activity (Zacher et al., 2019); researchers' needs for support, responsiveness to challenges, and inspiration vary significantly depending on their career stage (Hemmings et al., 2013). In contrast to these studies, our results indicate that certain features take on greater significance in hazardous situations.

Finally, it should be noted that in the context of events in Ukraine today, there is an obvious influence of the war on the scientific activity of researchers. This directly affects their ability to work productively for the benefit of the development of their regions and the country. Recognizing this urgent problem, we must not only analyze the situation but also emphasize the need for effective steps.

The decrease in scientific activity and the predicted significant loss of academic potential by universities have political consequences that cannot remain on the periphery of attention. It is necessary not only to identify existing problems but also to stimulate the development of strategies to support the academic environment in the conditions of war. The focus should be on a specific “Agenda for Action” that contains clear recommendations for implementing, at the political level, specific steps that should include support for the academic community, continuation of active support for scientific research, support for regional partnership and cooperation, as well as the development of higher education and science policy.

In summary, it is crucial to emphasize that despite the challenges faced by Ukrainian universities in the context of the war, this moment can be historic in determining the future role of science in the country's regional development. Therefore, it is essential for political leaders, the scientific community, and the public to make collaborative decisions that reflect the potential for cooperation between regions and universities, and guide our society towards recovery and development.

The Russian incursion into Ukraine not only captures geopolitical attention but also underscores the paramount importance of the capital of scientific knowledge essential for Ukraine's sustainable reconstruction (Pascariu et al., 2023). The symbiotic relationship between regional development and scientific contributions highlights the potential of regional science to significantly shape the geopolitical narrative in Ukraine, both during and in the aftermath of the conflict (Haddad et al., 2022; Hlazova et al., 2023; Knott, 2022; Maathuis and Kerkhof., 2023; Nikolaieva et al., 2023). Presently, there is a pressing need for more integrated and collaborative strategies to harness the power of science for regional rejuvenation and reconstruction. As this progresses, aligning endeavors with the existing knowledge body to maximize science's benefits in Ukraine's regional development becomes imperative.

Additionally, Ukraine faces the task of not only reclaiming its occupied territories but also restoring the activity of its universities and bringing back researchers to these regions. Currently, the urgent task is to counteract the loss of academic potential caused by migration. Efforts should be directed toward stimulating the return of researchers who were forced to emigrate. This task requires developing and implementing policies that would facilitate the return of these experts and create conditions for their productive work. In the context of Ukraine's de-occupied territories, this task assumes special significance as universities must play a key role in regional reconstruction and the creation of community development policies (Bohdanov et al., 2023; Duszczyk et al., 2023; Pasinovych and Myskiv, 2022). It is essential to understand that the success of such an approach requires active support at all levels of government, including national, regional, and local authorities (Hnatkovich et al., 2023).

This article is a call to action - to actively analyze the needs and challenges faced by researchers in Ukrainian universities, to search for and develop solutions that will help them cope with these challenges, and to take responsibility for ensuring the future of the Ukrainian academic community. The role of universities in the country’s regional development can and should be reassessed so that they can play an even more active role in the recovery and development of our country. This can contribute to Ukraine's return to the path of stable development in the post-war period by implementing the latest knowledge and technologies that promote productivity, competitiveness, and creativity.

## 5. Conclusions

The study of the impact of the war, the location of Ukrainian researchers, and the safety situation on the ability to perform research, based on the example of the [Anonymous university], presents us with two new discourses.

1. Researchers who are forced to work in war conditions (and this applies not only to Ukraine, as there are numerous conflict zones worldwide) confront challenges, threats, and needs that render scientific activity nearly unfeasible. The resources currently accessible to Ukrainian researchers to support their work often remain untapped due to internet connectivity issues, the loss of infrastructure, and a sense that research projects initiated before the war are no longer pertinent. The global scientific community and national governments must adopt a broader perspective on the challenges of science conducted "in bomb shelters", "under occupation", and "in information isolation". The world has yet to grasp the daily struggles faced by Ukrainian researchers fully. Furthermore, specific policy recommendations include creating international funds to support scientists in conflict zones and forging collaborations with neighboring institutions to provide the needed resources and platforms for continuing their research. It is also crucial for the Ukrainian government to prioritize rebuilding the research infrastructure and ensure security for its scientific community.
2. It was expected that mobility programs and the availability of research positions for Ukrainian researchers in European universities would lead to their high scientific activity and efficiency. However, the study shows that it takes some time to establish at least some level of scientific activity. At the time of the survey, the war had belastedlmost six months. During this time, researchers who went abroad could not reach the pre-war level of scientific activity. Therefore, expectations regarding their activities' effectiveness and contribution to world science are a little overestimated. In any case, researchers who have started work in foreign universities due to forced relocation caused by the war need considerable time to adapt and stabilize their psychological state. Perhaps, it is more effective and productive to support precisely those researchers who stayed to live in Ukraine by joining research groups and conducting joint research, but without the need to move abroad. Today, in the remote work age, exchanging experience and producing research results at a distance is possible. Scientific migration during the war did not

meet expectations, at least for the year's first half. In this context, this issue has not yet been considered. Hence, policymakers and educational institutions should consider these insights when formulating strategies and support mechanisms for researchers in conflict zones.

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