ORIGINAL RESEARCH

ANALYSIS OF BEHAVIORAL FACTORS AND LEVEL OF ANXIETY
OF SCHOOLCHILDREN IN THE CONDITIONS
OF THE RUSSIAN-UKRAINIAN WAR

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Background. The mental health of Ukrainian children is of great concern. The current study aims to investigate the behavioral factors and level of anxiety of schoolchildren aged 11-17 years old in Kremenchuk in the conditions of war.

Method: A total of 114 children took part in the survey in 2022. In addition, a total of 156 children filled out questionnaires on behavioral factors in 2021, and 114 children filled out questionnaires on behavioral factors in 2022. Of note, children’s questionnaires were available to their parents, who were able to correct children’s answers on the state of health and lifestyle. The level of situational and personal anxiety, and the dynamics of behavioral factors of students were assessed. The scale of personal and situational anxiety by Spielberger and Khanina was used to assess situational and personal anxiety.

Result. The mean age of the respondents in 2021 was 13.8±1.7 years (max = 17; min = 11), with 78 (68.4%) women and 36 (31.6%) men. In addition, 20 (17.5%) participants were internally displaced persons. Of note, internally displaced persons (IDPs) had a 5.4 times greater chance of situational anxiety than the local schoolchildren (odds ratio, OR=5.4, 95% confidence interval, CI: 1.66-9.39, p=0.045). Additionally, the level of personal anxiety in women is 6.6 times higher than in men (OR=6.66, 95% CI: 2.79-15.92, p =0.028). Furthermore, eating junk food was associated with higher odds of situational anxiety in war conditions (OR=3.11, 95% CI: 1.37-7.03, p=0.035).

Conclusion. The mental health and sleep health among children living in Kremenchuk are worrisome. The current study indicates the high psychological burden on Ukrainian children, especially IDPs. Constant mental health care during the initial period of resettlement is urgently needed.

Keywords: Ukrainian children, anxiety, behavioral factors
Background

The burden of war on the health of children and adolescents

Since 2014, Ukraine has been in a state of undeclared war. Almost one and a half million citizens of Ukraine were forced to leave their homes and go to the territory under the control of the Ukrainian authorities in search of protection, and often just salvation. According to the United Nations High Commissioner for Human Rights, two children die, and four are injured every day in Ukraine. The war in the East of Ukraine has become a great challenge and a psycho-traumatic factor for Ukrainians, particularly for children.

As the war began on February 24, 2022, Ukrainians from the east of the country are moving to safer areas. As of December 6, 2022, the number of internally displaced persons (IDPs) since the beginning of the war has increased from 1.5 million to 4.6 million. According to unofficial data, the number might be underestimated. People leave as families with children who will need to adapt to the new realities of life. All these events can lead to various psychological problems in children.

Children are increasingly becoming victims of modern military conflicts, including becoming victims of violence. Children may witness artillery shelling, shooting, and the destruction of their town or village, or even their homes. In addition, they may see the wounded, the dead, torture, murder, or mass death of people. They may suffer from heavy losses, and see how their family members and friends are injured or die. As of September 11, 2022, more than 1.130 children were injured in Ukraine because of the full-scale armed aggression of the Russian Federation. According to the official information of the juvenile prosecutors, as of September 11, 2022, 383 children were killed, and more than 747 were injured of various degrees of severity. Juvenile prosecutors noted that most children were affected in the Donetsk, Kyiv, and Kharkiv regions. Also, as a result of the war in Ukraine, about 300 hospitals and 2000 schools were destroyed, and the living conditions in the east and south of Ukraine are becoming increasingly unbearable.

State of mental health of internally displaced persons

According to recent estimates, by 2022, the number of people displaced by organized violence was 60 million. This included at least 32 million internally displaced persons (IDPs) forced to flee their homes and communities but still living within their countries’ borders. In 2018, more than 415 million children lived in conflict-affected countries, including 33 million displaced children (16 million refugees and asylum-seekers, and 17 million internally displaced children). Although all children are vulnerable to toxic stress, some subgroups are particularly vulnerable due to their marginalization, such as orphaned or unaccompanied children, girls, children with HIV infection, and children with developmental disabilities or disabilities. These groups may face additional stressors and have limited access to services.

The influence of risk factors on the state of mental health of children during the war

Galeva and Jhalovsky’s study found that the trajectory of risk and resilience in children affected by the war can be traced over long periods of time. In addition, the military influence increased the prevalence of chronic pathology in children by 24 times, and 81% of children exposed to the burden of war had psychopathology at some point in childhood. Moreover, war-exposed children were more likely to have post-traumatic stress disorder (PTSD), anxiety disorders, attention-deficit/hyperactivity disorder (ADHD) in middle childhood, and PTSD, conduct/oppositional defiant disorder, and ADHD in late childhood.

A previous study on the mental health of children living in conditions of armed conflicts showed that family violence and armed conflicts posed a significant risk to the psychological well-being of children in Turkey. In addition, a review of 20 quantitative studies from 2004 to 2015 indicated a consistent relationship between exposure to war and societal violence and childhood symptoms of PTSD, depression, and aggression.

Furthermore, the study of the influence of behavioral risk and protective factors on the level of anxiety of schoolchildren during the war remains outside the attention of researchers. Therefore, the current study aims to investigate behavioral factors, and the level of anxiety of schoolchildren in the conditions of the Russian-Ukrainian war.

Materials and methods

Study sample

The study was conducted at Lyceum No. 10 in Kremenchuk, Ukraine. At the initial stage, explanatory work was carried out in the form of meetings with parents and separately with children, about behavioral factors and psychohygiene of schoolchildren. Then questionnaires were distributed to children in the 6th, 7th, and 8th grades. A total of 156 children took part in the survey in 2021 (before the war) and 114 children took part in the survey in 2022 (during the war) (Supplement). Children who studied in senior classes of the Kremenchuk Lyceum and aged between 11 to 17 years old were included in the study.
Permission was obtained from parents and the ethics commission of the Department of Education. The test protocol was approved by the Ethics Committee of the Department of Education and Science of Kremenchuk, Poltava region.

**Measures**

The questionnaire consisted of two parts: 1) Demographic and behavioral factors; 2) a standard questionnaire, based on the scale of personal and situational anxiety by Spielberger and Khanin (the Spielberger-Khanin scale of reactive and personal anxiety, SRPA). Data from the children’s questionnaires were available to parents, who corrected their answers about their state of health and lifestyle. The answers to the questions allowed not only to evaluate the indicators of the students’ behavioral factors, but also allowed them to reflect on their own good and bad habits.

Anxiety levels were measured during the war in 2022. Personal anxiety is defined as a relatively stable individual quality of a person, which characterizes the degree of his/her concern, care, and emotional tension due to the action of stressful factors. Situational anxiety is a form of anxiety that occurs in response to a specific situation. Situational anxiety is defined as a patient’s condition, which characterizes the degree of his/her concern, care, and emotional tension and develops according to a specific stressful situation. If personal anxiety is a stable individual characteristic, then the state of situational anxiety can be quite dynamic both in terms of time and degree of severity: up to 30 points is low anxiety; 31-45 points is average anxiety; and 46 points or more is high anxiety.

**Statistical methods.**

Variables were presented as means (standard deviations) or numbers (percentages). The χ² (Chi-square test) was used to compare two-year data of types of snacks, sleep duration, and frequency of physical education. The influence of behavioral factors on its level was evaluated using the odds ratio (OR) and 95% confidence intervals (95% CI) for levels of situational and personal anxiety. Due to the limited sample size, only crude models were fitted.

Data entry and statistical analysis were performed using IBM Statistical Package for the Social Science (IBM SPSS) version 25.0.

**Results**

Demographic characteristics, medical and behavioral factors of schoolchildren

The mean age of the respondents in 2022 was 13.8±1.7 years (max = 17; min = 11), with 78 (68.4%) females and 36 (31.6%) males. In addition, 20 (17.5%) participants were internally displaced persons (Table 1).

The largest proportion of morbidity was contributed by children who had colds: 68 (59.6%). In 2021, before the start of the war, 58(51%) fell ill once a year, and 56 (49%) fell ill several times, whereas the number of children who were sick once a year or several times a year increased in 2022. In 2021, fruits, vegetables, and yogurt were consumed by 85 (54.5%) children, while in 2022, this number decreased significantly to 38 (33.3%) (p = 0.007) (Table 1). The number of children involved in physical education for more than 4 hours a week in 2022 decreased by 1.9 times than in 2021 (p = 0.000). In 2022, the number of children who sleep 8 or more hours a day decreased significantly from 61 (52.6%) in 2021 to 38 (33.3%) in 2022, p=0.000.

Levels of anxiety of schoolchildren

The level of situational and personal anxiety, according to Spielberger-Hanin in schoolchildren is shown in Table 1. A total of 66 (57.9%) children had a high level of situational anxiety, 44 (38.6%) had a moderate level of situational anxiety, and 4 (3.5%) had a low level of situational anxiety (Table 1). Similarly, 77 (67.5%) had a high level of personal anxiety, 32 (28.1%) had a moderate level of personal anxiety, and 5 (4.4%) had a low level of personal anxiety (Table 1).

<table>
<thead>
<tr>
<th>Characteristics of schoolchildren from the Kremenchuk Lyceum in 2021 and 2022</th>
<th>In 2021, n=156</th>
<th>In 2022, n=114</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years, mean±sd</td>
<td>12.4±1.2</td>
<td>13.8±1.7</td>
<td>0.501</td>
</tr>
<tr>
<td>Sex</td>
<td>0.474</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>113 (72.4)</td>
<td>78 (68.4)</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>43 (27.6)</td>
<td>36 (31.6)</td>
<td></td>
</tr>
<tr>
<td>Internally displaced status, N (%)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Internally displaced persons</td>
<td>-</td>
<td>20 (18)</td>
<td></td>
</tr>
<tr>
<td>The locals</td>
<td>-</td>
<td>94 (82)</td>
<td></td>
</tr>
<tr>
<td>Morbidity, N (%)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Colds</td>
<td>-</td>
<td>68 (59)</td>
<td></td>
</tr>
<tr>
<td>COVID</td>
<td>-</td>
<td>9 (8)</td>
<td></td>
</tr>
<tr>
<td>Chronic diseases</td>
<td>-</td>
<td>18 (16)</td>
<td></td>
</tr>
<tr>
<td>Not sick</td>
<td>-</td>
<td>19 (17)</td>
<td></td>
</tr>
<tr>
<td>Levels of situational anxiety according to Spielberger-Khanin</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
In addition, the odds of high or moderate situational anxiety among internally displaced persons were 5.4 times the odds of local schoolchildren. Moreover, eating junk food as a snack and smoking were associated with higher odds of high or moderate situational anxiety, while regular exercise was associated with lower odds of high or moderate situational anxiety (Table 2).

Table 3 shows the influence of demographic and behavioral factors on the level of personal anxiety of schoolchildren in the conditions of the Russian-Ukrainian war. The odds of high or moderate personal anxiety among women were 6.6 times the odds in men (OR 6.67, 95% CI (2.79-15.92), p=0.028). Students with sleep less than 8 hours (OR 3.97, 95% CI (1.79-8.82), p = <0.001) or restless sleep (OR 4.38, 95% CI (1.95-9.81), p = <0.001) were associated with higher odds of high or moderate personal anxiety (Table 3).
**Table 3.**

Odds ratios (ORs) and 95% confidence intervals (95% CIs) for high or moderate levels of personal anxiety compared to low levels of personal anxiety by demographic and behavioral factors under conditions of the Russian-Ukrainian war in 2022 (n=114)

<table>
<thead>
<tr>
<th>Behavioral factors</th>
<th>Unadjusted odds ratio (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females vs. Males (reference)</td>
<td>6.67 (2.79-15.92)</td>
<td>0.028</td>
</tr>
<tr>
<td>Internally displaced vs. Local (reference)</td>
<td>0.67 (0.25-1.81)</td>
<td>0.293</td>
</tr>
<tr>
<td>Patients with COVID vs. Patients with colds (reference)</td>
<td>2.03 (0.41-10.07)</td>
<td>0.310</td>
</tr>
<tr>
<td>There is a history of chronic diseases vs. All other diseases (reference)</td>
<td>2.16 (0.87-7.00)</td>
<td>0.147</td>
</tr>
<tr>
<td>They get colds several times a year vs. They get colds once a year (reference)</td>
<td>3.21 (1.49-6.93)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>They do not eat snacks vs. They have a snack (reference)</td>
<td>0.67 (0.25-1.81)</td>
<td>0.293</td>
</tr>
<tr>
<td>A snack is useless vs. A snack is useful (reference)</td>
<td>0.94 (0.41-2.17)</td>
<td>0.531</td>
</tr>
<tr>
<td>They eat fatty food vs. They do not eat fatty food (reference)</td>
<td>1.93 (0.72-5.17)</td>
<td>0.146</td>
</tr>
<tr>
<td>They do not do physical exercises vs. They do physical exercises (reference)</td>
<td>0.64 (0.19-2.17)</td>
<td>0.338</td>
</tr>
<tr>
<td>They smoke vs. They do not smoke (reference)</td>
<td>1.50 (0.38-5.90)</td>
<td>0.411</td>
</tr>
<tr>
<td>Sleep up to 8 hours vs. Sleep more than 8 (reference)</td>
<td>3.97 (1.78-8.82)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>They wake up at night vs. They do not wake up at night (reference)</td>
<td>4.38 (1.95-9.81)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Discussion**

The current study indicates the high psychological burden on Ukrainian children, especially IDPs. The current study found that eating junk food or smoking was associated with greater odds of high or moderate situational anxiety; sleeping up to 8 hours, restless sleep, or colds was associated with a higher level of personal anxiety. Moreover, IDPs had a higher level of situational anxiety, while women had a higher level of personal anxiety.

To our knowledge, the current study is the first study to describe the level of situational and personal anxiety among children who are in the territory far from hostilities, and establish demographic and behavioral risk factors that affect the level of anxiety in children. In addition, our study demonstrated the dynamics of behavioral factors of schoolchildren during and before the beginning of the war.

Epidemiological studies have shown that armed conflict is associated with a wide range of mental health outcomes for children. We have found that almost half of the children have a high level of situational anxiety. The high psychological burden on refugees emphasizes the need for constant psychological assistance during the initial period of resettlement. A previous study showed that the prevalence of mental disorders in the first years of resettlement increased only in PTSD, but after 5 years after resettlement, there was also an increase in the frequency of depressive and anxiety disorders. Poor mental health strongly affects other aspects of life in early adolescence. Most mental health disorders appear before the age of 14, but they may go untreated and thus have serious long-term consequences for a child’s mental, physical, and social health. Early detection and treatment of mental illness in childhood and adolescence improve a child's quality of life, academic performance, physical health, and social life. It also helps them cope with external risk factors in adulthood. Hence, our study to help to inform the level of anxiety of schoolchildren in the Russian-Ukrainian war.

Since the beginning of the war, 28,000 internally displaced persons have been officially registered in Kremenchuk, about 10% of the population. According to a UNICEF document, people of any age can become infected with the virus, but so far there have been few cases of COVID-19 infection among children. In the current study, 7.9% of the children among the subjects fell ill with COVID.

Rational nutrition is a physiological nutrition of potentially healthy people, that is, one that provides the human body with the optimal amount of nutrients and energy in accordance with the norms of the physiological needs of the human body. In conditions of war, especially at its beginning, when people are uncertain, it is not always possible to provide food rations. In our work, children who ate healthy food for a snack decreased significantly. Moreover, based on the tasks and goals of rational nutrition, this could affect the increase in morbidity, which was confirmed in our work when we found an increase in colds during the war. Research has confirmed a link between healthy eating or consuming high-quality foods and lower levels of depression or improved mental health in children. Similarly, there is a link between unhealthy eating and poor-quality food consumption and depression or poor mental health.

One of the components of a healthy lifestyle for schoolchildren is the optimal level of physical activity, which affects the level and harmony of physical development. Physical exercises improve the development of the musculoskeletal system, the central nervous system, and internal organs, enrich the child with new sensations, and contribute to psychological development. Since the spring of 2020, the COVID-19 pandemic has caused a number of sig-
significant changes in the lifestyle of the population, including children. The transition of schools to distance learning and quarantine measures imposed certain restrictions on the level of physical activity of children\(^\text{23}\). On the other hand, the Russian-Ukrainian war also affected the usual routine of schoolchildren. Therefore, we assumed that children during the war were engaged in physical education for more than 4 hours almost 2 times less. This may be due not only to distance learning, but also to the closure of sports sections in connection with the war and compliance with measures aimed at the safety of children.

Sleep is a primary component of a healthy lifestyle. School-age children aged 6 to 18 need 8-12 hours of sleep per night\(^\text{24}\). However, in the current study, we found that the number of children who sleep 8 hours has significantly decreased.

Cigarette smoking is the most common form of tobacco use among teens, according to the Public Health Center’s website\(^\text{25}\). Most tobacco users started smoking during adolescence. This causes a rapid formation of nicotine addiction and makes it harder to quit smoking at an older age\(^\text{26}\). A large body of clinical and preclinical data suggested the important role of nicotine exposure in adolescents and an increased vulnerability to developing addictive and anxiety disorders later in life\(^\text{27}\).

Conclusions
The mental health and sleep health among children living in Kremenchuk is worrisome. The current study indicates the high psychological burden on Ukrainian children, especially IDPs. Thus, constant mental health care during the initial period of resettlement is urgently needed.

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A – conception and design of the study; B – data collection; C – data analysis and interpretation; D – writing the article; E – revising the article; F – final approval of the article

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The authors declare no conflict of interest

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Ethics approval and consent to participate the study was approved by the Committee on Bioethics and Ethical Issues of Poltava State Medical University (Minutes No. 222 of 21.12.2023).

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10. Foster H, Brooks-Gunn J. Children’s exposure to community and war violence and mental health in four African
Як можна відповісти на питання щодо стану здоров'я та способу життя дітей, що мали антидопаміnergічні реактивності? Наш дослід показав, що відповіді дітей щодо стану здоров'я та способу життя могли бути відкориговані дітми з діагностичними факторами. Мета: Завдяки нашому дослідженню, ми можемо оцінити вплив факторів, що впливають на здоров'я та способи життя дітей. Результати: Дослідження нами було здійснене на 156 дітях з різного статусу. Матеріали і методи: Дослідження було проведено з метою виявлення впливу факторів на здоров'я дітей. Результати: Наші дослідження показали, що низка факторів вплинули на здоров'я дітей. Мета: Оцінити вплив факторів на здоров'я дітей. Результати: Оцінка впливу факторів на здоров'я дітей показала, що їх можна оцінити через підходи до впливу на здоров'я дітей. Мета: Вивчити вплив досвіду дітей на здоров'я. Результати: У нашому дослідженні було здійснено вивчення впливу досвіду дітей на здоров'я. Мета: Завдяки нашому дослідженню, ми можемо оцінити вплив факторів, що впливають на здоров'я та способи життя дітей. Результати: Наші дослідження показали, що вплив факторів на здоров'я дітей можна оцінити через підходи до впливу на здоров'я дітей. Мета: Завдяки нашому дослідженню, ми можемо оцінити вплив факторів, що впливають на здоров'я та способи життя дітей. Результати: Наші дослідження показали, що вплив факторів на здоров'я дітей можна оцінити через підходи до впливу на здоров'я дітей. Мета: Завдяки нашому дослідженню, ми можемо оцінити вплив факторів, що впливають на здоров'я та способи життя дітей. Результати: Наші дослідження показали, що вплив факторів на здоров'я дітей можна оцінити через підходи до впливу на здоров'я дітей. Мета: Завдяки нашому дослідженню, ми можемо оцінити вплив факторів, що впливають на здоров'я та способи життя дітей. Результати: Наші дослідження показали, що вплив факторів на здоров'я дітей можна оцінити через підходи до впливу на здоров'я дітей.
ти, що внутрішньо переміщені особи мали в 5,4 рази більше шансів ситуативної тривоги, ніж місцеві школярі (співвідношення шансів, ВШ=5,4, 95% довірчий інтервал, ДІ: 1,66-9,39, p=0,045). Крім того, рівень особистісної тривожності у дівчат у 6,6 разів був вищий, ніж у хлопців (ВШ=6,66, 95% ДІ: 2,79-15,92, p=0,028). Крім того, вживання шкідливої їжі було пов’язане з вищими шансами ситуативної тривоги в умовах війни (ВШ=3,11, 95% ДІ: 1,37-7,03, p=0,035).

Висновки: Дане дослідження свідчить про високе психологічне навантаження на українських дітей, особливо ВПО. Таким чином, постійний догляд за психічним здоров'ям протягом початкового періоду переселення є вкрай необхідним.

Ключові слова: діти, тривожність, поведінкові фактори