

FORMATION OF SELF-REGULATION BY MEANS OF KICKBOXING IN THE EDUCATIONAL COMPONENT “PROTECTION OF UKRAINE”

FORMAÇÃO DA AUTORREGULAÇÃO ATRAVÉS DO KICKBOXING NO COMPONENTE EDUCATIVO “PROTEÇÃO DA UCRÂNIA”

FORMACIÓN DE LA AUTORREGULACIÓN MEDIANTE EL KICKBOXING EN EL COMPONENTE EDUCATIVO “PROTECCIÓN DE UCRANIA”



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ABSTRACT: The purpose of the study is to examine the formation of self-regulation through kickboxing in the educational component “Protection of Ukraine”, in the context of developing non-cognitive skills. The methodological basis of the study is a quasi-experimental approach using psychodiagnostic techniques, pedagogical observation, and statistical analysis of changes in the level of self-regulation. The results indicate that the purposeful use of kickboxing elements contributes to a statistically significant increase in students’ self-regulation. The effect is systemic and manifests itself in increased self-control, stability of reactions, and discipline. The study shows that kickboxing can be used as a pedagogical tool in physical education and specialist training. Possible economic implications are treated only as an indirect perspective for future research, since employment, income, and productivity were not directly measured.

KEYWORDS: Self-regulation. Kickboxing. Educational Component “Protection of Ukraine”. Training of Specialists. Physical Education.

RESUMO: O objetivo do estudo é examinar a formação da autorregulação por meio do kickboxing no componente educativo “Proteção da Ucrânia”, no contexto do desenvolvimento de competências não cognitivas. A base metodológica do estudo é uma abordagem quase experimental que utiliza técnicas psicodiagnósticas, observação pedagógica e análise estatística das alterações no nível de autorregulação. Os resultados indicam que a utilização intencional de elementos do kickboxing contribui para um aumento estatisticamente significativo da autorregulação dos alunos. O efeito é sistêmico e manifesta-se no aumento do autocontrole, da estabilidade das reações e da disciplina. O estudo mostra que o kickboxing pode ser utilizado como ferramenta pedagógica na educação física e na formação de especialistas. As possíveis implicações econômicas são tratadas apenas como uma perspectiva indireta para pesquisas futuras, uma vez que a empregabilidade, a renda e a produtividade não foram medidas diretamente.

PALAVRAS-CHAVE: Autorregulação. Kickboxing. Componente educativa “Proteção da Ucrânia”. Formação de especialistas. Educação física.

RESUMEN: El objetivo del estudio es examinar la formación de la autorregulación mediante el kickboxing en el componente educativo “Protección de Ucrania”, en el contexto del desarrollo de habilidades no cognitivas. La base metodológica del estudio es un enfoque cuasiexperimental que utiliza técnicas psicodiagnósticas, observación pedagógica y análisis estadístico de los cambios en el nivel de autorregulación. Los resultados indican que el uso intencionado de elementos del kickboxing contribuye a un aumento estadísticamente significativo de la autorregulación de los estudiantes. El efecto es sistémico y se manifiesta en un aumento del autocontrol, la estabilidad de las reacciones y la disciplina. El estudio muestra que el kickboxing puede utilizarse como herramienta pedagógica en la educación física y en la formación de especialistas. Las posibles implicaciones económicas se tratan únicamente como una perspectiva indirecta para futuras investigaciones, ya que el empleo, los ingresos y la productividad no se midieron directamente.

PALABRAS CLAVE: Autorregulación. Kickboxing. Componente educativo “Protección de Ucrania”. Formación de especialistas. Educación física.

INTRODUCTION

In the context of updating secondary education and strengthening the educational component "Protection of Ukraine", the formation of self-regulation as a basic competence of future specialists becomes particularly relevant. Although discipline, resilience and readiness to act in critical situations are declared educational priorities, they are often formed unsystematically, while traditional physical education does not fully integrate the cognitive, emotional and behavioral components of self-regulation.

Against this background, kickboxing appears promising because it combines physical training with control, endurance and quick decision-making. However, this potential is still used sporadically. This creates a contradiction between the declared aim of training competitive and resilient specialists and the limited use of tools capable of forming such qualities. Self-regulation is therefore increasingly understood as a skill developed through systematic activity, including physical education, rather than as a fixed personal trait (Synytsia et al., 2025).

Lakes and Hoyt (2004) show that martial arts elements in learning enhance self-control, concentration and discipline, functioning as a pedagogical tool rather than only physical activity. Cheng et al. (2025) add that regular training develops inhibitory control and purposeful behavior, while Potoczny et al. (2022) emphasize the joint role of self-control and emotional regulation in subjective well-being, confirming the multidimensional nature of self-regulation. This logic is supported by Hernandez-Martinez et al. (2025), who note the systemic effect of combat sports on physical and functional indicators related to regulatory skills. Studies on human capital also indicate that non-cognitive skills, including self-regulation, may be associated with later educational and labor-market outcomes (Glewwe et al., 2022). In the present article, however, this economic dimension is not treated as an empirical objective, but only as a possible implication that requires further longitudinal investigation.

Despite evidence of the influence of martial arts and physical activity on self-regulation, research gaps remain. Existing studies mainly address sports or psychological aspects, while the integration of kickboxing into "Protection of Ukraine" as a school-based pedagogical tool remains insufficiently developed. The present study therefore focuses on the educational and behavioral effects of kickboxing on self-regulation, rather than on directly measuring financial or labor-market outcomes.

The purpose of the study is to examine the formation of self-regulation through kickboxing in the educational component "Protection of Ukraine" as part of the development of non-cognitive skills. The tasks are to analyze theoretical approaches to self-regulation,

characterize the potential of kickboxing, assess its integration into “Protection of Ukraine” and discuss, only as a prospective direction, the possible relevance of self-regulation for human capital development.

LITERATURE REVIEW

In modern literature, self-regulation is interpreted as a dynamic skill formed through cognitive, behavioral and emotional processes, supported by motivational, executive and emotional mechanisms, resistance to negative influences, psychological adaptation, subjective well-being and measurable self-discipline (Latinjak, 2025; Liu et al., 2024; Wang, 2025; Potoczny et al., 2022; Prabowo et al., 2025).

Physical activity is also recognized as a factor in self-regulation development, as it positively affects young people’s physical and mental indicators and regulatory mechanisms (Ruiz-Ranz & Asín-Izquierdo, 2025; Gea-García et al., 2020). Martial arts are especially relevant because they combine physical load with self-control, concentration and rapid decision-making, contributing to discipline, emotional stability, functional development and psychological well-being (Lakes & Hoyt, 2004; Hernandez-Martinez et al., 2025; Ying & Yang, 2025).

Nevertheless, the pedagogical potential of kickboxing remains insufficiently studied, as existing works mostly examine physical performance and technical skills (Ambroży et al., 2021; Morrone et al., 2024; Martusciello et al., 2026), while educational studies emphasize organizational skills, discipline, resilience and responsibility without detailing school-based tools (Bielikov, 2022; Kanishevskaya, 2025).

Research on non-cognitive skills also supports the broader relevance of the problem: such skills are associated in the literature with labor-market outcomes, income, occupational trajectories and educational results through social adjustment (Deming, 2017; Glewwe et al., 2022; Chen & Wu, 2025; Choi & Min, 2025; De Paola & Skatova, 2024). In this study, however, self-regulation is analyzed primarily as a psychological and pedagogical characteristic. Its possible economic relevance is considered only as a secondary interpretive perspective and as a direction for future research.

MATERIALS AND METHODS

The study was conducted in 2025–2026 in general secondary education institutions implementing the educational component “Protection of Ukraine”. The educational process complied with the State Standard of Specialized Secondary Education (Cabinet of Ministers of Ukraine, 2024) and current curricula for grades 10-11 (Ministry of Education and Science of Ukraine, 2024). The experimental model also considered active-learning approaches in physical education (OECD, 2019) and the development of non-cognitive competencies as a component of human capital (OECD, 2025).

The empirical sample included 80 high school students aged 15-17, divided into experimental ($n = 40$) and control ($n = 40$) groups. Selection considered age, physical fitness and health status. Inclusion criteria were regular attendance, absence of medical contraindications to physical exertion and participation in physical education classes; exclusion criteria were chronic diseases limiting activity, irregular attendance and previous systematic martial arts training. Participation was voluntary, with informed consent from students and parents. The experiment lasted 12 weeks.

The procedure included preparatory diagnosis, implementation of the experimental program and final measurements. In the experimental group, kickboxing elements were integrated twice a week into physical education and the educational component “Protection of Ukraine”. The program included punches, defense, movement, coordination exercises, reaction-speed tasks and situational exercises requiring quick decision-making and behavioral control under stress. The control group followed the standard program without martial arts elements.

Self-regulation was measured using the Tangney et al. (2004) self-control scale, which includes 36 statements assessed on a five-point Likert scale and measures behavioral regulation, impulse control and resistance to external influences. The reliability of the scale was confirmed in previous studies (Cronbach's $\alpha > 0.80$). Pedagogical observation and teacher expert assessment were additionally used to clarify behavioral manifestations of self-regulation. Behavioral indicators were evaluated on a five-point expert scale from 1, low manifestation, to 5, high manifestation, followed by averaging.

Data were processed using SPSS and Microsoft Excel. Distribution normality was checked with the Shapiro-Wilk test. A paired t-test assessed within-group changes, while an independent t-test compared groups. If normality was violated, Wilcoxon and Mann-Whitney

nonparametric tests were used. Statistical significance was set at $p < 0.05$, and Cohen's d was used to assess effect size.

The interpretation of broader human-capital implications was based on changes in self-regulation and on the literature linking non-cognitive skills to adaptability and competitiveness (OECD, 2025). Economic outcomes were not measured directly, and the study did not assess employment, income, productivity or financial effects. Therefore, the article does not claim to demonstrate an economic impact of kickboxing; it only indicates that the formation of self-regulation may be explored in future longitudinal studies as one possible factor related to specialist training and human capital development. Its limitations include sample size and experiment duration, which may restrict generalization but still allow identifying key trends in integrating kickboxing into the educational process.

RESULTS

Baseline level of self-regulation and sample homogeneity

The preparatory stage of the study was aimed at determining the initial level of self-regulation of the participants and checking the statistical homogeneity of the formed groups. The presence of homogeneity at the beginning of the experiment is a prerequisite for the correct interpretation of further changes in indicators.

The assessment was carried out according to the self-control scale (Tangney et al., 2004), which allows you to quantify the level of self-regulation as an integral behavioral characteristic. The obtained data were processed using descriptive statistics (mean, standard deviation). Verification of the normality of the distribution according to the Shapiro–Wilk test showed the absence of statistically significant deviations ($p > 0.05$), which justifies the use of parametric methods of analysis.

The results of the initial measurement are shown in Table 1.

Table 1.

Initial indicators of students' self-regulation (according to the Tangney scale)

Group	n	Mean	Standard Deviation (SD)
Experimental	40	3.21	0.42
Control	40	3.17	0.45

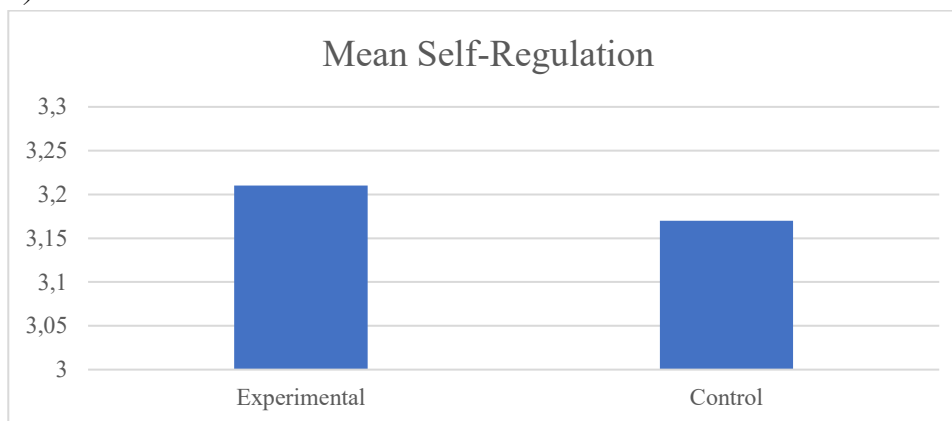
Note. Developed by the authors based on the results of empirical research.

Comparison of mean values between groups was carried out using the t-test for independent samples. The results showed no statistically significant differences between the experimental and control groups ($t = 0.87$; $p = 0.386 > 0.05$).

For clarity, the results are shown in Figure 1.

Figure 1.

Comparison of the level of self-regulation in the control and experimental groups (before the experiment)



Note. Developed by the authors.

The graphical representation is consistent with the results of the statistical analysis and shows minimal difference between the groups.

Therefore, the experimental and control groups are statistically homogeneous in terms of the level of self-regulation at the initial stage of the study. This creates grounds for further analysis of changes in indicators as a result of the influence of the experimental program.

Changes in the level of self-regulation under the influence of the kickboxing program

The central stage of the study was aimed at assessing the dynamics of changes in the level of self-regulation in the experimental and control groups during the 12-week period. It is at this stage that the effect of the experimental intervention is recorded and the effectiveness of the proposed model of the influence of physical activity on the formation of self-regulation is assessed.

In the first step, changes within each group were analyzed (pre-test → post-test). The results are shown in Table 2.

Table 2.*Changes in self-regulation indicators in groups (before and after the experiment)*

Group	To (M ± SD)	After (M ± SD)	t (paired)	p
Experimental	3.21 ± 0.42	3.84 ± 0.38	7.12	< 0.001
Control	3.17 ± 0.45	3.26 ± 0.44	1.21	0.231

Note. Developed by the authors based on the results of empirical research.

As can be seen from the above results, there was a significant increase in the average value of self-regulation in the experimental group from 3.21 to 3.84. The difference is statistically significant ($p < 0.001$), which indicates the presence of a pronounced effect. At the same time, the standard deviation decreased slightly, which may indicate a more homogeneous level of skill formation after the intervention.

In the control group, there is also a slight increase in the indicator (from 3.17 to 3.26), but these changes do not reach statistical significance ($p = 0.231$). Such dynamics may be associated with the general educational process or the effect of retesting, but without specialized influence, these changes remain minimal.

The next step was an intergroup comparison of the results after the completion of the experiment, which allows you to assess the difference between the experimental and control conditions. The relevant data are given in Table 3.

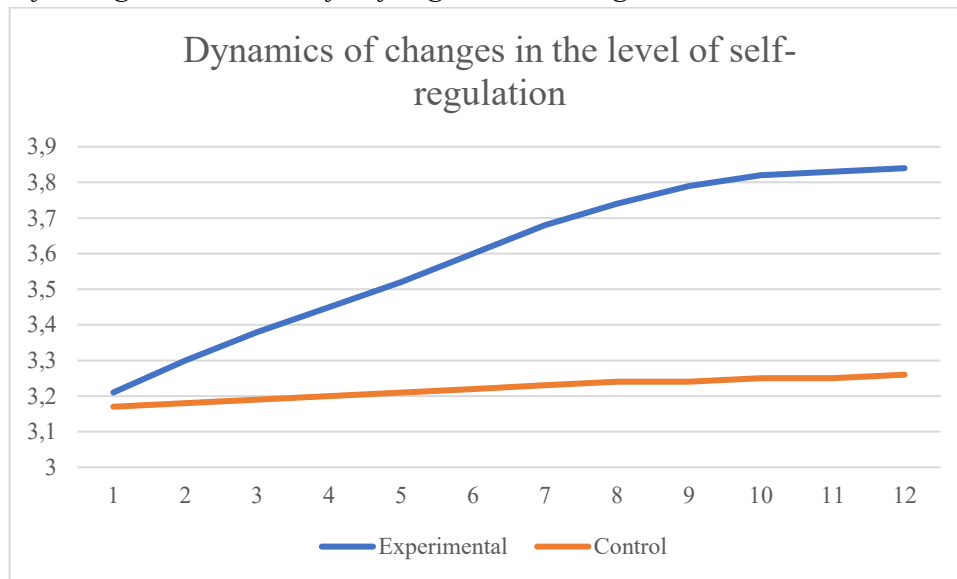
Table 3.*Comparison of self-regulation indicators between groups after the experiment*

Indicator	Mean (exp.)	Mean (control)	t (independent)	p	Cohen's d
Self-regulation	3.84	3.26	5.48	< 0.001	0.95

Note. Developed by the authors.

The results demonstrate a statistically significant difference between the groups ($p < 0.001$). The value of Cohen's coefficient $d = 0.95$ corresponds to a large effect of influence, which allows us to talk not only about the statistical, but also about the practical significance of the changes obtained.

For visual clarity, the dynamics of self-regulation are presented in Figure 2. The graphical data confirm weak and unstable changes in the control group and a consistent increase in the experimental group.

Figure 2.*Dynamics of changes in the level of self-regulation during 12 weeks*

Note. Developed by the authors.

The experimental group showed a higher proportion of students with high self-regulation, whereas the control group was dominated by the medium level.

Behavioral manifestations of self-regulation and their implications for specialist training

Behavioral manifestations of self-regulation were assessed through pedagogical observation and teacher expert evaluation, focusing on discipline, load response and behavior control. The results are shown in Table 4.

Table 4.*Behavioral indicators of self-regulation based on the results of observation*

Indicator	Experimental group	Control group	Δ
Discipline	4.12	3.45	+0.67
Load response	3.98	3.41	+0.57
Behavior control	4.21	3.52	+0.69

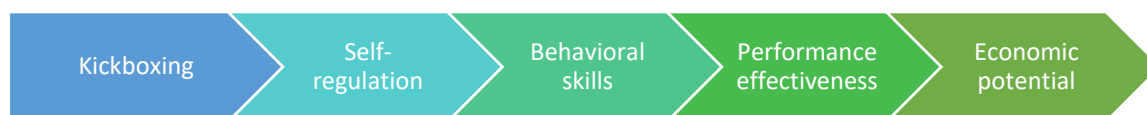
Note. Developed by the authors on the basis of expert assessment.

The experimental group showed higher values for all behavioral indicators, with the largest difference in behavior control (+0.69). This was reflected in better attention retention, stronger adherence to instructions and fewer impulsive reactions under physical and emotional stress. In contrast, the control group demonstrated less stable behavioral manifestations, while the experimental group showed more systematic self-control, organization and reaction

stability. To generalize the identified results, a conceptual model was built (Figure 3), reflecting the sequence of relationships between variables.

Figure 3.

Model of the influence of kickboxing on self-regulation and specialist training potential



Note. Developed by the authors.

The model indicates that structured physical activity is associated with higher self-regulation, reflected in students' behavioral characteristics. These changes may be relevant for specialist training because self-control, discipline and reaction stability are important non-cognitive competencies. Any economic interpretation remains indirect and exploratory: the study did not measure productivity, employability or income, and therefore cannot confirm financial effects. The recorded changes should be understood as educational and behavioral results that may later inform broader human-capital research.

Thus, the behavioral changes recorded within the study are consistent with the quantitative results and complement them, reflecting the practical aspects of the formation of self-regulation.

DISCUSSION

The results demonstrate a statistically confirmed trend: integrating kickboxing elements into the educational process increases high school students' self-regulation. This effect is not limited to higher mean scores but is also reflected in behavioral patterns, indicating changes in self-control, attention regulation and disciplined action. The mechanism of this influence can be explained by the structure of kickboxing, which combines physical load with continuous control of actions, attention regulation and quick decision-making. Such activity activates inhibitory control, behavioral stabilization and cognitive regulation, which is consistent with Wang et al. (2024). The stronger effect observed in this study may be related to the specificity of combat sports, where control is embedded in each exercise.

The findings correspond to previous studies. Ying and Yang (2025) confirm the positive influence of combat sports on emotional state and subjective well-being through regulatory

mechanisms, while Zormann et al. (2026) emphasize the broader psychological effects of martial arts. Similar evidence is provided by van der Stouwe et al. (2016), who show that kickboxing-based training supports resilience and self-regulation even in clinical groups, and by Tsos et al. (2017), who report a positive impact of regular classes on students' quality of life. In the broader context of physical education, the results are consistent with the shift toward developing not only physical but also socio-behavioral competencies (Vlček et al., 2021). Therefore, martial arts may be viewed as a practical tool for forming self-control, responsibility and adaptability. The economic interpretation is analytical, since economic indicators were not directly measured. However, self-regulation may be considered a component of human capital, in line with Schultz (1993), while Deming (2017) confirms the role of non-cognitive skills in economic outcomes.

Thus, kickboxing can be considered an effective means of forming self-regulation in the educational environment, with effects visible in both quantitative indicators and students' behavior. The study is limited by the sample size ($n = 80$), the 12-week duration and the absence of direct economic measurements. Further research should expand the sample, extend the observation period and include direct indicators before making claims about economic efficiency or labor-market impact.

FINAL CONSIDERATIONS

The study confirms that integrating kickboxing elements into the educational component "Protection of Ukraine" creates favorable conditions for developing self-regulation as a behavioral skill formed through physical activity and cognitive control. The scientific novelty lies in interpreting self-regulation as a controlled educational result, not merely a side effect of physical training.

The proposed approach influenced students' discipline, reaction stability and ability to regulate actions under stress. Self-regulation may therefore be considered a component of human capital with possible relevance to productivity and adaptability, but this link was not directly confirmed in the short-term experiment and should not be presented as an empirical result of the current study.

The main limitations concern the sample size, experiment duration and absence of direct economic measurements. The practical value lies in using kickboxing to develop behavioral

competencies in secondary education. Further research should expand the sample, assess long-term effects and measure possible economic impact of formed non-cognitive skills.

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