

Importance of integrating psychophysical training into the holistic training program for law enforcement

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Published online: October 31, 2024

Accepted for publication: October 15, 2024

DOI:10.7752/jpes.2024.10269

Abstract

Introduction: This study explores the importance of psychophysical exercises and physical fitness assessments in the comprehensive training of future police officers. It highlights the necessity for targeted exercise regimens and rigorous fitness evaluations in law enforcement training programs. By combining a literature review with empirical analysis drawn from eight years of experience, this research aims to elucidate how the specialised training program—evaluated through fitness tests—affects the performance and overall preparedness of officer trainees. **Materials and Methods:** The study included two groups of police officer trainees: a control group and an experimental group. Both groups completed a series of physical fitness tests, which consisted of the standing long jump (SLJ), lumbar mobility (LM), running speed (R50), sit-ups (SU), touch plates (TP), agility (Illinois), hand-release push-ups (HRPU), beep test (BT), and plank test (PT). The experimental group participated in an enhanced training program that integrated psychophysical exercises into a tailored sports performance curriculum aimed at improving physical fitness. Statistical analyses, including independent and dependent t-tests, were performed to compare performance between the groups and evaluate the effectiveness of the training intervention. **Results:** Initial assessments showed no significant differences between the control and experimental groups across various physical fitness tests. However, post-training results revealed significant improvements in the experimental group compared to the control group in several areas: LM ($p = 0.004$), R50 ($p < 0.001$), SU ($p < 0.001$), TP ($p = 0.000$), agility (Illinois test) ($p = 0.045$), and BT ($p = 0.017$). These enhancements indicate that the improved training program had a positive effect on the physical performance of the experimental group. In contrast, no significant differences were found between the groups in terms of weight, SLJ, HRPU, and PT. **Conclusions:** The findings highlight the need to incorporate sports performance principles and psychophysical exercises into police training programs. The significant improvements noted in the experimental group, as demonstrated by rigorous physical fitness tests, underscore the effectiveness of enhanced training protocols. By integrating comprehensive physical fitness assessments, police officers can be better equipped to handle the physical demands of their roles, which may lead to increased operational effectiveness and improved public safety. Future training programs should prioritise the inclusion of psychophysical exercises, advanced sports performance principles, and thorough fitness testing as standard components to optimise officer readiness and performance.

Keywords: fitness evaluation, mental toughness, tactical readiness, performance optimisation, stress resilience, holistic development

Introduction

The physical and psychological demands placed on police officers require a comprehensive and rigorous training program (Bloschynskyi et al., 2021). Law enforcement encompasses demanding departments (DeNysschen et al., 2018), where officers must be prepared to rapidly transition from periods of inactivity to situations that require peak physical and mental performance, often in high-pressure and hostile environments.

Despite the largely sedentary nature of police work, maintaining a high level of physical fitness is crucial. Officers must be equipped to perform essential tasks such as pursuing suspects, apprehending and restraining individuals, and managing crowd control during unpredictable events (Adams, 2010).

Additionally, emergency service personnel, including police officers, require specialised training in strength, speed, endurance, and agility to effectively meet the demands of their roles.

This preparation ensures that officers are capable of handling the physical challenges they may face in the field (Crawley et al., 2015). Furthermore, Keith (2024) emphasises that to effectively address a wide range of emergency scenarios, comprehensive preparedness must align with a well-structured training plan. This plan should include essential components such as strength, power, muscular endurance, flexibility, balance, body composition, aerobic endurance, agility, speed, quickness/reaction time, and coordination.

Physical, technical, and tactical training are essential components for athletes and special forces personnel, including police officers. However, to excel in elite roles, it is vital to develop cognitive and emotional skills. These abilities empower individuals to perform effectively under pressure, manage anxiety, and overcome the fear of injury (Howe, 2011). Additionally, Andersen notes that "psychological and physiological stress responses during critical incidents shape the outcome of the incident, either for good or for bad" (Andersen, 2016).

Both law enforcement officers and special forces soldiers encounter critical situations requiring quick and decisive action. They must manage their fear, follow established protocols, and execute tasks in high-stress environments, whether during physical confrontations or armed conflicts (Gutierrez, 2016).

Military personnel frequently need to push their physical limits to build strength and endurance, even when fatigued. This can be mentally challenging, particularly during the refinement of speed–endurance techniques. Without sufficient psychological preparation—encompassing the development of intellectual, moral, and volitional qualities—soldiers may encounter "exaggerated emotional states, nervousness, a lack of confidence in their own abilities, and sometimes even fear of the enemy" in real combat situations (Băițan, 2015, p. 201).

While traditional training systems for police officers, especially in the United States, prioritise firearms proficiency, mental preparation is frequently overlooked. This imbalance can contribute to increased stress, cynicism, and cognitive impairments, which negatively affect performance and decision-making (Gutierrez, 2016). Research has demonstrated that heightened stress adversely impacts shooting accuracy, self-defence skills, and communication. Officers experiencing high anxiety are more likely to misinterpret threats and make poor decisions (Nuwer, 2016).

Therefore, the capacity to manage traumatic experiences and maintain mental resilience is crucial for police officers because exposure to violence and high-stress situations can profoundly disrupt their emotional and psychological well-being. Trauma may lead to anxiety, insomnia, depression, and post-traumatic stress disorder (PTSD), impacting both their professional and personal lives. Furthermore, "burnout," which is characterised by emotional exhaustion and reduced job satisfaction, can arise from accumulated stress (Conn, 2018).

While functional training programs aim to mimic real-life demands, they often overlook the impact of cognitive factors on physiological performance and adaptations. A more effective approach is to integrate cognitive elements into training, drawing inspiration from various fields. This strategy emphasises practice-related techniques and motor-learning strategies that can promote neuromotor adaptations. By manipulating mental effort, attention, and intention, the goal is to optimise sport-specific adaptations and ultimately enhance performance in real-life situations (Ives & Shelley, 2003). Consequently, when implementing psychophysical training programs, trainees may undergo significant systemic changes that can lead to positive improvements in "behavioural patterns or habitual movement protocols" (Middleton, 2012).

Recognising the deficiencies in physical training programs that can lead to decreased performance, physical and mental health issues, injuries, and even disability among law enforcement officers, the importance of enhancing their psychophysiological capabilities has been emphasised to ensure the effectiveness of their cognitive processes (Okhrimenko et al., 2022). In response to these challenges, various international programs have been developed to improve the psychological preparation of law enforcement personnel. For instance, Canada's "The Road to Mental Readiness" program emphasises goal-setting and visualisation techniques to enhance confidence and performance (Guest et al., 2019). Similarly, the "Master Resilience Training" program in the United States has demonstrated positive impacts on resilience and mental health, especially among younger individuals (Lester et al., 2011).

Conversely, some programs have produced limited results, such as a mental strengthening initiative at the Dutch Police Academy, where the high initial mental resilience of participants may have affected the results (Van der Meulen et al., 2017). Research in Norway indicates that individuals with lower initial levels of mental toughness exhibit greater potential for improvement compared to those who are close to their capacity (Hystad et al., 2015). In Israel, gradually increasing stress factors during training significantly enhanced performance under pressure (Zach et al., 2007). These findings underscore the importance of tailoring training programs to meet the specific needs of participants and incorporating gradual exposure to stress to improve mental resilience and performance.

Materials and Methods

To establish the control and experimental groups, a random selection of 60 first-year students aged 18–21 was performed from a four-year program at a Superior School for Police Officers (SSPO).

After assigning students for training, the initial phase involved distributing the participants into two homogeneous samples.

As a result, the first training sessions focused on the physical and psychological testing of the students to ensure a balanced allocation between the experimental group (EG) and the control group (CG). The subjects then followed a 10-week program consisting of five training sessions per week.

Training Program Planning

The objective of the current training program is to develop both aerobic and anaerobic endurance, specifically aimed at preparing students for endurance and muscular endurance assessments. As a result, the weekly training schedule is structured as follows. Monday includes an aerobic endurance running session; Tuesday focuses on general strength training; Wednesday is dedicated to coordination and agility training; Thursday emphasises anaerobic endurance training (sprints); and Friday is reserved for a lower-intensity recovery session.

The following factors were considered in implementing the training program:

1. At the beginning of the training period at the SSPO, it is essential to consider that some students may have limited experience with physical activities. In this context, it is crucial to implement both theoretical and practical training that aids in understanding and mastering proper techniques for the correct execution of exercises and running biomechanics.

2. The primary objective of the training program, particularly for first-year SSPO students, should be the development of fundamental motor qualities such as strength, coordination, balance, joint mobility, and muscular flexibility. These elements aim to establish a solid foundation for physical fitness, which will facilitate the successful execution of subsequent activities and training, ultimately contributing to the holistic preparation of future officers.

3. The sequence of training sessions is crucial for maximising effectiveness in student preparation. Therefore, it is advisable for coordination training to follow aerobic running training to prevent muscle fatigue that may result from general strength or aerobic power training because this fatigue may adversely affect the implementation of coordination training. Consequently, we have moved the aerobic running training from Monday to replace the strength training scheduled for Tuesday.

4. The Wednesday training session, originally focused on high-intensity agility and coordination development, has been replaced with a lower-intensity workout. Consequently, we have decided that the Wednesday session will now emphasise coordination, balance, muscular flexibility, and joint mobility. By incorporating a moderate-intensity workout in the middle of the week, the objective is to allow students to recover their energy and workout capacity in preparation for the subsequent day's speed and agility training.

5. The training scheduled for Thursday maintained its anaerobic focus with the addition of agility drills.

6. The training planned for Friday involved a high-intensity workout in the form of a strength circuit focused on endurance. This approach was justified by the two-day recovery period over the weekend before the next training session.

Considering the abovementioned changes, the structure of the developed weekly program is illustrated in Figure 1.

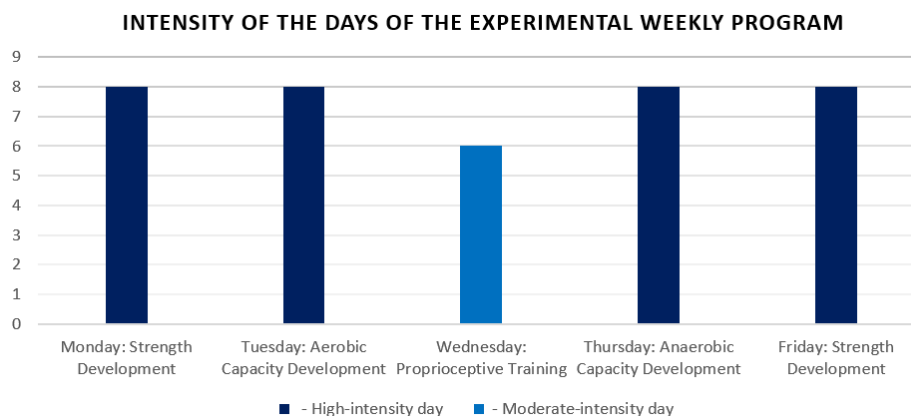


Figure 1. Weekly training plan for the experimental group

Furthermore, we believe that periodising the program may enhance the training process by offering a broader perspective on the workouts and enabling optimisation opportunities (Muraru, 2008, pp. 50-56).

Therefore, the program comprises a macrocycle with the primary objectives of developing strength, improving coordination, and enhancing mobility and balance. It includes three mesocycles of training: the anatomical adaptation period, the accumulation period, and the stabilisation and peak performance period. Additionally, the program features 10 microcycles (weeks) of training, where every three weeks of progressively increasing intensity, volume, and complexity of workouts are followed by a fourth week of "deloading" (reduced intensity, volume, and complexity). This deloading week allows students to recover, prevent injuries, and build the physiological and psychological reserves necessary to sustain effort in the subsequent period (Figure 2).

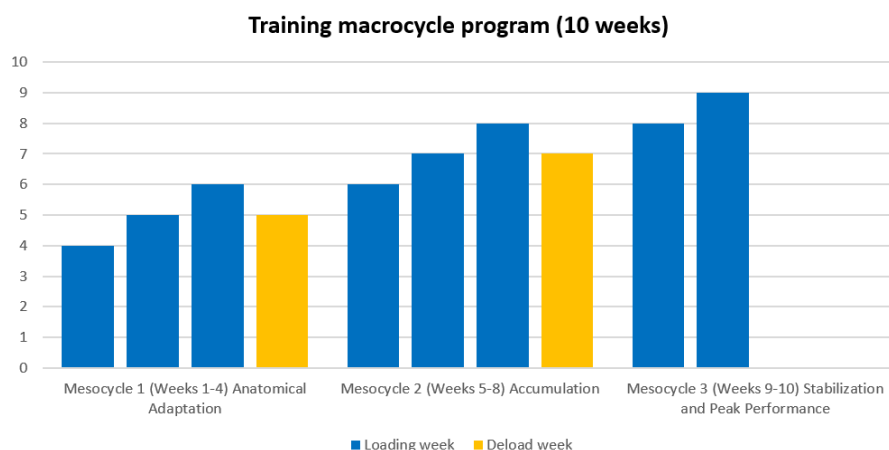


Figure 2. Training macrocycle

Monday's Training – Strength Development

Identified deficiencies in execution technique prompted the establishment of key objectives for strength training: enhancing motor skills, refining technique, and increasing strength. The program commenced with isometric exercises designed to strengthen muscles and joints, prevent injuries, and improve the mind-body connection (Davidson, 2022).

Next, psycho-neuro-motor exercises were incorporated to optimise the connection between the nervous system and muscle fibres, promoting awareness and correction of technique, thereby positively influencing coordination, mobility, and overall efficiency (Iorga et al., 2024).

The next phase focused on hypertrophy of major muscle groups, with 3–4 sets of 6–12 repetitions per exercise (Muraru, 2008, p. 202). For individualisation, students who could easily complete 12 repetitions worked in pairs, with their partner providing additional resistance.

In the pre-testing stage, speed-strength training was introduced to enhance power development, preparing students to achieve their maximum potential in the final assessments.

Tuesday's Training - Aerobic Endurance Development

Endurance training began with alternating intervals of running and walking, adjusted to the weather conditions, and progressively increased in intensity according to the students' fitness levels. Additionally, the warm-up included running drills and exercises focused on limb coordination and technique improvement, aimed at enhancing biomechanics and boosting running performance.

Moreover, specific sessions were incorporated to teach and familiarise students with various running tempos, using drills that ranged from 25% to 100% of their maximum speed. This approach was designed to enhance their awareness and understanding of effective effort management.

Wednesday's Training - Coordination, Balance, Joint Mobility, and Muscular Flexibility Development

After two days of intensive training, a moderate-intensity session was introduced on Wednesday, focusing on coordination, balance, joint mobility, and muscular flexibility to aid recovery and prepare students for upcoming training sessions. The periodisation commenced with a phase of anatomical adaptation, emphasising recovery. As the subjects' exertion capacity improved, the complexity of the exercises also increased.

The development of coordination, which is essential for athletic performance, advanced from simple exercises targeting upper and lower body coordination to more complex tasks involving objects, balance challenges, and distractions.

Similarly, balance training progressed from static exercises to dynamic elements, including exercises performed with closed eyes and ultimately culminating in challenges and competitions. Improvements in flexibility and mobility were achieved through three stages: active mobility exercises, yoga for passive stretching, and proprioceptive neuromuscular facilitation (PNF) techniques.

Thursday's Training – Anaerobic

In officer training, the development of general speed followed a staged progression. Initially, the focus was on enhancing quick reactions to stimuli through short sprints and brief exercises. This was followed by an emphasis on improving acceleration speed, which involved gradually increasing sprint distances and incorporating games and competitions. Ultimately, the objective was to develop anaerobic lactic acid speed through longer sprints performed at maximum intensity.

Agility training started with coordination ladder exercises, followed by cone drills to enhance acceleration and change of direction. The complexity was then increased by combining ladder exercises with directional changes and hurdle jumps.

Friday's Training - Strength Development

The periodisation of strength training in endurance mode consisted of three progressive stages: an initial phase focused on anatomical adaptation, emphasising an increase in repetitions in an exercise circuit; a second phase incorporating high-intensity interval training (HIIT), which involved gradually increasing work durations while maintaining constant rest periods; and a final phase centred on high intensity, characterised by the elimination of rest periods between exercises and an increase in effort duration. This structured approach facilitated adaptation to the students' needs and capabilities while ensuring consistent progress toward strength goals.

Applied Psychophysical Exercises

According to Băițan, "Creating interest and enthusiasm for physical training among military personnel can be achieved through the use of a variety of motivational techniques or by organising practical sessions with fun competitions or those resembling competitive conditions, with a high emotional charge. I believe that the most important of all the reasons that motivate physical training activities in the military should be the attainment of perfect physical fitness, which also demonstrates the awareness of military personnel regarding the importance of physical training" (Băițan, 2016, p. 93). By incorporating psychophysical exercises derived from the training of high-performance athletes and the specific methodologies used in special forces, the emotional dimension of the training process can be enhanced. Integrating practical sessions, using motivational techniques, and organising competitions foster a positive and engaging atmosphere among SSPO students.

Thus, similar to high-performance sports, the profession of a police officer encompasses specific trainable skills that, when developed, can enhance the officer's efficiency, effectiveness, and overall performance in their duties. As a result, psychophysical exercises incorporating these elements were introduced towards the end of the training sessions:

- "Psycho-motor skills: static and dynamic balance, general and segmental coordination, laterality, ambidexterity, body schema, muscle tone, spatial integration, spatiotemporal perceptions, ideomotor skills, kinesthesia, synchronisation, reaction speed, repetition speed, and anticipation;
 - Psycho-intellectual skills: mental concentration, anticipation, decision-making, attention, vigilance, thinking, memory, and imagination;
 - Psycho-affective skills: stress resistance and emotional balance;
 - Psycho-volitional regulatory skills: combativeness, voluntary effort, resilience, and perseverance."
- (Tulea, 2020)

Applied Evaluations

Evaluating the physical fitness of police officers can identify strengths and areas needing improvement (Marins et al., 2019). Therefore, incorporating physical fitness tests into the comprehensive training of police officers is essential for enhancing their overall effectiveness and readiness for duty.

Weight: This involves comparing body mass measurements taken before the training program with those recorded after its implementation.

Standing Long Jump (SLJ): For each student, the distance of a long jump performed from a standing position on a smooth surface was measured (Wood, 2008A).

Lumbar Mobility (LM): The subject sits with their legs extended and feet flat against a box marked with a graduated line. They perform a maximal forward trunk bend with arms extended, attempting to touch the furthest point on the graduated line. This test records the maximum distance each subject can reach (Wood, 2008B).

50m Sprint Test (R50): The "Sprint Test" measures the time it takes for the subject to cover a distance of 50 meters while running at maximum speed.

Sit-Ups Test (SU): This test involves recording the number of trunk raises (crunches) performed from a supine position with bent legs over a duration of 30 s, with a partner holding the feet to prevent any movement.

Touch Plates (TP): In this test, two plates are placed 60 cm apart, with a sheet of paper between them, on an adjustable table set to the minimum height corresponding to the subject's pelvis level. The evaluation measures the time it takes for the subject to complete 25 "back and forth" movements between the two plates using their dominant hand, assessing their coordination skills (Wood, 2008C).

Illinois Test: The student is required to navigate a specific rectangular course that involves running in a straight line and manoeuvring around cones placed along the path. Starting from a neutral position, the student completes the course as quickly as possible upon receiving a signal, and their time is recorded (Shaw, 2022).

Hand-Release Push-Ups (HRPU): In this exercise, the subject begins in a prone position, supported on their hands. The student lowers their arms until their chest touches the ground and then lifts their hands off the ground before returning to the starting position. The objective is to perform as many repetitions as possible in a 30-s timeframe (Balestrieri, 2018).

Beep Test (BT): The "BT" was used to assess aerobic endurance on a smooth surface. Participants were instructed to run back and forth between two lines of cones set 20 m apart. At each beep, they needed to reach the cone line and return. The test comprised multiple stages, each of which decreased the time allowed to cover the distance between the cones. When a participant failed to reach the cones after two consecutive beeps, they were stopped, and the stage they reached was recorded (Paradis et al., 2014).

Plank: The "Plank on Elbows" test requires holding a prone position while supported on the forearms until exhaustion. The maximum score is given for maintaining the position for three minutes, according to SSPO standards.

Results

Table 1. Descriptive statistics for control and experimental groups at pre- and post-test stages (M $\pm$ SD)

Variable	Control group		Experimental group	
	Initial	Final	Initial	Final
Weight (kg)	69.93 $\pm$ 11.27	69.29 $\pm$ 11.06	71.69 $\pm$ 14.34	71.88 $\pm$ 14.30
SLJ (cm)	187.95 $\pm$ 30.02	180.30 $\pm$ 26.91	184.45 $\pm$ 23.76	191.20 $\pm$ 24.25
LM (cm)	30.55 $\pm$ 9.29	32.90 $\pm$ 7.99	30.75 $\pm$ 8.41	25.25 $\pm$ 7.68
R50 (s)	7.67 $\pm$ 0.63	9.25 $\pm$ 1.26	7.70 $\pm$ 0.68	7.78 $\pm$ 1.08
SU (reps)	26.20 $\pm$ 4.29	18.55 $\pm$ 3.08	25.75 $\pm$ 3.83	23.40 $\pm$ 5.61
TP (s)	10.35 $\pm$ 1.37	12.13 $\pm$ 2.12	10.34 $\pm$ 1.44	8.76 $\pm$ 1.33
Illinois (s)	19.36 $\pm$ 2.25	20.69 $\pm$ 2.83	19.14 $\pm$ 1.81	19.10 $\pm$ 1.95
HRPU (reps)	23.30 $\pm$ 3.75	19.30 $\pm$ 3.68	22.45 $\pm$ 3.97	20.90 $\pm$ 3.79
BT (m)	816.00 $\pm$ 396.59	603.00 $\pm$ 307.47	901 $\pm$ 413.63	897 $\pm$ 423.93
Plank (s)	105.90 $\pm$ 51.97	88.85 $\pm$ 47.64	111.60 $\pm$ 51.24	110.90 $\pm$ 56.82

Note: Weight (kg) = Weight of the subjects; SL = Standing long jump (cm); LM = Lumbar mobility (cm); R50 (s) = Running speed 50 m; SU = Sit-ups (reps); TP = Touch plates (s); Illinois (s) = Agility trail; HRPU (reps) = Hand-release push-ups; BT (m) = Beep test; Plank (s) = Plank test (

The descriptive statistical analysis in Table 1 reveals that the experimental group exhibited a notable improvement in physical test performance from the initial to the final stage, in contrast to the control group. Specifically, the subjects' weight remained relatively stable across both groups, with the control group experiencing a slight decrease (69.93 $\pm$ 11.27 kg initially vs. 69.29 $\pm$ 11.06 kg at the end) and the experimental group showing a slight increase (71.69 $\pm$ 14.34 kg initially vs. 71.88 $\pm$ 14.30 kg at the end). In the SLJ test, the experimental group demonstrated a significant improvement, increasing from 184.45 $\pm$ 23.76 cm initially to 191.20 $\pm$ 24.25 cm at the end. In contrast, the control group experienced a decline, decreasing from 187.95 $\pm$ 30.02 cm initially to 180.30 $\pm$ 26.91 cm at the end of the test. Additionally, LM improved significantly in the experimental group, decreasing from 30.75 $\pm$ 8.41 cm initially to 25.25 $\pm$ 7.68 cm at the end, while the control group experienced a slight decrease from 30.55 $\pm$ 9.29 cm initially to 32.90 $\pm$ 7.99 cm at the end. In the 50-m speed test (R50), the experimental group maintained its initial performance, recording times of 7.70 $\pm$ 0.68 s initially and 7.78 $\pm$ 1.08 s at the end. In contrast, the control group experienced a significant decline, with times shifting from 7.67 $\pm$ 0.63 s initially to 9.25 $\pm$ 1.26 s at the end of the test. In the SU test, the experimental group showed a smaller decrease in the number of repetitions, changing from 25.75 $\pm$ 3.83 repetitions initially to 23.40 $\pm$ 5.61 repetitions at the end, while the control group exhibited a more substantial decrease from 26.20 $\pm$ 4.29 repetitions initially to 18.55 $\pm$ 3.08 repetitions at the end. Similarly, the results for the TP test showed comparable trends.

The experimental group exhibited a considerable improvement in time, with results of 10.34 $\pm$ 1.44 s initially compared to 8.76 $\pm$ 1.33 s at the end. In contrast, the control group experienced a decline, changing from an initial time of 10.35 $\pm$ 1.37 s to 12.13 $\pm$ 2.12 s at the end of the test. In the Illinois agility test, the control group's initial average time was 19.36 $\pm$ 2.25 s, which increased to 20.69 $\pm$ 2.83 s, indicating a reduction in agility. Conversely, the experimental group started with an average of 19.14 $\pm$ 1.81 s and maintained a relatively constant performance, finishing with a final average of 19.10 $\pm$ 1.95 s. In the HRPU test (reps), the control group initially exhibited an average of 23.30 $\pm$ 3.75 reps, followed by a decrease to 19.30 $\pm$ 3.68 reps, reflecting a decline in strength. In contrast, the experimental group started with an average of 22.45 $\pm$ 3.97 reps, decreasing to 20.90 $\pm$ 3.79 reps, though the decline was less pronounced than that of the control group. In the BT test (m), the control group's initial average was 816.00 $\pm$ 396.59 m, which decreased to 603.00 $\pm$ 307.47 m, indicating a loss in aerobic capacity. The experimental group had an initial average of 901 $\pm$ 413.63 m and remained stable, with a final average of 897 $\pm$ 423.93 m. Finally, in the plank test (s), the control group recorded an initial average of 105.90 $\pm$ 51.97 s, which declined to 88.85 $\pm$ 47.64 s, reflecting a decrease in plank endurance. Conversely, the experimental group started with an average of 111.60 $\pm$ 51.24 s and experienced only a slight decrease to 110.90 $\pm$ 56.82 s, indicating relative stability in this area.

These results indicate that the intervention positively impacted the physical performance of the experimental group, especially in the SLJ, TP, and SU tests.

To assess the statistical significance of the observed differences between the control and experimental groups, we will use inferential statistics. The independent t-test will compare differences between groups, while the dependent t-test will evaluate within-group changes from pre-test to post-test.

Table 2. Independent t-test results for control and experimental groups – initial evaluation

Variable		F	Sig.	t	df	Sig (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Weight	Equal variances assumed	2.063	0.159	-0.433	38	0.668	-1.765	4.080	-10.024	6.494
	Equal variances not assumed			-0.433	36	0.668	-1.765	4.080	-10.039	6.509
SLJ	Equal variances assumed	0.448	0.507	0.409	38	0.685	3.500	8.562	-13.832	20.832
	Equal variances not assumed			0.409	36	0.685	3.500	8.562	-13.862	20.862
LM	Equal variances assumed	0.355	0.555	-0.071	38	0.944	-0.200	2.804	-5.877	5.477
	Equal variances not assumed			-0.071	38	0.944	-0.200	2.804	-5.879	5.479
R50	Equal variances assumed	0.488	0.489	-0.174	38	0.862	-0.037	0.209	-0.460	0.387
	Equal variances not assumed			-0.174	38	0.862	-0.037	0.209	-0.460	0.387
SU	Equal variances assumed	0.600	0.443	0.349	38	0.729	0.450	1.289	-2.159	3.059
	Equal variances not assumed			0.349	38	0.729	0.450	1.289	-2.160	3.060
TP	Equal variances assumed	0.351	0.557	0.010	38	0.992	0.004	0.446	-0.898	0.907
	Equal variances not assumed			0.010	38	0.992	0.004	0.446	-0.899	0.908
Illinois	Equal variances assumed	0.402	0.530	0.342	38	0.734	0.221	0.647	-1.088	1.531
	Equal variances not assumed			0.342	36	0.734	0.221	0.647	-1.090	1.533
HRPU	Equal variances assumed	0.027	0.869	0.695	38	0.492	0.850	1.224	-1.628	3.328
	Equal variances not assumed			0.695	38	0.492	0.850	1.224	-1.628	3.328
BT	Equal variances assumed	0.069	0.794	-0.663	38	0.511	-85.000	128.137	-344.400	174.400
	Equal variances not assumed			-0.663	38	0.511	-85.000	128.137	-344.415	174.415
Plank	Equal variances assumed	0.034	0.855	-0.349	38	0.729	-5.700	16.321	-38.739	27.339
	Equal variances not assumed			-0.349	38	0.729	-5.700	16.321	-38.740	27.340

Note: Weight (kg) = Weight of the subjects; SL = Standing long jump (cm); LM = Lumbar mobility (cm); R50 (s) = Running speed 50 m; SU = Sit-ups (reps); TP = Touch plates (s); Illinois (s) = Agility trail; HRPU (reps) = Hand-release push-ups; BT (m) = Beep test; Plank (s) = Plank test

Table 2 shows the results of the independent t-test performed for the initial evaluation of both the control and experimental groups.

The data indicate that there are no statistically significant differences between the two groups across any of the analysed variables. The p-values (sig. 2-tailed) for all tests exceed the significance threshold of 0.05, suggesting that the observed average differences are insufficient to reject the null hypothesis of equality between the groups.

For instance, p-values for variables such as weight ($p = 0.668$), SLJ (SLJ) ($p = 0.685$), and 50-m speed (R50) ($p = 0.862$) indicate a lack of statistically significant differences. Likewise, the LM, SU, TP, Agility (Illinois), HRPU, BT, and plank tests all yield non-significant statistical results.

Levene's test F-values indicate similar variances between the groups because none are significant (all $p > 0.05$), supporting the assumption of equal variances for all variables studied.

Table 3. Independent t-test results for control and experimental groups – final evaluation

Variable		F	Sig.	t	df	Sig (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Weight	Equal variances assumed	2.246	0.142	0.641	38	.526	2.590	4.043	-5.596	10.776
	Equal variances not assumed			0.641	36	.526	2.590	4.043	-5.613	10.793
SLJ	Equal variances assumed	0.145	0.706	1.345	38	.186	10.900	8.102	-5.501	27.301
	Equal variances not assumed			1.345	38	.187	10.900	8.102	-5.507	27.307
LM	Equal variances assumed	0.028	0.867	-3.086	38	.004	-7.650	2.479	-12.669	-2.631
	Equal variances not assumed			-3.086	38	.004	-7.650	2.479	-12.669	-2.631
R50	Equal variances assumed	1.320	0.258	-3.946	38	.000	-1.473	0.373	-2.228	-0.717
	Equal variances not assumed			-3.946	37	.000	-1.473	0.373	-2.229	-0.716
SU	Equal variances assumed	6.428	0.015	3.386	38	.002	4.850	1.432	1.950	7.750
	Equal variances not assumed			3.386	30	.002	4.850	1.432	1.923	7.777
TP	Equal variances assumed	3.945	0.054	-6.015	38	.000	-3.375	0.561	-4.511	-2.239
	Equal variances not assumed			-6.015	32	.000	-3.375	0.561	-4.518	-2.232
Illinois	Equal variances assumed	0.785	0.381	-2.070	38	.045	-1.595	0.771	-3.155	-0.035
	Equal variances not assumed			-2.070	34	.046	-1.595	0.771	-3.162	-0.028
HRPU	Equal variances assumed	0.774	0.385	1.352	38	.184	1.600	1.183	-0.795	3.995
	Equal variances not assumed			1.352	38	.184	1.600	1.183	-0.795	3.995
BT	Equal variances assumed	2.501	0.122	2.511	38	.016	294.000	117.101	56.941	531.059
	Equal variances not assumed			2.511	35	0.017	294.000	117.101	56.187	531.813
Plank	Equal variances assumed	3.484	0.070	1.330	38	0.192	22.050	16.582	-11.519	55.619
	Equal variances not assumed			1.330	37	0.192	22.050	16.582	-11.552	55.652

The independent t-test presented in Table 3 compares the final-stage performances of the control and experimental groups across various physical tests. The results indicate significant differences between the groups in LM, R50, SU, TP, Illinois agility test, and BT, suggesting that the experimental group outperformed the control group in these areas, with p-values < 0.05. Conversely, no significant differences were observed for weight, SLJ, HRP, and the plank test, with p-values > 0.05, indicating that the intervention did not significantly affect these measures. Therefore, the intervention had a significant impact on specific aspects of physical performance, though it did not affect all evaluated variables uniformly.

Additionally, Levene's test F-values indicated unequal variances for variables such as SU and TP, with p-values < 0.05. For the other variables, the F- and p-values suggest relatively equal variances, indicating that the observed differences between the groups were not statistically significant for weight, SLJ, agility (Illinois), HRP, and the plank test. In the initial evaluation, no statistically significant differences were found between the control and experimental groups for any of the measured variables, indicating initial homogeneity. However, the final testing revealed significant differences for several variables, including LM, R50, SU, TP, and BT. These results suggest that the intervention implemented in the experimental group positively affected their performance compared to the control group, particularly in the physical capabilities assessed by these tests.

After performing the independent t-test to compare the differences between the control and experimental groups, as detailed in Tables 2 and 3, we decided to further analyse the data using the dependent t-test for each group individually (refer to Tables 4 and 5). This approach enables a detailed evaluation of the changes in each group from pre-test to post-test, offering a comprehensive understanding of the intervention's effectiveness. The dependent t-test will help identify significant changes in the studied variables, providing additional valuable insights for interpreting the results and validating the intervention's impact on each group.

Table 4. Paired t-test results for the control group in the post-test stage

Variable	n	M	SD	S.E. mean	95% interval	Confidence		Paired t-test		
						Lower	Upper	t	df	Sig (two-tailed)
Pair 1 Weight pre & post	20	0.635	1.240	0.277	0.055	1.215		2.290	19	.034
Pair 2 SLJ pre & post	20	7.650	15.404	3.445	0.441	14.859		2.221	19	.039
Pair 3 LM pre & post	20	-2.350	5.761	1.288	-5.046	0.346		-1.824	19	.084
Pair 4 R50 pre & post	20	-1.582	1.134	0.253	-2.113	-1.051		-6.241	19	.000
Pair 5 SU pre & post	20	7.650	5.958	1.332	4.861	10.439		5.742	19	.000
Pair 6 TP - pre & post	20	-1.782	2.271	0.508	-2.844	-0.719		-3.508	19	.002
Pair 7 Illinois - pre and post	20	-1.334	2.572	0.575	-2.537	-0.130		-2.319	19	.032
Pair 8 HRP - pre & post	20	4.000	5.554	1.242	1.401	6.599		3.221	19	.004
Pair 9 BT - pre & post	20	213	351.01	78.489	48.720	377.280		2.714	19	.014
Pair 10 Plank - pre & post	20	17.050	27.464	6.141	4.197	29.903		2.776	19	.012

Note: Weight (kg) = Weight of the subjects; SL = Standing long jump (cm); LM = Lumbar mobility (cm); R50 (s) = Running speed 50 m; SU = Sit-ups (reps); TP = Touch plates (s); Illinois (s) = Agility trail; HRP (reps) = Hand-release push-ups; BT (m) = Beep test; Plank (s) = Plank test

The analysis of the paired t-test results presented in Table 4 revealed significant differences between the pre-test and post-test measurements for most variables. Significant differences were found in weight (p = 0.034), SLJ (p = 0.039), R50 (p = 0.000), SU (p = 0.000), TP (p = 0.002), Illinois agility test (p = 0.032), HRP (p = 0.004), BT (p = 0.014), and the plank test (p = 0.012). Conversely, LM did not exhibit a significant difference (p = 0.084), indicating that the intervention did not significantly affect this variable.

Table 5. Paired t-test results for the experimental group at the post-test stage

Variable	n	M	SD	S.E. mean	95% interval	Confidence		Paired t-test		
						Lower	Upper	t	df	Sig (two-tailed)
Pair 1 Weight pre & post	20	-1.190	1.425	.319	-.857	.477		-.596	19	.558
Pair 2 SLJ pre & post	20	-6.750	24.625	5.506	-18.275	4.775		1.226	19	.235
Pair 3 LM pre & post	20	5.500	7.295	1.631	2.086	8.914		3.372	19	.003
Pair 4 R50 pre & post	20	-.073	1.014	.227	-.548	.402		-.322	19	.751
Pair 5 SU pre & post	20	2.350	4.487	1.003	.250	4.450		2.342	19	.030
Pair 6 TP - pre & post	20	1.589	1.762	.394	.764	2.414		4.033	19	.001
Pair 7 Illinois - pre & post	20	.040	1.710	.382	-.761	.841		.105	19	.918
Pair 8 HRP - pre & post	20	1.550	4.236	.947	-.433	3.533		1.636	19	.118
Pair 9 BT - pre & post	20	4.000	251.697	56.281	-113.798	121.798		.071	19	.944
Pair 10 Plank - pre & post	20	.700	33.876	7.575	-15.154	16.554		.092	19	.927

Note: Weight (kg) = Weight of the subjects; SL = Standing long jump (cm); LM = Lumbar mobility (cm); R50 (s) = Running speed 50 m; SU = Sit-ups (reps); TP = Touch plates (s); Illinois (s) = Agility trail; HRP (reps) = Hand-release push-ups; BT (m) = Beep test; Plank (s) = Plank test

Table 5 shows that the application of the paired t-test for the experimental group at the post-test stage demonstrated significant changes in several variables. Notable improvements were found in the LM ($p = .003$) and SU ($p = .030$) tests. Furthermore, the TP test also exhibited a significant improvement ($p = .001$).

Conversely, no significant changes were observed in weight ($p = .088$), SLJ ($p = .142$), R50 ($p = .215$), or endurance in BT ($p = .147$).

In conclusion, this analysis indicates that the interventions had varied effects based on the group, highlighting the need for personalised approaches to optimise results.

Discussion

Special tactical units set themselves apart from other law enforcement agencies by engaging in tasks and physical activities that demand a higher intensity level (Fink et al., 2024). To support the maintenance and improvement of police officers' physical fitness, overall health, occupational performance, and quality of life, it is recommended that an institutional policy promoting regular physical activity be implemented (da Silva et al., 2024).

Kukic et al. (2018) found that police officers with higher muscle mass and a body mass index (BMI) exceeding 27.5 kg/m^2 may experience a decline in physical performance, particularly in endurance and flexibility exercises such as SU and long-distance running.

While increased muscle mass can provide benefits in terms of strength and power, the results suggest that excessive muscle development may adversely affect performance in aerobic endurance tests, such as the 800-m run. The findings of Losty et al. (2016) regarding Irish police officers further emphasise the need for mandatory health and fitness testing for police forces. The absence of ongoing assessments beyond initial training can impede the monitoring and enhancement of fitness levels among officers, contradicting expectations of physical progress. These findings highlight the importance of a balanced approach to physical training for police personnel, indicating that greater emphasis should be placed not only on muscle mass development but also on maintaining overall fitness to optimise performance in daily tasks. Excessive muscle growth may compromise flexibility and speed, potentially limiting the ability to respond effectively in emergency situations.

The tabular data indicates that after the 10-week training regimen, performance results across various domains showed a combination of improvement, decline, or stagnation. This inconsistency in progress can likely be attributed to the inherent unpredictability of police training programs. Unlike high-performance sports, where factors such as consistency, nutrition, training conditions, rest, and sleep are carefully controlled to enhance performance, police training programs face unforeseen schedule changes, sleep deprivation, suboptimal nutrition, increased physical exertion from daily drills, adverse weather conditions, and the psychological stress associated with examinations.

Given the unpredictable and high-stress nature of law enforcement work (Tengpongsthorn, 2017), physical training alone is insufficient to fully prepare officers for the demands of their duties. Therefore, it is essential to integrate psychophysical exercises into training regimens to enhance overall physical and mental preparedness (Berkling, 2010).

A key finding from the plank assessment was that nine subjects achieved the three-minute hold, reaching the test threshold and limiting further observation of their abdominal endurance. Future assessments should consider allowing participants to continue the plank until failure or using an alternative abdominal endurance test to provide a more comprehensive evaluation of this performance parameter.

Conclusions

To ensure an accurate assessment of trainees' performance levels, periodic comprehensive evaluations should be implemented (Čvorović et al., 2021). This approach can help identify both strengths and areas needing improvement, facilitating the development of targeted, adaptable, and innovative training methods that align with the evolving trends and dynamics of law enforcement systems (Okhrimenko et al., 2020).

The adoption of a training methodology based on sports performance principles—incorporating program periodisation, adaptation, accumulation and stabilisation phases, loading and deloading microcycles, and progressive increases in intensity and complexity—has shown promising potential for enhancing performance outcomes among SSPO students.

Moreover, cultivating a healthy mentality (Prots et al., 2021) characterised by resilience and stress management techniques, along with developing a disciplined and focused mindset similar to martial arts training (Dăncescu & Iorga, 2024), can significantly enhance the mental fortitude and overall well-being of future law enforcement personnel through tailored psychophysical exercises and drills. This integrated approach not only empowers officers to perform optimally in demanding and unpredictable situations but also equips them with essential coping mechanisms to navigate the challenges inherent to their profession.

This holistic training model addresses both the physical and psychological demands of police work, fostering peak performance and a sustainable work-life balance, ultimately enhancing the effectiveness and resilience of the police force.

Author Contributions All authors contributed equally to the completion of this work.

Conflicts of Interest: The authors declare no conflicts of interest.

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