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EFFECTS OF A 12-WEEK PHYSICAL TRAINING PROGRAM AND NUTRITION PLAN ON THE BODY COMPOSITION OF OVERWEIGHT POLICE TRAINEES

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Introduction

- Although the daily tasks of police officers are mostly sedentary, optimal body composition and physical abilities are important for the occasional high intensity task duties that may occur and for general health.
- The question of **body composition** and its manifestation in the form of obesity is a frequent subject in all segments of society and among different occupations (Lukaski, 2017). As such, it is also present in **law enforcement, firefighters and military personnel** (Daves et al., 2016; Michaelidis et al. 2011; Friedel, 2012). Apart from proven negative health effects, a **sub-optimal** body composition can also directly affect the successful job performance of a modern policeman (Daves et al., 2016).
- The main **goal** of this research was to determine the effects of a 12-week intervention of physical training and a caloric deficit in the controlled conditions of the police campus. **The leading hypothesis** of this research was that, under the influence of **planned physical training** and a recommended **caloric deficit**, it was possible to significantly affect the **loss of body fat** while maintaining and improving the relative values of **skeletal muscle mass**.

Methods

- The physical training program consisted of **12 hours** per week during the first six weeks and **nine hours** per week during the second six weeks.

- The nutritional plan consisting of six weeks in controlled caloric conditions (**caloric deficit 500 Kcal**) and six weeks in partially controlled conditions (no insights on food intake over the weekend).

- A body composition analyzer (InBody 370) was measured body mass index (**BMI**), percentage body fat (**PBF**), and percentage skeletal muscle mass (**PSSM**).

Subjects

- A convenience sample of overweight male police trainees took part in the study:

  n = **55**; mean age = 28.51 ± 5.26 years,

  mean body height (**BH**) = 174.58 ± 5.79 cm,

  mean body mass index (**BMI**) = 32.03 ± 3.03 kg/m^2 ,

  and mean body mass (**BM**) = 97.67 ± 11.21 kg.

- The **inclusion criteria** in the training program were BMI > **24.99** kg/m^2 and PBF > **22**%

Measurement procedures

- The testing procedure consisted from initial **BH** assessment and two measurements of the **body composition** before and after the experimental procedure was completed. Measurements of body composition were carried out on an **InBody 370 device** (Biospace, Seoul, South Korea).

- Trainees were instructed to fast overnight prior to before each body composition measurement and were restricted fluid intake for up to **3 hours** beforehand.

- Throughout the assessments trainees were barefooted and dressed in shorts and t-shirt. All body composition measurements were conducted in an indoor environment, temperature controlled to **22 °C.**

Training program

Table 1: ***12-week training program sample designed for ADPC trainees to lose weight and improve overall fitness*****.**

Mesocycle 1 Week 1-6	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Morning **(06:00-07:00)**	10 min WU 20 min W-R 20 min SC 10 min CD	10 min WU 20 min W-R 20 min CC 10 min CD	10 min WU 20 min W-R 20 min IT 10 min CD	10 min WU 20 min W-R 20 min SC 10 min CD	10 min WU 25 min SSR 15 min BE 10 min CD	10 min WU 20 min W-R 20 min BE 10 min CD	Rest
Afternoon **(17:00-18:00)**	15 min WU 35 min A&C 10 min CD	15 min WU 35 min BE 10 min CD	15 min WU 35 min A&C 10 min CD	15 min WU 35 min C&F 10 min CD	15 min WU 35 min C&F 10 min CD	15 min WU 35 min SC 10 min CD	Rest
Mesocycle 2 **Week 7-12**	**Sun**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
Morning **(06:00-07:00)**	2 km run <12 min 35 min SC 10 min CD	2 km run <12 min 35 min CC 10 min CD	2 km run <12 min 35 min IT 10 min CD	2 km run <12 min 35 min SC 10 min CD	15 min WU 30 min SSR 15 min CD	Rest	Rest
Afternoon **(17:00-18:00)**	15 min WU 35 min A&C 10 min CD	15 min WU 35 min BE 10 min CD	15 min WU 35 min A&C 10 min CD	15 min WU 35 min C&F 10 min CD	Rest	Rest	Rest

WU - Warm up, **W-R** - Walk and run, **SC** - Strength circuit, **CC** - Cardio Circuit, **CD** - Cool down, **A&C** - Agility and Coordination, **BE** - Bodyweight Exercises, **C&F** - Core and Flexibility, **SSR** - Steady State Run.

Nutrition plan

- The **nutrition plan** was designed **individually** based on an assessment by a qualified nutritionist and based on the individual caloric needs of the trainees. The basic strategy was based on an estimate of individual daily caloric consumption with the obtained value then reduced by **500** kilocalories (kcal).
- It was assumed that trainees belonged to the category of "very active" according to physical activity factor (PA). The PA factor for adult males has four categories (Sedentary [PA=1.00], Low active [PA=1.11], Active [PA=1.25] and **Very active [1.48]** (Hertzler and Carlson-Philips, 2017). **Estimated energy requirement (EER)** was calculated by the Institute of Medicine formula for male adults (2006):

$$\text{EER} = 662 - 9.53 \times \text{age in years} + \text{PA} \times (15.91 \times \text{weight [kg]} + 539.6 \times \text{height [m]})$$

- During the **first 6-week period**, the trainees were in completely controlled conditions, since they were not allowed to leave the campus. However, during **the next 6-weeks** they were permitted to leave the campus over the **weekend** period and, as such, **there was no insight into their food intake during their weekend leave period.**

Statistics

- The statistical analyses were performed using SPSS ver. 20 (IBM, Armrok, USA).
- All data were expressed as mean ± standard deviation (**SD**), range, minimum (**Min.**) and maximum (**Max.**) values.
- Data were checked for normality using the Kolmogorov–Smirnov test.
- A paired sample **T-test**, significance was set at ***p* = 0.05** a priori.
- and **Cohen's effect** size (*d*) with **percentage differences** (%), were used to evaluate the **training effects** and **magnitude** of training and nutrition plan changes.

Results

Table 2: *Descriptive data before and after 12-week intervention and estimated energy requirements (EER) and with 500 kcal deficit ($EER_{[-500]}$).*

N=55	Mean	SD	Range	Min.	Max.
BM-1 (kg)	97.67	11.21	56.90	77.80	134.70
BM-2 (kg)	86.49*	9.35	46.40	70.10	116.50
BMI-1(kg/m²)	32.01	3.03	12.60	27.30	39.90
BMI-2 (kg/m²)	28.27*	2.36	10.30	24.00	34.30
PBF-1 (%)	32.56	5.75	30.30	20.80	51.10
PBF-2 (%)	25.81*	5.71	25.90	16.60	42.50
PSMM-1 (%)	38.06	3.45	17.93	27.31	45.24
PSMM-2 (%)	41.82*	3.44	15.86	31.87	47.73
EER (kcal)	4079.86	280.32	1558.26	3530.64	5088.90
$EER_{[-500]}$ (kcal)	3579.86	280.32	1558.26	3030.64	4588.90

* **Significantly different from initial scores, $p < 0.001$.**

Results

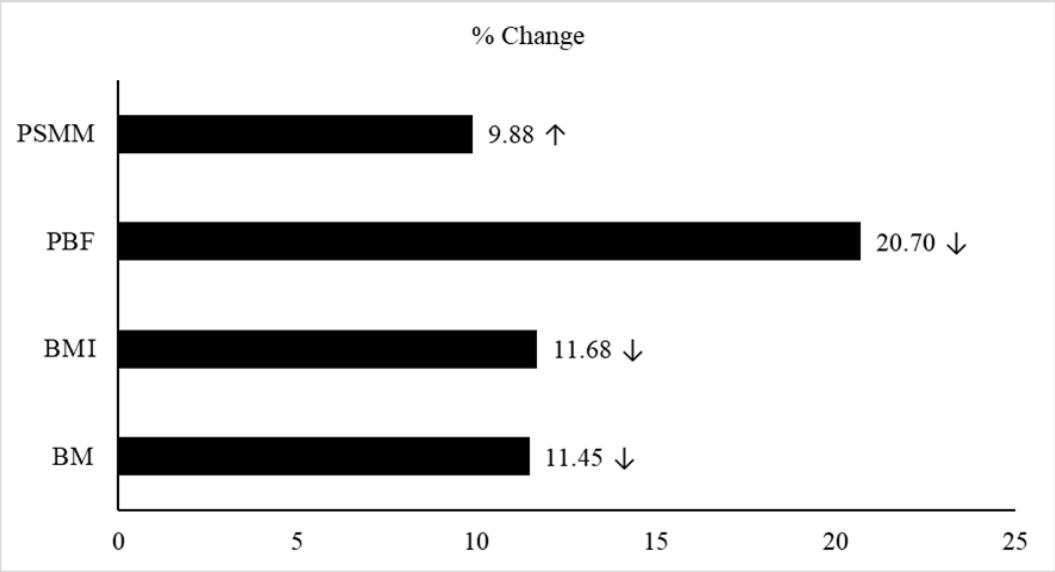

Figure 1: *Relative percentage changes (%) in body composition, (direction of change: ↑- increase, ↓- decrease)*

Table 3: *Effect size of experimental intervention on body composition.*

Variables	Mean Differences	SD±	Effect Size Cohen's (d)
BM	**11.18**	**3.35**	**3.34*****
BMI	**3.75**	**1.19**	**3.14*****
PBF	**6.75**	**2.22**	**3.04*****
PSMM	**3.76**	**1.27**	**2.96*****

*small (0.2-0.5), **moderate (0.5-0.8), ***large (> 0.8).

Practical application and Conclusion

- The **practical application** of this or similar programs, especially in controlled conditions of the police academy, military school or similar institutions, is certainly recommended.
- The existence of such programs should be a **constant practice** within the framework of any law enforcement system in which implementation is possible.
- It is meant not only within the obligatory courses, for employment or promotion, but as a **regular program** for the prevention and reduction of negative impacts of inadequate body composition not only on performance, but also on the overall health of the members of the police workforce.

- **Conclusion:** A dedicated 12-week physical training program with a caloric controlled nutritional plan can lead to significant improvements in the body composition of overweight police trainees and reduce their associated health risks.

References

1. American College of Sports Medicine. (2013). ACSM's health-related physical fitness assessment manual. Lippincott Williams & Wilkins.
2. American College of Sports Medicine. (2018). ACSM's Guidelines for Exercise Testing and Prescription (Tenth Edition), USA: Wolters Kluwer.
3. Anderson, GS, Litzenberger, R, Plecas, D. (2002). Physical evidence of police officer stress. *Policing: an international journal of police strategies & management*, 25(2): 399-420.
4. Andern, C., Katzmarzyk, P., Janssen, J., Ross, R. (2003). Discrimination of health risk by combined Body Mass Index and waist circumference. *Obesity Research*, issue 11, vol 1: 135-142.
5. Boyce, R. W., Jones, G. R., Lloyd C. L., Boone E. L. (2008). A longitudinal observation of police: body composition changes over 12 years with gender and race comparisons, *Journal of Exercise Physiology*, issue 11: 1-13.
6. Collingwood, T., Hoffman, R., Smith, J. (1998). Why officers need to be fit. Fit Force Administrators Guide. Illinois: Human Kinetics.
7. Cvorovic, A., Maamari, A. (2017). Differences in key performance indicators between police college cadets in different semesters of their education. In: Proceedings from the International Scientific Conference "Archibald Reis Days" (pp. 429-438). Belgrade: Academy of Criminalistic and Police Studies.
8. Da Silva, F., Hernandez, S., Gonçalves, E., Arancibia, B., Castro, T. D. S., Da Silva, R. (2014). Anthropometric indicators of obesity in policemen: a systematic review of observational studies. *International journal of occupational medicine and environmental health*, *27*(6), 891-901.
9. Davis, P. O., Abel M. G. (2017). Body composition and Public Safety-The Industrial Athlete. In: Lukaski, H.C. Ed. Body Composition: health and performance in exercise and sport. CRC Press. Page: 307-319.
10. Dawes, J. J., Orr, R. M., Siekaniec, C. L., Vanderwoude, A. A., Pope, R. (2016). Associations between anthropometric characteristics and physical performance in male law enforcement officers: a retrospective cohort study. *Annals of Occupational and Environmental Medicine*, *28*, 26. http://doi.org/10.1186/s40557-016-0112-5
11. Demling, R. H., DeSanti, L. (2000). Effect of hypocaloric diet, increased protein intaje and resistance training on lean mass gains and fat mass loss in overweight police Officers. Annals of Nutrition & Metabolism, 44: 21-29.
12. Friedl, K.E. (2012). Body composition and military performance-Many things to many people. J Strength Cond Res 26(Suppl 2): S87-100.
13. General Assembly of the World Medical Association. (2014). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. The Journal of the American College of Dentists, 81(3), 14.
14. Gu, J. K., Charles, L. E., Burchfiel, C. M., Fekedulegn, D., Sarkisian, K., Andrew, M. E., … Violanti, J. M. (2012). Long Work Hours and Adiposity Among Police Officers in a US Northeast City. *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine*, *54*(11), 1374–1381. http://doi.org/10.1097/JOM.0b013e31825f2bea
15. Hertzler, S. Carlson-Philips, A. (2017). Basic nutrition for Tactical Population In: NSCA'S Essentials of Tactical strength and Conditioning, Eds Alvar, B., Sell, K. and Deuster, P.A. Human Kinetics Publishers.
16. Institute of Medicine. (2006). Dietary Reference Intakes: the essential guide to nutrient requirements. Washington DC: National Academies Press.
17. Janssen, I., Heymsfield, B., Wang, Z., Ross, R. (2000). Skeletal muscle mass distribution in 468 man and women aged. Journal of Applied Physiology, issue 89, volume 1: 81-88.
18. Jeknic, V., Stojkovic, M. (2017). Effects of twelve-week training program on fitness level and anthropometric status of police college students. In: Proceedings from the International Scientific Conference "Archibald Reis Days" (pp. 449-458). Belgrade: Academy of Criminalistic and Police Studies.
19. Kukić, F., Dopsaj, M. (2016). Structural analysis of body composition status in Abu Dhabi police personnel. Nauka, bezbednost, policija, 21(3), 19-38.
20. Kukic, F., Cvorovic, A., Dawes, J. J., Korpanovski, N. (2017). Body mass index differences of police cadets and police employees. In: Proceedings from the International Scientific Conference Effects of applying physical activity on anthropological status of children adolescents and adults. Belgrade, Serbia, Faculty of sport and Physical Education, 193-198.
21. Lagestad, P., van den Tillaar, R. A. (2014). Comparison of Training and Physical Performance of Police Students at the Start and the End of Three-Year Police Education. *The Journal of Strength and Conditioning Research*, 28(5): 1394-1400.
22. Lukaski,H.C. (2017). Body Composition: health and performance in exercise and sport. CRC Press.
23. Michaelides, M. A., Parpa, K. M., Henry, L. J., Thompson, G. B., Brown, B. S. (2011). Assessment of physical fitness aspects and their relationship to firefighters' job abilities. *The Journal of Strength & Conditioning Research*, *25*(4), 956-965.
24. Ng, S. W., Zaghloul, S., Ali, H. I., Harrison, G., Popkin, B. M., (2011a). The prevalence and trends of overweight, obesity and nutrition-related non-communicable diseases in the Arabian Gulf States, *Obesity Reviews*, 12 (1): 1-13.
25. Ng, S. W., Zaghloul, S., Ali, H., Harrison, G., Yeatts, K., El Sadig, M., Popkin, B. M. (2011b). Nutrition transition in the United Arab Emirates, *European Journal of Clinical Nutrition*, 65(12): 1328-1337.
26. Orr, R, Dawes, J, Pope, R, Terry, J. (2017). It is my job, not my age: Fitness loss between police cadets and officers not explained by age. Journal of Science and Medicine in Sport, 20, 58.
27. Orr, R., Dawes, J. J., Pope, R., Terry, J. (2017). Assessing Differences in Anthropometric and Fitness Characteristics Between Police Academy Cadets and Incumbent Officers. *Journal of strength and conditioning research*. Publish Ahead of Print: http://doi:10.1519/JSC.0000000000002328
28. Pihlainen, K., Santtila, M., Häkkinen, K., Kyröläinen, H. (2018). Associations of physical fitness and body composition characteristics with simulated military task performance. *The Journal of Strength and Conditioning Research*. 32 (4): 1089-1098.
29. Sorensen, L., Smolander, J., Louhevaara, V., Korhonen, O., Oja, P. (2000). Physical activity, fitness and body composition of Finnish police officers: a 15-year follow-up study, *Occupational Medicine*, Vol. 50 No. 1: 2-10.
30. Violanti, J. M., Ma, C. C., Fekedulegn, D., Andrew, M. E., Gu, J. K., Hartley, T. A., …Burchfiel, C. M. (2017). Associations Between Body Fat Percentage and Fitness among Police Officers: A Statewide Study. *Safety and Health at Work*, *8*(1), 36–41. http://doi.org/10.1016/j.shaw.2016.07.004
31. Wang, Z. M., Pierson, R. N., Heymsfield, S. B. (1992). The five-level model: a new approach to organizing body-composition research. *The American journal of clinical nutrition*, 56(1): 19-28.

QUESTIONS and DISCUSSION

Thank you for your attention!!!

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