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Educational interventions in relation to the level of physical activities for police officers: a systematic literature review

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Abstract

To systematically review literature in relation to the effects of health education interventions on the level of physical activities for police officers. A systematic review of controlled clinical trials, real-life experiences, quasi-experimental and observational studies investigating the effects of health education interventions in relation to the level of physical activities for police officers. The following electronic data-bases were adopted: Cochrane Central Register of Controlled Trials, PubMed, Biblioteca Virtual em Saúde, Education Resources Information Center and Plataforma Rede Nacional de Atenção Integral à Saúde do Trabalhador. Data collection was carried out in accordance with the main items for systematic reviews. Five articles were selected (N=1302 participants). Improvements to primary and secondary outcomes in the interventions performed in groups or individually, in person and with long-term monitoring, were observed. With reference to the outcomes, educational interventions enabled the improvement, in a statistically significant manner, of the level of physical activities (60% of the studies), reduce body mass index (60% of the studies) and reduce arterial blood pressure (20% of the studies). Educational interventions are capable of improving the level of physical activities, body mass index and arterial blood pressure for police officers.

Keywords: Police; Motor Activity; Nursing; Health Education; Heart Disease Risk Factors; Healthy Lifestyle.

1. Introduce

Among countless existing professions worldwide, that of police officers arouses attention once it is one of the most vulnerable to the development of Chronic Non-Communicable Diseases (CNCD), and Cardiovascular Diseases (CVD), due to high exposure to psychological and physical risks tied to working conditions (Ferraz et al., 2018; Bezerra et al., 2015).

The specific conditions and characteristics of the profession of a police officer can be harmful to health. The work routine of police officers is highly demanding due to the characteristics of the profession, such as working shifts; long working hours; extensive periods of time seated, either in cars on patrol and/or on chases and/or on administrative activities; high level of demand for fulfillment of the activities; and raised responsibility defending society and keeping public order (Barbosa et al., 2018; Bernardo et al; 2018).

As a result of the above mentioned characteristics, police officers experience tensions caused by hierarchical conflicts; sleep-deprived and inadequate meals, due to long working hours, aspects that do not enable healthy sleeping or eating habits during intensive working shifts. Furthermore, they are submitted to strict disciplinary measures; suffering and emotional stress in addressing high risk situations; exposure to infectious diseases, during police approach, apart from the incompatibility of the wages with the job, and consequent need of performing extra work in their spare time, to complement their earnings (Barbosa et al., 2018; Bernardo et al; 2018).

Additionally, working conditions of police officers could imply in less time for self-care and hinder participation in social and leisure activities, such as Physical Activity (PA). PA corresponds to any bodily movement that increases energy expenditure above resting energy expenditure and, when performed in a regular manner, contributes towards the prevention and control of cardiovascular risk factors and various CNCDs and reduce mortality rates for all causes (Barroso et al., 2020; World Health Organization, 2020).

A study carried out with police officers identified their physical aptitudes through a battery of physical aptitude tests to assess aerobic capacity, muscular resistance, strength, power, flexibility, agility and body composition, concluding that educational interventions for exercises and physical conditioning assessments should be part of the routine of the police force, having an important impact on their health and professional performance, once the study observed that PA has a positive impact on agility, aerobic endurance, waist and abdominal circumference (Beck et al, 2020).

However, despite the great importance of educational interventions for improvement of the level of PA for police officers, it is observed that there are no Brazilian studies considering this matter.

As set out above, there is the need for analysis of the health conditions of these professionals and to stimulate changes in lifestyle habits to control risk factors, by means of educational interventions positively impacting the level of regular activities and fostering, in this manner, health, quality of life and increased willingness for practicing the profession. Consequently, this study had the purpose of systematically reviewing literature as to the effects of health education interventions on the level of physical activities of police officers.

2 Method

2.1 Study design

A systematic review of controlled clinical trials (randomized or not), real-life experiences, quasi-experimental and observational studies investigating the effects of health education interventions in relation to the level of PA for police officers.

2.2 Sources of information

Data collection occurred between January and July 2021. Research in scientific literature was performed in five electronic databases: Cochrane Central Register of Controlled Trials (CENTRAL), PubMed / Medical Literature Analysis and Retrieval System Online (MEDLINE), BIREME Biblioteca Virtual em Saúde (LILACS, MEDLINE and SciELO), Education Resources Information Center (ERIC) and Plataforma Rede Nacional de Atenção Integral à Saúde do Trabalhador (RENAST), where the main publications of biomedical literature are included. Studies not found from this research strategy but identified in the reference of articles that fulfilled the eligibility criteria or in references used in the guidelines for the current study were also considered.

2.2 Research strategies

Electronic research occurred with the use of the research terms of the platforms Descritores em Ciência da Saúde (DeCS) and Medical Subject Headings (MeSH): Polícia / Police / Police Force, Atividade Física / Motor Activity, Doença Cardiovascular /Cardiovascular Disease, Hipertensão / Hypertension, Comportamento Sedentário / Sedentary Behavior, Educação em Saúde / Health Education, Autoeficácia/ Self Efficacy, Autoimagem/ Self Concept, Autoavaliação/ Self-Assessment, Psicometria/ Psychometrics, Indice de Massa Corporal / Body Mass Index; Circunferência da Cintura / Waist Circumference.

These terms were crossed using Boolean operators AND / OR, as follows: (i) Police OR Police Force AND Physical Activity AND Cardiovascular Disease; (ii) Physical Activity AND Police OR Police Force AND Hypertension; (iii) Physical Activity AND Police OR Police Force AND Sedentary Behavior; (iv) Physical Activity AND Police OR Police Force AND Health Education; (v) Physical Activity AND Police OR Police Force AND Cardiovascular Disease AND Hypertension; (vi) Police OR Police Force AND Physical Activity AND Sedentary Behavior AND Health Education; (vii) Police OR Police Force AND Physical Activity AND Self Efficacy; (viii) Physical Activity AND Police OR Police Force AND Self Concept; (ix) Physical Activity AND Police OR Police Force AND Self-Assessment; (x) Physical Activity AND Police OR Police Force AND Psychometrics; (xi) Physical Activity AND Police OR Police Force AND Body Mass Index; (xii) Physical Activity AND Police OR Police Force AND Waist Circumference.

Articles in any language were considered, published between 2011 and 2021, a period adopted considering that in 2010 physical inactivity was identified by the World Health Organization (WHO) as being the fourth leading risk factor for CNCD, with implications to overall health and increase to global mortality. Accordingly, in that same year, the WHO released Global Recommendations on Physical Activity for Health

and primary prevention of CNCD, through PAs. Furthermore, in 2018 the WHO disclosed a Global Action Plan on Physical Activity 2018-2030, with political actions guided towards the creation of active societies, active environments, active people and active systems.

Study selection

Study selection was performed by one author (A1), in accordance with the previously defined electronic research strategy. After the research, duplicate articles were excluded, titles and abstracts were read, excluding those that did not contemplate the inclusion criteria. Subsequently a second author (A2) fully read each article and made a selection in accordance with the previously established eligibility criteria, organized and reviewed the material in an independent manner from the first author. Inclusion and exclusion criteria are described under Figure 1.

Criteria for the selection of studies	
Inclusion criteria	1. Address the effects of health education actions, programs or projects on the level of physical activities of police officers; 2. Present on or more of the following outcomes (primary or secondary): level of physical activity; self-efficacy in the practice of physical activities; self-perception of the practice of physical activities; body mass index; waist-hip ratio; waist circumference and arterial blood pressure; 3. Type of controlled clinical trials (randomized or not); real-life experiences, quasi-experimental and observational; 4. Having police officers as focus group; 5. Published in any language, during the last 10 years.
Exclusion criteria	1. The effect of the health education actions or program on the level of physical activities of police officers that have not yet been actively included in the corporation, or for reserve police officers; 2. Publications that do not address primary or secondary outcomes; 3. Duplicated or complementary studies.

Figure 1. Study selection criteria

2.3 Data collection process

The selected articles were reviewed by A1 and A2 and discussed among peers, obtaining, in this manner, standardized information. When any discrepancy in the information was observed, in any topic of the analyzed study, the participation of a third author (A3) occurred for a final assessment and solution to the discrepancy. The following variables were identified for each selected article under review: (1) author, country of the study and year of publication; (2) study design, sample size and age group; (3) instrument used for data collection; (4) approach used in the intervention (individual, in group or mixed); (5) type of intervention performed, duration and measurement ranges; (6) level of physical activities for the studied police officers; (7) self-

efficacy in the practice of physical activities; (7) self-perception in the practice of physical activities; (8) Body Mass Index (BMI); (9) Waist circumference (WC); (10) Waist-hip ratio (WHR); (11) Arterial Blood Pressure (BP). The primary outcome assessed was the level of physical activities and secondary outcomes assessed were self-efficacy in the practice of physical activities; self-perception in the practice of physical activities; BMI; WC; WHR; and BP.

2.4 Methodological assessment of the selected articles

For methodological assessment of the clinical trial articles selected, the Jadad Scale was adopted, being one of the most mentioned and used scales by the scientific community in the area of health sciences (Olivo et al., 2008). The other types of studies selected did not have any specific scale for this type of assessment specifically contemplating the object of this study.

3. Results

3.1 Study selection

A total of 11,588 articles were identified in the databases and another 60 articles in the references of those articles, totaling 11,648 articles for assessment of duplicity; 4,114 duplicates were excluded, resulting in 7,534 articles for selection sorted by title. After reading the titles, 219 articles were potentially eligible and selected for reading of the abstracts. After reading the abstracts, 18 articles were assessed for eligibility and reading in full.

Of these, 13 were excluded for the following reasons: i) the study did not address the effects of the health education actions, program or projects on the level of PA of police officers (n = 04), ii) duplicated or complementary studies (n = 02), unavailable studies (n = 07). Finally, five articles were selected in accordance with the eligibility criteria, as demonstrated in the study selection process for systematic literature review (Figure 2), in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020; Buckingham et al., 2020). Items of the PRISMA that refer to meta-analyses were not included: consistency measurement for each meta-analysis of the summary of results; results for each meta-analysis performed, including confidence intervals and consistency measures.

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Nr.	Autor / year	Title	Country/ location	Study design	Sample / age group	Intervention duration and measurement intervals	Assessment instruments of the primary and secondary outcomes
01	Colleen I. Rossomanno et al. / 2012	A 6-month supervised employer-based minimal exercise program for police officers improves fitness	St. Louis, U.S.A.	Experimental study.	**Sample:** 165 commissioned employees of the St. Louis Metropolitan Police Department. **Age** ($X^{*} \pm SD^{\dagger}$)**:** 26.4 ± 1.9 years.	**Study duration:** 18 months. **Intervention duration:** six months. **Measurement interval:** beginning, six months and 18 months.	**Physical activity:** physical aptitude test; Minnesota Leisure Time Physical Activity Questionnaire (Richardson et al., 1994).
02	Kerry S. Kuehl *et al*. 2016	The SHIELD‡ (Safety & Health Improvement: Enhancing Law Enforcement Departments) Study: Mixed	Washington, USA	Prospective randomized study	**Sample:** 408 police officers and support team. ***Baseline:*** **CG§:** 41.7 ± 94 years **IG‖** 44.6 ± 9.5 years. **24 months:** **CG§:** 43.1 ± 8.6 years	**Study duration:** 24 months. **Intervention duration**: six months. **Monitoring intervals:** Baseline, 6, 12 and 24 months.	**Health perceptions:** general state of health was assessed using the Short Form Health Survey-*36.* **Physical activity**: constructs with established reliability, based on prior studies (MacKinnon et al., 2002).

		Methods Longitudinal Findings			**IG[II]:** 45.9 ± 9.3 years.		
03	Kouwenhoven-Pasmooij *et al*. 2018	Effectiveness of the blended-care lifestyle intervention 'PerfectFit': a cluster randomized trial in employees at risk for cardiovascular diseases	Holland	Randomized cluster trial.	**Sample:** 491 workers. **Age** (X^{*} ± $SD^{\dagger}$)**:** **Limited intervention:** 51.62 ± 6.0 years. **Broad intervention:** 50.19 ± 5.6 years. Limited intervention (n = 213 military officers; 9 clusters) formed a health risk assessment on the internet plus an electronic newsletter with information on the intervention. In the broad intervention (n = 271; police force and university hospital; 8 clusters), including seven individual coaching sessions with occupational health medical professionals and additionally	**Intervention duration:** 12 months **Measurement intervals:** 6 and 12 months	**Health self-assessment**: Health research using the questionnaire Short-Form Health Survey of 36 items. **BMI[¶] in kg/m2:** Obesity was defined as BMI ≥30 kg/m2. **Physical activities**: Dutch guideline on physical activities. Measured using the question: "are you physically active at least five days a week, for at least 30 minutes, in activities of moderate intensity (i.e., heart rate and breathing rate slightly increased in brisk walks or cycling)?" (yes/no).

					motivational interviews (3 in person and 4 over the telephone).		
04	Mohsen Saffari et al. / 2020	Educational Intervention Based on the Health Belief Model to Modify Risk Factors of Cardiovascular Disease in Police Officers in Iran: A Quasi-experimental Study	Iran	Quasi-experimental study, sole group.	**Sample:** 58 police officers. **Age** (X^{*} ± $SD^{\dagger}$)**:** 35.5 ± 4.4 years,	**Intervention duration:** five weeks based on the principles of the Health Belief Model.	**Health beliefs:** Scale of the Multidimensional Health Belief Model – once there is no standard questionnaire to assess the beliefs of police officers based on the health belief model to prevent cardiovascular diseases, the authors developed a scale based on previously measured measures (Diddana et al., 2018; Hoseini et al., 2014; Parandeh et al., 2019; Tovar et al., 2010). **Body mass index in kg/m2:** height and weight were measured by trained nurse, using a wall mounted measuring tape (SECA-206, Hamburg, Germany) and digital scales (Beurer-PS160; Beurer GmbH, Ulm, Germany to calculate the BMI[‡].

							Blood pressure: systolic and diastolic arterial blood pressure were measured in the seated position on three consecutive days, by a nurse using a mercury sphygmomanometer. **Level of physical activities:** the first four domains of the short form of the International Physical Activity Questionnaire were used to determine the level of physical activities..
05	Sarah Ann Buckingham *et al*. / 2020	The Physical Activity Wearables in the Police Force (PAW-Force)** study: acceptability and impact	England	Pilot study of a sole group, pre and post monitoring, mixed methods.	**Sample:** 180 police officers and employees were recruited. **Age** (X^* ± $SD^\dagger$)**:** 39.3 ± 9.6 years.	**Intervention duration:** 12 weeks. **Study duration:** eight months.	**Sedentary period:** assessed by means of the short form of the International Physical Activity Questionnaire. **Quality of life related to physical and mental health**: assessed using the Short Form Survey of 12 items. **Fitbit® charge 2 –** smartphone app used to monitor physical activities, which the participants involved in the study can use

							free of charge while employed by the police force. ***Bupa boost* –** smartphone app administered by the Bupa private health insurance and, specifically, projected for the promotion of health and well-being at the workplace, supplied free of charge. The Fitbit® was capable of synchronizing with the *Bupa Boost* app.

*X = Median; †SD = Standard Deviation; ‡SHIELD = Safety & Health Improvement: Enhancing Law Enforcement Departments; §CG = Control Group; ‖ ‖ IG = Intervention Group; ⁋BMI = Body Mass Index; **PAW-Force = Police Force

Figure 3. Study characterization

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3.2 Results associated to the primary outcome: level of physical activities for police officers

The five selected studies (100%) assessed the level of PA for police officers, in accordance with Figures 3, 4 and 5.

In a study performed in the U.S.A., 165 commissioned employees of the police department were submitted to a supervised physical conditioning program, with physical aptitude tests being performed, during a six-month period, being monitored for a further 12 months, totaling 18 months of study, to verify effects on cardiovascular and muscular fitness (Rossomanno et al., 2012). During the six months of intervention, there was a progression in aerobic exercises and muscular strength training, with a significant reduction in the period of time for the physical aptitude test. It was observed that the supervised intervention with the practice of PA for police officers improved their cardiovascular a muscular fitness (from beginning to six months: men: X ± SD= -23 ± 4 seconds, $p<0.001$; women: X ± SD= -21 ± 3 seconds, $p<0001$; 6 to 18 months: men: X ± SD= 21 ± 4 seconds, $p<0.01$; women: X ± SD= 19 ± 3 seconds, $p<0.001$) (Rossomanno et al., 2012).

Another study performed in the U.S.A. worked the intervention using the SHIELD Program, with 408 police officers and support team of the police department and the sheriff to reduce the risks of occupational risks and unhealthy behavior related to lifestyles (Kuehl., 2018). The intervention included 12 weekly 30-minute sessions during the working hours, led by colleagues, based on teams and guided by a specific script. Each session consisted of three or four brief interactive activities on healthy eating. BP, body weight, stress, sleep and other aspects related to the lifestyle. The intervention was considered as feasible and effective in six months for improvement to the quality of life (Baseline: Control Group (CG): adjusted average score: −0.026 vs. Intervention Group (IG): adjusted average score: 0.028; six months monitoring: CG: adjusted average score: 0.216 vs. IG: adjusted average score: 0.304; program effect size: 0.04; 12-month monitoring: CG: adjusted average score: 0.139 vs. IG: adjusted average score: 0.304; program effect size: -0.10) (Kuehl., 2018).

In Holland, a randomized controlled clinical trial by multicentric cluster (PerfectFit) was performed in 18 police units and in a hospital, with 491 workers with increased cardiovascular risk (Kouwenhoven-Pasmooij., et al; 2018). These workers were randomized in two intervention groups. The limited intervention (n = 213 military officers; 9 clusters) constituted of a health risk assessment on the web (internet tool for the proposed assessment) plus an electronic newsletter with information on the intervention and information on a healthy lifestyle, which were forwarded to e-mail addresses by the newsletter software risk (Kouwenhoven-Pasmooij., et al; 2018).

In the broad intervention (n = 271; police force and employees of a university hospital; 8 clusters), individual coaching sessions were added by occupational health doctors and in addition motivational interviews (three in person and four over the phone). Both in the group of limited intervention and in the broad intervention group, the proportion of individuals that complied with the PA, according to the Dutch guidelines on PA, increase in over 50% (Kouwenhoven-Pasmooij., et al; 2018).

A quasi-experimental study performed in Iran a sole group, with 48 police officers of a police station, with pre and post-interventions, through an educational program based on the health belief model, worked in groups

formed by 9-12 police officers, with five in person session of 90 minutes, performed weekly, during a five-week period. Approximately 25% of the participants who were not physically active at the beginning of the study increased the level of PA above or beyond the healthy limit. As observed in Table 3, pre- intervention, moderate PA was observed (min/week): X ± SD= 135.9 ± 36.4 and, after the intervention, moderate PA (min/week) X ± SD= 155.9 ± 42.3, ($p<0.001$). Prior to the intervention vigorous PA was verified (min/week) X ± SD= 32.3±17.9 and, after the intervention, (min/week) X ± SD = 55.7 ± 19.5 was verified, ($p<0.001$). Furthermore, self-efficacy for the capacity of carrying out healthy behaviors increased with the application of the intervention (pre- intervention: X ± SD=2.35±0.27 vs. post-intervention X ± SD=3.26±0.26, ($p<0.001$)).

In a pilot study performed in England, of a sole group, pre-post and monitoring, of mixed methods, an intervention was applied, where the participants received a Fitbit® Charge 2 device, a PA monitor and Bupa Boost app, projected to promote health and wellbeing at the workplace, synchronized to the Fitbit®. Containing, jointly, 20 of 40 possible techniques for change of behavior. The Fitbit® (exposed screen) was used together with the Bupa Boost app. The 12-week intervention was divided into an "individual" phase and a "social" phase. Apart from the "individual" resources, they were capable of comparing themselves with their colleagues, compete with them and offer and receive social support by means of virtual "likes" and messages. At the end of the 12 weeks, there was a five-month "maintenance phase", during which time they continued using the Fitbit® and Bupa Boost, as and when they wished (Buckingham et al., 2020).

In the quasi-experimental study carried out in Iran it was observed that the self-referred PA increased in the short and long-term. In relation to the total self-referred PA (min/week), in week 6, individual intervention phase: 27.8; CI95% 10.4; 44.7 ($p= 0.001$), in week 12, social phase intervention: 22.7; CI95% 4.8; 40.6 ($p= 0.013$); and in 8 months, during monitoring: 18.6; CI95% -0.1; 37.2 ($p= 0.052$). There were no statistically significant changes in relation to PA. In relation to total PA (Metabolic Equivalent of Task – MET-min/week), it was observed that, in week 6 (individual intervention phase): 460.3; CI95% 71.3; 849.3 ($p= 0.021$); in week 12, (social intervention phase): 465.4; CI95% 106.7; 824.1 ($p= 0.011$); and in eight months (post intervention, in the monitoring period): 317.7; CI95% -99.2; 734.6 ($p= 0.134$). Moderate and vigorous PA (MET-min/week) in week 6, (individual intervention phase): 271.9; CI95% -6.3; 537.6 ($p= 0.045$); in week 12, (social intervention phase): 402.9; CI95% 129.9; 676.0 ($p= 0.004$); and in eight months (post-intervention, in the monitoring period): 420.5; CI95% 56.4; 784.6 ($p= 0.024$). There were no significant changes in period of sedentarism (Saffari et al., 2020).

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Nr.	Authors/year	Assessed outcomes						
		Level of physical activity	**Self-efficacy in the practice of physical activities**	**Self-perception in the practice of physical activities**	**BMI***	**WHR**	**WC‡**	**BP§**
01	Colleen I. Rossomanno *et al.* / 2012	X	-	-	X	-	-	-
02	Kerry S. Kuehl *et al*., 2016	X	-	-	-	-	-	-
03	Kouwenhoven-Pasmooij *et al*.,2018	X	-	-	X	-	-	-
04	Mohsen Saffari *et al*., 2020	X	-	--	X		-	X
05	Sarah Ann Buckingham *et al*., 2020	X	-	-	-	-	-	-

*BMI = Body Mass Index; †WHR = Waist-Hip Ratio; ‡WC = Waist Circumference; §BP = Blood Pressure

Figure 4 – Outcome of the studies

Nr.	Author / years	Intervention	Effects of actions/programs on assessed outcomes (Results)		
			Level of physical activities	**BMI***	**BP†**
01	Colleen I. Rossomanno *et al.* / 2012	Supervised six-month physical conditioning program after the physical aptitude test and 12-month monitoring.	**Cardiovascular and muscular fitness at the conclusion of the physical aptitude test:** **Beginning up to 6 months:** men: $X^{‡}$ ± $SD^{§}$= -23 ± 4 seconds, p^{II}<0.001; women: $X^{‡}$ ± $SD^{§}$= -21 ± 3 seconds, p^{II}<0.001. **6 to 18 months:** men: X ± $SD^{§}$= 21 ± 4 seconds, p^{II}<0.01; women: X ± $SD^{§}$= 19 ± 3 seconds, p^{II}<0.001.	**BMI* in kg/m2:** **6 to 18 months:** men: $X^{‡}$ ± $SD^{§}$= 1.4 ± 0.2kg.m^{-2}, p^{II}<0.01; women: $X^{‡}$ ± $SD^{§}$= 1.5 ± 0.3kg.m^{-2}, p^{II}<0.005. Thus, significant difference of the baseline for 18 months for men and women (p^{II}< 0.01).	-
02	Kerry S. Kuehl *et al.* / 2016	The intervention included 12 30-minute sessions, with a script, led by colleagues and based on teams, on a weekly basis during working hours. Each session consisted of three or four brief interactive activities on healthy eating, exercises, body weight, stress, sleep and other lifestyle factors.	***Baseline:*** **CG‖:** Adjusted average score: −0.026 vs. **IG**:** Adjusted average score: 0.028 **Six-month monitoring period:** **CG‖:** Adjusted average score: 0.216 vs. **IG**:** Adjusted average score: 0.304 Program effect size: 0.04 **12-month monitoring:** **CG‖:** Adjusted average score: 0.139 vs. **GI**:** Adjusted average score: 0.304 Program effect size: -0.10 **24-month monitoring:**	-	-

			CG[Ⱡ]: Adjusted average score: 0.139 vs. **IG[**]:** Adjusted average score: 0.142 Program effect size: −0.01 **All monitoring:** p[‖]= −0.02		
03	Kouwenhoven-Pasmooij *et al*. / 2018	Limited intervention: (n = 213; military officers; 9 clusters) constituted a health risk assessment based on the web + electronic newsletter, with information on the interventions vs. Broad Intervention: (n = 271; police force and university hospital; 8 clusters), constituted 7 individual coaching sessions by occupational health doctors, in addition to motivational interviews (three in person and four over the telephone).	**Lack of physical activities**: **Baseline** **Limited intervention group**: X[‡] ± SD[§]= 133±72.7 **Broad intervention group**: X[‡] ± SD[§]= 188±72.3 (p[‖]= 0,932) **Six month monitoring less baseline:** **Limited intervention group**: - 58.6 **Broad intervention group**: - 49.2 (p[‖]< 0.05) **12-month monitoring less baseline:** **Limited intervention group**: - 53.6 **Broad intervention group**: - 50.3 (p[‖]< 0.05)	**BMI in kg/m2:** **Limited intervention group**: X[‡] ± SD[§]= 26.9±3.4 **Broad intervention group**: X[‡] ± SD[§]= 27.5 ± 3.6 p[‖]= 0.066	-
04	Mohsen Saffari *et al*. / 2020	Educational program consisting of group presential sessions of 1.5 hours, performed weekly during a five-week period, in groups of 8-12 participants. Session 1 focused on perceived susceptibility with report on cardiovascular disease statistics	**Pre-intervention:** Moderate physical activities: X[‡] ± SD[§]= 135.9 ± 36.4 vs. **Post-intervention:** X[‡] ± SD[§]= 155.9 ± 42.3, (p[‖]<0.001). **Pre-intervention:** Vigorous physical activities: X[‡] ± SD[§]= 32.3±17.9 vs. **Post-intervention:** X[‡] ± SD[§]= 55.7 ± 19.5,	**Pre-intervention:** BMI[*]: X[‡] ± SD[§]= 26.7 ± 2.9 kg/m2 vs. **Post-intervention:** X[‡] ± SD[§]= 25.8 ± 2.4 kg/m2, (p[‖]= 0.012).	**Systolic blood pressure pre-intervention:** X[‡] ± SD[§]= 132.3 ± 26.8 vs. **post-intervention:** X[‡] ± SD[§]= 126.2 ±

		among military officers and among police officers in particular. In Session 2, the perceived severity was the focus. A documentary video was presented describing complications and negative results related to poor health behaviors affecting cardiovascular diseases. In Session 3, emphasis was given to benefits perceived from preventive behaviors and a healthy lifestyle, using a format of focus group discussion. Session 4 involved perceived barriers. Session 5 was projected to improve tips for action and increase self-efficacy. To increase self-efficacy, two behavior models (police officers with excellent physical health and positive attitudes in relation to keeping up physical fitness) were used, presenting talks to the group on personal lifestyle planning and, subsequently, answering questions from the group.	(p^{II}<0.001).		24.9; (p^{II}=0.063). **Diastolic blood pressure:** **Pre-intervention:** $X^{‡}$ ± $SD^{§}$ = 85.1±19.7 vs. **Post-intervention:** $X^{‡}$ ± $SD^{§}$= 83.5 ± 18.8; (p^{II}=0.235).
05	Sarah Ann Buckingham *et*	The participants received a Fitbit® Charge 2, which monitors physical	**Daily steps:** **Individual phase intervention (week 6):** -		

	al. / 2020	activities. The *Bupa Boost* app, projected to promote health and wellbeing at the workplace, synchronized to the Fitbit®. Together they contain 20 out of 40 possible techniques for changing behaviors. Fitbit® (with exposed screen) was used together with the *Bupa Boost* app. The 12-week intervention was divided into an "individual" phase and a "social" phase. During weeks 1 to 6, participants were instructed to use only the "individual" resource of the Fitbit® and *Bupa Boost*: app, establishing individual goals; self-monitoring; feedback on the progress using the app; obtaining virtual rewards per achievement; and access to the 'Bupa library' in the Bupa Boost. During weeks 7 to 12 ("social" phase), individuals were encouraged to connect with colleagues in the *Bupa Boot* app. Apart from the "individual" resources, they were capable of comparing themselves with colleagues through social	214; CI††95% -730; 302, p‖= 0.413; **Social phase intervention (week 12):** 78; CI††95% -404; 561, p‖= 0.748; **Monitoring (8 months):** -888; CI††95% -1518; -258, p‖= 0.006. **Total self-referred physical activities (min/week):** **Individual phase intervention (week 6):** 27,8; CI††95% 10.4; 44.7, p‖= 0.001; **Social phase intervention (week 12):** 22.7; CI††95% 4.8; 40.6, p‖= 0.013; **Monitoring (8 months):** 18.6; CI††95% -0.1; 37.2, p‖= 0.052. **Total physical activities (MET‡‡min/week):** **Individual phase intervention (week 6):** 460.3; CI††95% 71.3; 849.3, p‖= 0.021; **Social phase intervention (week 12):** 465.4; CI††95% 106.7; 824.1, p‖= 0.011; **Monitoring (8 months):** 317.7; CI††95% -99.2; 734.6, p‖= 0.134. **Moderate to vigorous physical activities (MET‡‡min/week):** **Individual phase intervention (week 6):**		

		feeding, compete with them and give and receive social support, through virtual "likes" and messages. At the end of the 12 weeks there was a five-month "maintenance phase" where the use of the Fitbit® and *Bupa Boos* app was maintained, how and when desired	271.9; CI††95% -6.3; 537.6, p‖= 0.045; **Social phase intervention (week 12):** 402.9; CI††95% 129.9; 676.0, p‖= 0.004; **Monitoring (8 months):** 420.5; CI††95% 56.4; 784.6, p‖= 0.024. **Sedentary period (hours in a typical week day):** **Individual phase intervention (week 6):** -0.12; CI††95% -0.65; 0.41, p‖= 0.651; **Social phase intervention (week 12):** -0.03; CI††95% 0.59; 0.52, p‖= 0.906; **Monitoring (8 months):** -0.24; CI††95% -0.73; 0.26, p‖= 0.344.		

*BMI = Body Mass Index; †BP = Blood Pressure; ‡X = Mean value; §SD= Standard Deviation; ‖ ‖ p = Value-p; ¶CG= Control Group; **IG = Intervention Group; ††CI = Confidence Interval; ‡‡MET = Metabolic Equivalent of Task.

Figure 5 – Effects of Health Education Interventions on assessed outcomes

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3.3. Results associated to the secondary outcomes

Regarding the secondary outcome IMC, 60% of the studies assessed this outcome (Kouwenhoven-Pasmooij et al., 2018; Rossomann et al., 2012; Saffari et al., 2020). In one of the studies performed in the U.S.A., the BMI was assessed at the beginning of the study, after a supervised physical conditioning program, with the performance of a physical aptitude test, in the six-month period, and monitoring for another 12 months, totaling 18 months of study (Rossomann et al., 2012). During the six-months of intervention, there was a significant reduction to the BMI and period of time for performing the Physical Aptitude Test (Men: X ± SD= -0.6 ± 0.1 kg.m-2 ($p<0.001$); women: X ± SD= -0.8 ± 0.1 kg.m-2 ($p<0.005$)). However, the BMI increased significantly from six to 18 months, (men: X ± SD= 1.4 ± 0.2kg.m-2 ($p<0.01$); women: X ± SD= 1.5 ± 0.3kg.m-2 ($p<0.005$)). Thus, significant difference of the baseline for 18 months for men and women ($p< 0.01$). It was observed that the supervised intervention with PA practice for police officers causes improvement in the body composition after six months, but continued supervision may be necessary, in order for the benefits to be maintained.

In the study carried out in Holland, the randomized controlled clinical trial by multicentric cluster was applied with 491 workers, who were randomized into two intervention groups: the randomized controlled clinical trial by multicentric cluster was applied in two intervention groups: limited and broad. At 12 months, the broad intervention was not statistically different from the limited intervention to improve the BMI. As demonstrated in Table 3, limited intervention group: X ± SD= 26.9±3.4 and broad intervention group: X ± SD= 27.5 ± 3.6, ($p= 0.066$) (Kouwenhoven-Pasmooij et al., 2018;).

In the investigation performed in Iran, the intervention occurred from the education program performed based on five in-person sessions of 1 hour and 30 minutes, carried out in a group of 8-12 participants, weekly, during five weeks. The BMI decreased from X ± SD= 26.7 ± 2;9 kg / m2 before the intervention to X ± SD= 25.8 ± 2.4 kg / m2 after the intervention ($p= 0.012$). Thus, there was a reduction to the BMI from 43% to 33% (a 10% improvement) (Saffari et al., 2020).

In this same study performed in Iran, the BP outcome was assessed. Both the Systolic Blood Pressure (SBP) as the Diastolic Blood Pressure (DBP) suffered a reduction after the intervention, but not of statistical significance. As observed in Table 3, the pre-intervention SBP: X ± SD= 132.3 ± 26.8 reduced to X ± SD= 126.2 ± 24.9 in the post-intervention moment, ($p=0.063$). The pre-intervention DBP: X ± SD= 85.1±19.7 reduced to X ± SD= 83.5 ± 18.8 in the post=intervention moment ($p=0.235$) (Saffari et al., 2020).

The remaining secondary outcomes in police officers (self-efficacy in the practice of physical activities, self-perception in the practice of physical activities, WC and WHR) were not studied in these selected studies.

4. Discussion

In this review, it was observed that health education interventions produce positive effects on the level of PA of police officers (100% of the studies). In relation to the primary and secondary outcomes, educational interventions were capable of improving in a positive and statistically significant manner: the level of PA (60%) (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012) and reduce the BMI (60%) (Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020) and BP (20%) (Saffari et

al., 2020).

Three, among the five studies identified, worked with health education interventions and it was verified that these produce positive effects in the improvement of the level of PA for police officers (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020; Buckingham et al., 2020). However, the studies performed in the U.S.A signaled the need for continued supervision of the proposed interventions, support contents, self-monitoring and encouragement, in order for the results to be effective and benefits maintained (Kuehl et al., 2016; Rossomano et al., 2012).

One of these studies, carried out in the U.S.A. evidenced that an educational intervention can be effective in long-term change in behaviors, specifically regarding improvement in the PA level of police officers with the inclusion of daily healthy activities (Kuehl et al., 2016). It is clear that an important factor for the durability of the intervention on the behavior of the participants is the fact that the intervention works with a program to foster changes in various behaviors instead of only one. The program used in this study had seven educational intervention targets, in other words, seven behavioral objectives, such as: daily exercises, healthy diets, reach the ideal body weight, reduce stress, improve sleep, decrease the use of alcohol and quit smoking. This demonstrates that interventions with different approaches can present a synergistic effect and cause a greater impact to expected objectives.

In the studies found in this review, it is observed that for the effectiveness of the interventions and maintenance of the benefits, it is important that the following characteristics are presented: performed in group or individually (Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012) or in a mixed manner (Buckingham et al., 2020), in person (80%) (Rossomano et al., 2012), long-lasting intervention (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Buckingham et al., 2020), long-term monitoring (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020; Buckingham et al., 2020), regular PA program at work (60%) (Rossomano et al., 2012; Buckingham et al., 2020), ongoing supervision by the police departments (40%) (Rossomano et al., 2012; Buckingham et al., 2020), support contents, self-monitoring (40%) (Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012), encouragement (40%) (Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012) and interventions with different approaches for a greater impact on expected objectives (20%) (Kuehl et al., 2016).

Interventions on the level of PA of police officers could produce beneficial effects in secondary outcomes, such as reduction in BMI, WC, WHR and in BP. Some of the studies selected in this review presented positive impacts in changes to the BMI, which could be linked to self-monitoring, encouragement and to intervention with different approaches applied by the studies performed in Holland and Iran (Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020;) and of BP, which could be linked to the regular program of PA at the workplace applied in the intervention of the study performed in Iran (Saffari et al., 2020). However, other interventions did not present effects on any of these secondary outcomes.

The study applied in Holland states that an intervention performed by means of tailored health risk assessment based on the web linked to a face-to-face motivational interview, constitutes a fundamental and promissory strategy for improvement of health risk behaviors, such as BMI reduction (Kouwenhoven-Pasmooij et al., 2018).

Risk assessment based on the web is attractive, reaches large populations and does not need much interaction, however it is not effective for a long-term participation, namely, effectiveness is momentary. It is proposed that interventions that wish to achieve greater changes to health behaviors and positive effects at the workplace, should have face-to-face contact with the participants (Kouwenhoven-Pasmooij et al., 2018).

It was evidenced that the group that received motivational face-to-face interviews, achieved a significant reduction to body weight and BMI, while the group that only had tailored health risk assessment based on the web did not achieve weight reduction. Seven individual coaching sessions were performed with an occupational health doctor, with personalized health promotion guidance, using techniques and motivational interviews, such as making open-ended questions, reflecting, supporting and increasing ambivalence and discussing the CVD risk profile of each participant (Kouwenhoven-Pasmooij et al., 2018).

Also in relation to the study applied in Holland, regarding the PA outcome, the groups had a 50% increase in the level of PA, not being possible to attribute the result to the motivational interview. PA was assessed and motivated individually at the coaching session, based on the question in accordance with the Dutch guideline on: "are you physically active at least five days a week, for at least 30 minutes, in activities of moderate intensity (i.e., heart rate and breathing rate slightly increased in brisk walks or cycling)?" (yes/no)". The groups had a 50% increase on the level of PA, not being possible to attribute the result to the motivational interview (Kouwenhoven-Pasmooij et al., 2018).

In the study performed in Iran, educational intervention was developed based on the health belief model to increase awareness, improve health behaviors of specific groups, such as improvement to the level of PA. The health belief model constitutes one of the first theoretical models prepared to explain and change health behaviors and is based on the expectancy-value theory, offering insights on how people can be motivated to improve healthy behaviors (Saffari et al., 2020).

The health belief model has been used in educational interventions to improve health behaviors in various areas, encompassing perceptions of individuals about the susceptibility to CVD, complications, benefits and difficulties towards preventive behaviors. The mentioned educational intervention was used for the prevention of CVD risk factors in police officers and achieved effective results (Saffari et al., 2020).

According to the study from Iran, this intervention favored positive effects in all health behavior aspects assessed for police officers, such as levels of PA, BMI and BP. The Multidimensional Health Belief Scale Model was applied, based on the measures previously used, which was divided into seven subscales, including perceived susceptibility (6 items), perceived severity (7 items), perceived benefits (7 items), perceived barriers (6 items), tips for action (5 items), self-efficacy for action (5 items), self-efficacy (7 items) and preventive behaviors (6 items) (Saffari et al., 2020).

Based on the International Physical Activity Questionnaire (IPAQ), the participants were classified as to the level of moderate and vigorous PA, according to recommendations by the WHO, and it was observed that over half of the police officers did not present regular PA levels as recommended. With the educational intervention, the level of PA improved, with a 25% increase, i.e., increased practice of PA above the healthy limit. The BMI also significantly improved. BP was reduced, but no statistically significant difference was observed (Saffari et al., 2020). Despite some health behavior improvements having been observed in police officers participating

of the study, it cannot be stated that it was due to the proposed educational intervention and it is not possible to generalize the results to the whole population of police officers, once the study had as limitations convenience samples and the inexistence of a control group, which would be fundamental for making comparisons and assessing the effectiveness of the intervention.

Evidences increasingly suggest that the susceptibility of police officers to cardiovascular risk factors is higher than to the population in general, including excess weight and obesity, due to their lifestyles at work, such as physical inactivity and stress (Kuehl et al., 2016; Kouwenhoven-Pasmooij et al., 2018; Rossomano et al., 2012; Saffari et al., 2020; Buckingham et al., 2020).

Under the perspective that the activities of police officers are stressful and increasingly sedentary, the mHealth was proposed, using the Fitbit® and Bupa Boost activity trackers, as educational intervention for improving the level of PA and reducing the sedentary periods of police officers. In this study, an increase in short-term self-referred PA was observed. Intervention with mHealth technology was considered acceptable and with impact to the increase of PA. However, less useful for the reduction of sedentary period (Buckingham et al., 2020).

This study has limitations, such as the different assessment instruments adopted for measuring outcomes and different durations of the intervention. Homogeneity of the analyses was also not observed in the analyzed studies, considering that it is a systematic literature review without meta-analysis.

The authors emphasize the originality of the study and that the above mentioned limitations do not alter the results of the present review. Future researches are important for the study of health behaviors of police officers and studies that could collaborate towards the implementation of public health policies, through health interventions for police officers, particularly in relation to the practice of PA for the prevention of CVD and CNCD in this professional category and, moreover, reduce national and worldwide morbidity and mortality rates.

The authors declare that there was no financial support for carrying out this study, and also declare that there are no conflicts of interest.

5. Conclusion

It is evident that educational interventions are capable of improving the level of PA, as well as BMI and BP of police officers, despite the small number of studies and concern in relation to the health of police officers. It was observed that the most feasible, effective interventions and with long-lasting effects are performed in person, during long periods, accompanied for a long-term, with the inclusion of a regular program of PA at work, under the continued supervision by the police departments, support contents, self-monitoring and encouragement.

It is concluded that there are few studies addressing the effects of health education interventions on the level of PA of these professionals. Accordingly, there is the need for the development of further studies on the health of police officers, once the workers of this profession are more susceptible to CNCD, due to the characteristics of their job.

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