




Article

A Multidisciplinary Vision of the Criminal, Social and Occupational Risk Consequences of the Use of Police Force

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Abstract: (1) Background: The use of force by public and private security forces is currently an issue of great relevance because of the potential injuries caused by any excessive use of force by either active or passive subjects or a deficit in the real mastery of appropriate physical intervention techniques (PITs). For this reason, certain traditionally used physical intervention techniques have been questioned by scientific research studies and punished by justice. On the other hand, certain media have dealt with this matter in a biased and unfair manner by broadcasting videos where the use of force by police officer is displayed out of context. As a consequence, this problem has been brought under the spotlight, causing general uneasiness of the communities and rapidly spreading over social networks while favoring all sorts of parallel judgments. (2) Research method: A suit was equipped with 19 inertial measurement units (IMUs) and a Biomechanics of Bodies software application for Marras analysis of the data collected on trajectory, trunk twisting velocity, sagittal angle, load, and nature and severity of the injuries associated with the different intervention techniques examined. (3) Results: According to the data registered, the implementation of operational tactical procedures (OTPs) reduces the probability of injuries and leads to a more satisfactory outcome. (4) Conclusions: The implementation of operational tactical procedures, together with an awareness of the risks associated with the excessive use of force by public and private security forces and bodies, could reduce the risk of injuries suffered by both officers and citizens.

Keywords: use of force; IMUS; body injuries; forensic medicine; police arrest techniques; criminology; operational tactical procedures



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1. Introduction

The use of force by public and private law enforcement professionals is defined as the use of coercive physical measures by public security bodies according to the competencies granted by the state members (European Regulation on the Use of Force [1]).

Media has echoed this problem and fostered public scrutiny and criticism of police practices (Delgado, 2011) [2]. Since the murder of George Floyd (McLean, 2022) [3] in May 2020, public concern on the use of force by police officers has substantially increased after promises of change by politicians followed by unsubstantiated police training programs that have led to no satisfactory solution.

If we turn to legislation, nothing has been established with regard to how interventions should be performed, but it sets out certain limits with respect to human rights, dignity, exceptionality, proportionality, and prohibition of torture and degrading treatment (Code of Conduct for Law Enforcement Officials 4/169 of 17 December 1979 [4], European Code of Police Ethics [5], Law 2/86 on Security Forces and Corps [6], Organic Law 4/2015 on the

protection of citizen security [7], Criminal Procedure Law [8], and the Criminal Code [9]), without discrimination or abuse of power (Code of Ethics of the National Police Force).

The doctrine of the Supreme Court (Conde-Pumpido, 2016) [10], on the other hand, determines certain cases where the use of force is justified, weighing the goods and interests in conflict, and concluding that they must be governed by the principles of congruence, opportunity, and proportionality, in addition to starting from the manifest limit of not carrying out torture or inhuman or degrading treatment.

For all the above said, the potential harm that may be caused by certain interventions of the security forces and bodies is a matter of great relevance, since they constitute formal actions that have the capability of depriving citizens, even if unintentionally, from numerous rights, including the right to life (Lawson, 2019) [11]. This is either because appropriate training is not being provided or scarce time is not properly used or, at least, not in the most effective manner, which results in poor safety standards both for the active and the passive subject.

Regular training usually consists of a number of reactive actions based on martial arts and combat sports (Vera-Jiménez, 2022) [12], where attacks are targeted to specific vital organs (Vera-Jiménez, 2020) [13] and the preventive actions require the use of tools on specific vulnerable body parts (arms and legs) to inflict moderate and controlled pain for a less harmful outcome. Naturally, any direct action on the extremities may be closely associated with either bone fractures and dislocations or contusions of the soft tissues or neurovascular structures. On the other hand, any action directed to the head is highly likely to cause brain injuries or skull fractures (Adedipe, 2013) [14].

The increasing trend to militarize [11] security forces by fostering the recruitment of people with military backgrounds for law enforcement bodies is often positively and erroneously associated with the use of lethal force against civilians under arrest. The problem is that people who have been trained on military *modus operandi* may tend to apply a disproportionate use of force (Williams, 2003) [15].

The Rokoko Smartsuit Pro (a suit with sensors to capture movement and other variables) was fundamental for the purpose of this study. This equipment provides a set of data suitable for their analysis by Biomechanics of Bodies software applications (Shippen, 2016) [16], such as the Marras risk assessment method or REBA and NIOSH, which were used previously (Vera-Jiménez, 2022) [12]. In the latter study, a set of biomechanical parameters useful for risk analysis in physical police intervention techniques were determined on the basis of REBA and NIOSH methods. Progressing in this line, a comparison of the injury risks associated with OTP techniques and traditional physical intervention techniques, using such a set of parameters, was recently made (Vera-Jiménez, 2023) [17]. It was concluded that the OTP techniques proved to be the least harmful. The same procedures can be applied to the analysis and assessment of the injury risks associated with OTP, comparing these against those associated with traditional physical intervention techniques, using the Marras method (Marras, 1993) [18].

Marras analysis allows to identify and discriminate, for instance, between high and low risk of work-related lumbar spine disorders on the basis of a multiple logistic regression model that comprises a combination of five workplace movements and other factors.

In this sense, the inadequacy of the original design seems to come from the linear structure that has traditionally been applied, both at a macro level (general aspects of training) and at a micro level (isolated techniques and tactics). In fact, more training time is allocated to the training on firearms and combat than to the acquisition of the knowledge and skills that the officers need to effectively implement specific nonviolent methods for the resolution of conflicts. For example, in 2013, 95% of police academies provided an average of just 12 h of training (Garrett, 2017) [19].

Participants in different research studies on search and police practices stated that they did not trust the tools and knowledge they had been provided with, since they lacked a great deal of practice and a standardized evaluation of their performance (Rajakaruna, 2016) [20].

On the basis of the results reported by Koerner (2021) on the implementation of nonlinear pedagogy [21], those in charge of providing the training should be prepared to incorporate into their training sessions a new self-defense method that should help law enforcement officers to prevent future harm.

Normally, trainers try to teach trainees the escalation of force that may happen in a police intervention and, in the same order, the corresponding de-escalation techniques. The problem around these situations is that, although there is legal protection and previous “training” of the officers, these are situations where certain emotions such as stress, fear, or anger may heighten. These are factors to be taken into account and to be addressed in order to accomplish more efficient interventions.

Therefore, when providing training at the micro level, i.e., isolated techniques and tactics, instructors should take into consideration the decision-making capacity of the students in real situations to overcome their own limitations and gain experience. In conclusion, for a more effective intervention, it is also necessary to take into account the management and control of emotions such as stress, fear, or anger (Miller, 2017) [22].

Vera-Jiménez evaluated in his thesis the intervention techniques used by the police forces from Cadiz city in order to determine the possibilities of limiting the risk of injuries suffered by their officers during physical interventions through the implementation of operational tactical procedures in the case of demanding arrests (Vera-Jiménez, 2020) [23] using reflex-based defense mechanisms. Through the internalization of a series of body movements known as specific tactical responses, officers should be able to contain a subject showing strong resistance to the arrest while avoiding the risk of serious injuries. To this end, officers basically learn to press, manipulate, or hit specific nonvital areas of the body. A reduction in casualties was observed from 2007 until 2013 as a result of this new method of training, while neither crime rate nor the number of physical interventions declined.

It should not be forgotten that, over the last few years, new tools or technologies have been incorporated into police intervention equipment (conducted energy devices, CEDs, or pepper sprays). Although their use has caused a great deal of public outrage and attracted widespread media coverage, it has been overlooked that the problems arising from their use were often attributable to specific circumstances such as positional asphyxia, pre-existing diseases, or substance abuse (MacDonald, 2009) [24].

Regarding expandable batons, training protocols identify the primary target areas (large muscles or muscle masses), since a blow onto a vulnerable area could lead to serious body injuries or even lethal ones [2]. Similarly, different types of police batons that would allow reducing the risk of injuries have been tested (Vera-Jiménez, 2020) [23].

As an addition to the previous background, we must point out that the judgments SPSC 1255/2023 [25], SPSC 540/2022 [26], SPSC 959/2021 [27], SPSC 3910/2019 [28], SPSC 2223/2014 [29], SPSC 671/2010 [30], and SPSC 752/2009 [31] sentenced police officers for the use of force in a nonproportionate manner that resulted in serious injuries, which entails the nonapplication of exonerating circumstance according to Article 20.7 of the Criminal Code.

2. Materials and Methods

This research consisted of an analysis of different scientific publications on the use of force by law enforcement personnel. In addition, the need to incorporate new techniques, with or without the use of specific equipment, to minimize the risk of injury is analyzed. Likewise, current legislation is examined (Code of Conduct for Law Enforcement Officers, European Code of Police Ethics, Law 2/86 on Security Forces and Corps, Organic Law 4/2015, of 30 March, on the Protection of Citizen Security, Code of Ethics of the National Police Corps, Law 5/2014 on Private Security, Criminal Procedure Act, and Criminal Code) with regard to the principles governing the use of force by security forces and corps. A number of judicial sentences passed by the Supreme Court on this matter (SPSC 1255/2023, SPSC 540/2022, SPSC 959/2021, SPSC 3910/2019, SPSC 2223/2014, SPSC 671/2010, and SPSC 752/2009), pointing out in each case the injuries, consequences, procedures, and

arguments of the judges, are also examined. For this purpose, different databases are used, such as the Judicial Documentation Center, Digital Law, and Iberley.

In addition to the above, a Rokoko Smartsuit Pro suit was employed. This suit is equipped with a set of 19 wireless triaxial accelerometric or inertial measurement units (IMUs), as well as gyroscopic and geomagnetic sensors that allow determining the position, velocity, acceleration, and magnetic field of a human body. The collected data are displayed on a screen by means of an avatar that shows the different positions of the body (Figure 1).

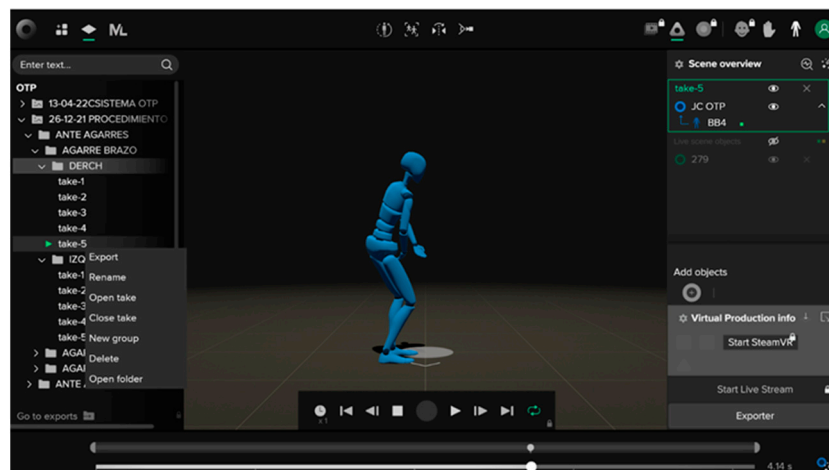


Figure 1. Avatar that illustrates the posture of a human body while performing an intervention technique.

This suit allowed the measurement of a series of biomechanical parameters while two police officers collaborating in this research performed each of the physical intervention techniques while wearing the sensor-fitted suit. The data collected were then processed using the Biomechanics of Bodies (BoB) version 10.5, analysis software, which allowed the risks involved in traditional techniques to be compared with the new tactical operational procedures. The BoB software includes several software plugins for biomechanical modeling to manage the data on position, velocity, acceleration (linear and angular extensions or muscle rotations), muscle tension or compression force, and energy or power. It is also fitted with three-dimensional graph generation features and several data display modes (Figure 2).

The ergonomics system known as “Occupational Biomechanics” by Marras [18] is based on a multiple logistic regression model, which uses a combination of five factors corresponding to five trunk movements features: (1) lift rate, (2) average twisting velocity, (3) maximum moment, (4) maximum sagittal flexion, and (5) maximum lateral velocity. The values corresponding to these factors are determined by means of the BoB software application.

In the paper by Marras [18], even though causality was not demonstrated, an association between biomechanical factors and the risk of low back disorders was indicated. This model is appropriate to be used for quantitative and objective measures in ergonomic studies that intend to minimize the risk of work-related lumbar disorders. The analysis yields the results in the form of “probability of high risk”.

The subjects who performed the relevant tests were a 1.83 m tall and 98 kg weight male as the police officer performing the arrest, and a 1.73 m tall and 68 kg weight male as the opponent. Both of them practiced martial arts and combat sports at a high level. After warming up, the techniques were performed in specifically adequate sport facilities.

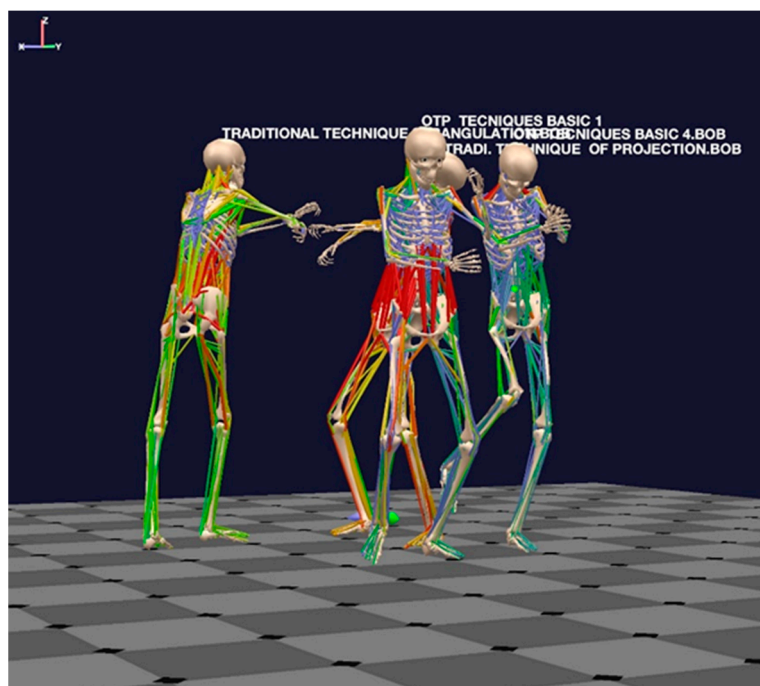


Figure 2. Graph generated by the BoB software application.

3. Results and Discussion

The abovementioned judicial sentences are analyzed below.

SPSC 1255/2023 of 15 March 2023

In this judicial sentence, the following was ruled: “We find the defendant local police officers guilty of the crime of torture, in its form of serious attack to the moral integrity as provided for and sanctioned in the Article 174 of the Penal Code, and of the crime of injuries, provided for and sanctioned in the Articles 147 and 148.1 of the Penal Code”. The defendants, two city police officers, were sentenced to 4 years of imprisonment for the crime of torture, with cessation of employment for a period of 10 years. For the crime of injuries, they were sentenced to 3 years and 6 months of prison and deprived from the right to stand for election during the time of conviction. The defendants were to jointly and severally indemnify the injured party with the amounts of 20,745.75 EUR for the injuries caused, 2936.8 EUR for the sequels, and 20,000 EUR for the moral damages. These amounts would accrue the official legal interest increased by 2 points, in accordance with the provisions set forth in Article 576.1 of the LEC (Law of Criminal Procedure). MOGÁN Town Council was declared to have subsidiary civil liability.

The defendants beat and mistreated the injured citizen in retaliation for his engagement in itinerant trade and with the purpose of intimidating him in relation to his eventual testimony in the trial in which one of the defendant officers was also involved.

As a consequence of these events, the injured citizen suffered injuries consisting of a closed fracture of the left ulna, contusion of the thoracic wall, and contusion with frontal abrasion which, in addition to first medical aids, required subsequent medical–surgical treatment consisting of surgery and rehabilitation treatment, which totaled 341 days for the recovery of the disability, one of which was spent in hospital. Minor aesthetic damages included a surgical scar of about 10 cm at the left forearm (one stitch), a plate for osteosynthesis on the left ulna held in place by five screws (two stitches), and inability to fully bend the left elbow.

SPSC 540/2022 of 16 February 2022

A local police officer was condemned for causing injuries (art. 147.2 of the Penal Code) after attacking several people, causing one of them a contusion on the left knee with ecchymosis of 12 × 4 cm, and causing another an open injury and fracture of the cartilage

shell of the right auricle, which impeded both of them from exercising their occupations. As established by Article 22.7 of the Penal Code, wrong use of his public agent status was considered as an aggravating factor.

SPSC 959/2021 of 10 December 2021

The sentenced officers were found guilty of causing injuries to an individual (article 147.1 of the Penal Code) consisting of a jaw double fracture that required the use of osteosynthesis material and left the victim suffering from chronic pain.

SPSC 3910/2019 of 22 December 2019

In this Supreme Court sentence, the Basque Country Police officer (Ertzaintza) was found guilty of the crime of injuries under Articles 147.1 and 148.1 of the Criminal Code, and he was sentenced to 2 years imprisonment and suspension from public employment or public office with respect to the performance of his duties at the Ertzaintza Mobile Brigade.

He was also condemned to indemnify the injured citizen with the amount of 3600 EUR, plus official legal interest of money increased by two points on the said amount, which would accrue from the date of the sentence until the date of its full payment.

As a consequence of the aforementioned action, the injured citizen suffered from frontal traumatism, consisting of a 6 cm cut/bruise wound that stretched from the upper part of the forehead toward the scalp, as well as cervical pain. She required suture of the scalp wound, and it took 113 days to heal, neither of which impeded her from performing her usual occupations. When healed, she presented a 6 cm scar on the scalp, which was not visible and, therefore, did not pose any aesthetic impairment.

SPSC 2223/2014 of 13 May 2014

Four police officers were found guilty of the crime of injuries under Art. 621.1 of the Penal Code in relation to Art. 147.2 of the Penal Code, with each of them being sentenced to pay a fine of 1 month at a daily rate of 20 EUR. In addition, three defendant agents were jointly and severally liable for the payment to the injured citizen of the sum of 4600 EUR for all the days that he required healing from his injuries, plus 1000 EUR for the sequels.

The injured citizen suffered damages consisting of numerous hematomas that kept him unable to work for 30 days.

SPSC 671/2010 of 2 July 2010

The police officers caused a fracture in three fragments of the lower third of the left humerus, in addition to radial paralysis, requiring orthopedic and rehabilitative medical treatment and the following side-effects: osteosynthesis material in the left shoulder, paralysis of the radial nerve in the left upper extremity at the radius, causing a partial and permanent disability for the development of normal activities, and a moderate aesthetic defect as a result of the surgical scar. The police officers were sanctioned on the basis of article 147.1 of the Penal Code.

SPSC 752/2009 of 3 July 2009

In the same line, several municipal police officers were found guilty of a crime of injuries under the Article 147 of the Penal Code for assaulting a person and causing him cranioencephalic trauma with collapse-fracture, adding a right temporoparietal epidural hematoma and mass effect on the right-ventricular system, contusions on the right hemisphere, and a probable fracture of the medial orbital wall, as well as hematoma on the right periorbital area, contusions on the thoracic wall, and erosions on the left forearm.

It is important to point out that all these judicial sentences had a common element, which is that the convicted officers used the traditional techniques of physical intervention for which they had received training. They did not take into account that police officers can be convicted of a crime of injury as described in Article 147, without the exemption provided for in Article 20.7 of the Penal Code, which would apply in cases of legitimate and proportionate use of force in the performance of a duty, and which would entail the application of penalties ranging from 6 months to 3 years and 6 months of imprisonment.

As can be seen, the consequences of bad intervention or training and the subsequent inappropriate use of force were highly harmful, often involving cranioencephalic trauma, cervical contusions, and hematomas, most of which were disabling. The same can be said

about the use of expandable batons, which resulted in condemning the police officers for their use after qualifying them as “dangerous instruments”.

We must point out that the injuries that resulted as a consequence of the deficient training of police officers and the policies by which the different agencies are governed are highly questionable aspects due to two main reasons:

1. The utmost importance of the proper training of officers on the implementation of police intervention techniques that result in the least possible injuries or no injuries at all;
2. The limited number of existing studies on criminological and medico-legal data.

However, we would like to add that the use of intelligent suits (IMUs) has allowed the collection of data related to the energy and force applied over the different postures involved in the interventions, whether traditional or new OTPs. Furthermore, thanks to the “Body Biomechanics” software application, the numerous data corresponding to the postures, speeds, and accelerations involved are registered by the sensors in the suit and fed into the software application for subsequent analysis following the Marras method (Figure 3).

In Figure 3, four avatars representing each of the techniques (basic OTP technique 4, basic OTP technique 1, traditional throw technique, and traditional choking technique) are shown on the top. A graph with the data corresponding to the different levels of injury risk is displayed at the bottom. It can be seen that, on the one hand, traditional physical intervention techniques presented 70–80% risk of injury, while it was confirmed, on the other hand, that the OTPs registered lower risk levels (between 54% and 63%), with a lower risk of injury for the officers themselves.

Table 1 shows a combination of six parameters that use the Marras method.

Table 1. Descriptive factors in each physical intervention technique.

Classification of Techniques by Injury Risk Levels					
Biomechanical data					
Parameter	units	BASIC OTP 4. BoB	BASIC OTP 1. BoB	TRAD. THROW TECH. BoB	TRAD. CHOKING TECH. BoB
Lift rate	[Lifts/h]	0.00	0.00	0.00	0.00
Average twisting velocity	[°/s]	8.54	8.83	12.41	22.19
Maximum momentum	[N·m]	355.02	1222.01	1614.74	2019.01
Maximum sagittal flexion	[°]	15.78	19.49	46.76	44.82
Maximum lateral velocity	[°/s]	43.65	52.28	73.28	98.37
Probability of injuries	%	54.20	62.49	77.07	80.20

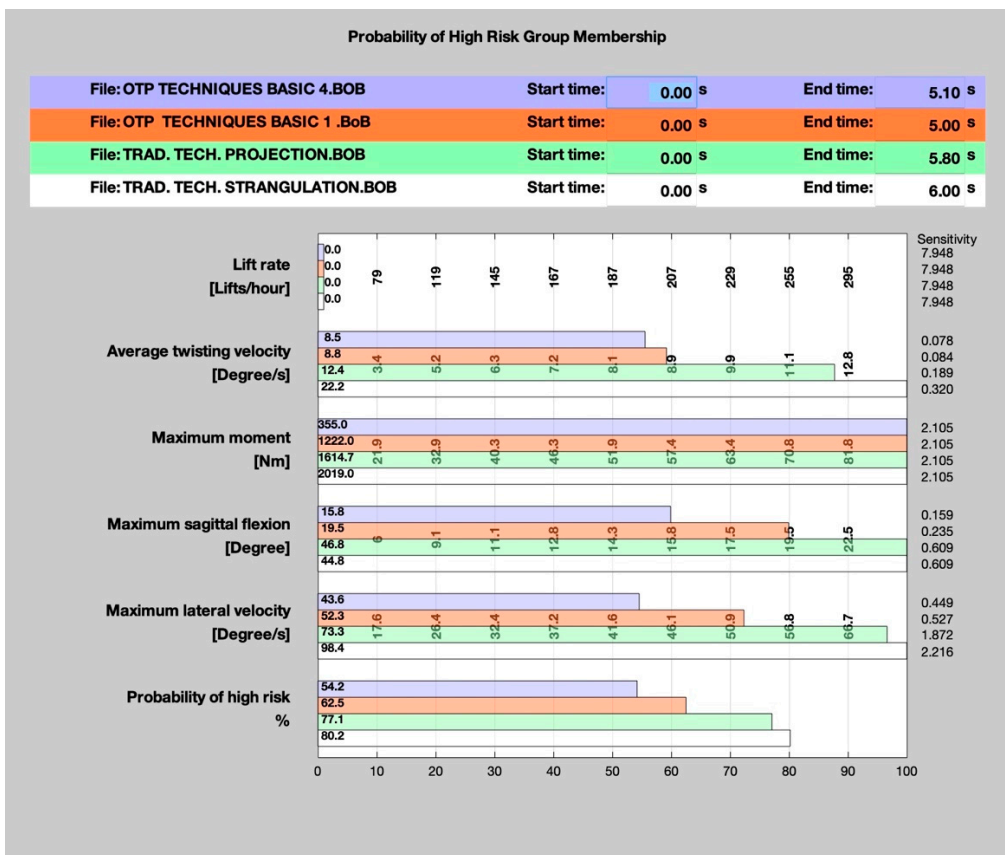
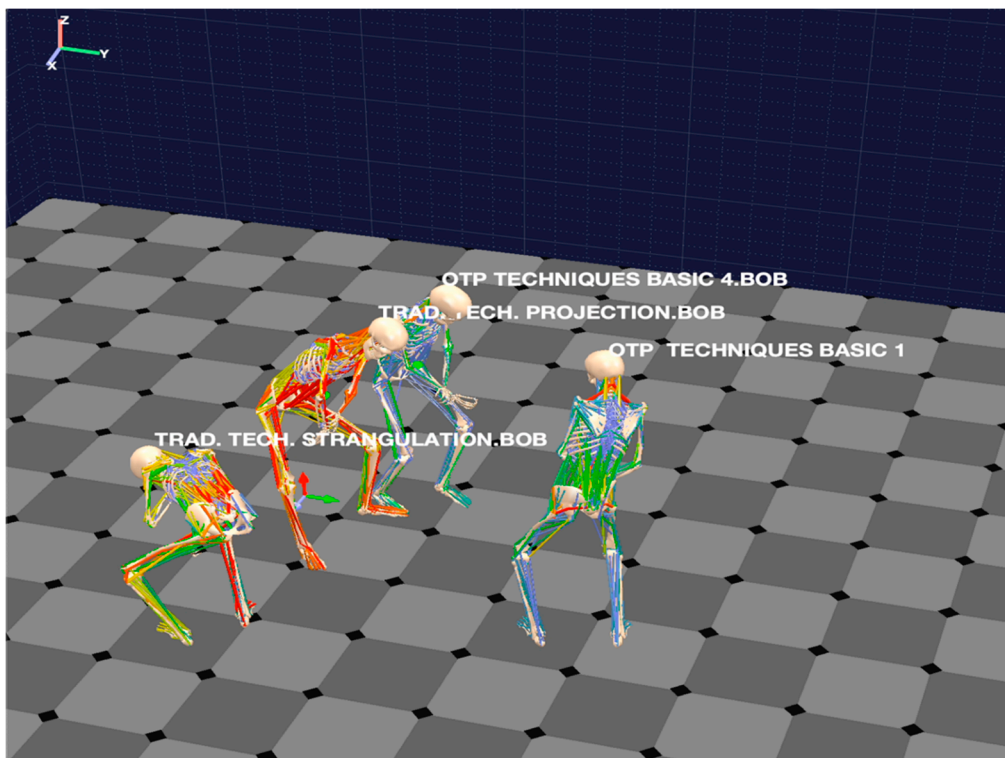


Figure 3. Graph generated from the Marras analysis.

4. Conclusions

On the basis of the results of the probability of injuries analysis that was carried out, it could be concluded that OTPs are less harmful and, therefore, more suitable for the training of the members of the security forces and corps. Their implementation allows speeding up police interventions by reducing body movements, in addition to providing the possibility to clearly differentiate the levels of force to be employed in each situation. From the perspective of occupational risks, specifically in the police field, this represents a considerable improvement of the safety during police arrests, with a significant reduction in the risk of injuries suffered by both police officers and citizens.

Without prejudice to what has been indicated, we stress the need to continue scientific research in order to enhance knowledge in at least two aspects: expansion of the risk analysis with a greater number of PIT techniques, and expansion of the studies to a larger population sample of police officers.

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Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

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Abbreviations

BoB	Biomechanics of Bodies
CED	Conducted energy devices
IMU	Inertial measurement units
OTP	Operational tactical procedures
PIT	Physical intervention techniques
SPSC	Spanish Supreme Court
Tech.	Techniques
Trad.	Traditional

References

1. European Regulation on the Use of Force. Available online: <https://brill.com/display/title/35884?language=en> (accessed on 30 June 2023).
2. Delgado, R.A. *An Ideal Use of Force Model for Law Enforcement: An Assessment of the Austin Police Department*; Masters of Public Administration, Texas State University: San Marcos, TX, USA, 2011. Available online: <https://digital.library.txstate.edu/handle/10877/3472> (accessed on 30 June 2023).
3. McLean, K.; Stoughton, S.W.; Alpert, G.P. Police Uses of Force in the USA: A Wealth of Theories and a Lack of Evidence. *Camb. J. Evid.-Based Polic.* **2022**, *6*, 87–108. [CrossRef]
4. Code of Conduct for Law Enforcement Officials 4/169 of 17 December 1979. Available online: <https://www.ojp.gov/ncjrs/virtual-library/abstracts/code-conduct-law-enforcement-officials#:~:text=A%20code%20of%20conduct%20for,General%20Assembly%20in%20December%201979> (accessed on 30 June 2023).
5. European Code of Police Ethics. Available online: <https://polis.osce.org/european-code-police-ethics> (accessed on 30 June 2023).
6. Law 2/86 on Public Security Forces. Available online: <https://www.boe.es/buscar/act.php?id=BOE-A-1986-6859> (accessed on 30 June 2023).

7. Organic Law 4/2015 on the Protection of Citizen Security. Available online: <https://www.boe.es/buscar/act.php?id=BOE-A-2015-3442> (accessed on 30 June 2023).
8. Criminal Procedure Law. Available online: <https://www.mjusticia.gob.es/es/AreaTematica/DocumentacionPublicaciones/Documents/Criminal%20Procedure%20Act%202016.pdf> (accessed on 30 June 2023).
9. Criminal Code. Available online: https://www.mjusticia.gob.es/es/AreaTematica/DocumentacionPublicaciones/Documents/Criminal_Code_2016.pdf (accessed on 30 June 2023).
10. Conde-Pumpido, C. en Estudio Multidisciplinar de la Operativa y del uso de la Fuerza Policial. Tirant lo Blanch. 2016, pp. 37–42. Available online: <https://biblioteca-tirant-com.bibezproxy.uca.es/cloudLibrary/ebook/info/9788491193777> (accessed on 30 June 2023).
11. Lawson, E. TRENDS: Police Militarization and the Use of Lethal Force. *Political Res. Q.* **2019**, *72*, 177–189. [[CrossRef](#)]
12. Vera-Jiménez, J.C.; Meléndez-Sánchez, F.L.; Álvarez, J.A.; Ayuso, J. An Analysis of Biomechanical Parameters in OTP Police Physical Intervention Techniques for Occupational Risk Prevention. *Int. J. Environ. Res. Public Health* **2022**, *19*, 6615. [[CrossRef](#)] [[PubMed](#)]
13. Vera-Jiménez, J.C.; Lorente, J.A.; González-Herrera, L.; Álvarez, J.A.; Ferreiro-González, M.; Ayuso, J. A Legal and Forensic Medicine Approach to Police Physical Intervention Techniques in High-Risk Situations. *Int. J. Environ. Res. Public Health* **2020**, *17*, 2809. [[CrossRef](#)] [[PubMed](#)]
14. Adedipe, A.; Maher, P.J.; Strote, J. Injuries associated with law enforcement use of force. *Trauma* **2013**, *15*, 99–106. [[CrossRef](#)]
15. Williams, J.J.; Westall, D. SWAT and non-SWAT Police officers and the use of force. *J. Crim. Justice* **2003**, *31*, 469–474. [[CrossRef](#)]
16. Shippen, J.; May, B. BoB—Biomechanics in MATLAB. In Proceedings of the 11th International Conference BIOMDLORE, Druskininkai, Lithuania, 20–22 October 2016; Vilnius Gediminas Technical University: Vilnius, Lithuania, 2016; pp. 11–13. [[CrossRef](#)]
17. Vera-Jiménez, J.C.; Villero-Carro, D.; Pastor-Fernandez, A.; Shippen, J.; Ferreiro-González, M.; Vera-Jurado, J.C.; Álvarez, J.A.; Ayuso, J. Comparison of Traditional Physical Intervention Techniques vs. Operational Tactical Procedures and Techniques in the Use of Force during Police Arrests. *Safety* **2023**, *9*, 39. [[CrossRef](#)]
18. Marras, W.S.; Lavender, S.A.; Leurgans, S.E.; Rajulu, S.L.; Allread, W.G.; Fathallah, F.A.; Ferguson, S.A. The role of dynamic three-dimensional trunk motion in occupationally-related low back disorders. The effects of workplace factors, trunk position, and trunk motion characteristics on risk of injury. *Spine (Phila Pa 1976)*. *Spine* **1993**, *18*, 617–628. [[CrossRef](#)] [[PubMed](#)]
19. Garrett, B.L.; Stoughton, S.W. A Tactical Fourth Amendment (25 March 2016). Virginia Law Review, Volume 103, 211, 2017, Virginia Public Law and Legal Theory Research Paper No. 29. Available online: <https://ssrn.com/abstract=2754759> (accessed on 30 June 2023).
20. Rajakaruna, N.; Pamela, J.H.; Cutler, A.; Fairman, G. Ensuring the validity of police use of force training. *Police Pract. Res.* **2016**, *18*, 507–521. [[CrossRef](#)]
21. Koerner, S. Nonlinear Pedagogy in Police Self-Defence Training: Concept and Application. Ph.D. Dissertation, University of Education Freiburg (Pädagogische Hochschule Freiburg), Breisgau, Germany, 2021.
22. Miller, T.R.; Lawrence, B.A.; Carlson, N.N.; Hendrie, D.; Randall, S.; Rockett, I.R.; Spicer, R.S. Perils of police action: A cautionary tale from US data sets. *Inj. Prev.* **2017**, *23*, 27–32. [[CrossRef](#)] [[PubMed](#)]
23. Vera Jiménez, J.C.; Fernandez, F.; Ayuso, J.; Lorente Acosta, J.A. Evaluation of the police operational tactical procedures for reducing officer injuries resulting from physical interventions in problematic arrests. The case of the Municipal Police of Cádiz (Spain). *Int. J. Occup. Med. Environ. Health* **2020**, *33*, 35–43. [[CrossRef](#)] [[PubMed](#)]
24. MacDonald, J.M.; Kaminski, R.J.; Smith, M.R. The effect of less-lethal weapons on injuries in police use-of-force events. *Am. J. Public Health* **2009**, *99*, 2268–2274. [[CrossRef](#)] [[PubMed](#)]
25. SPSC 1255/2023 of 15 March 2023. Available online: <https://www.poderjudicial.es/search/AN/openDocument/c61f398a79038816a0a8778d75e36f0d/20230413> (accessed on 30 June 2023).
26. SPSC 540/2022 of 16 February 2022. Available online: <https://www.poderjudicial.es/search/AN/openDocument/6883216c5653cac0/20220225> (accessed on 30 June 2023).
27. SPSC 959/2021 of 10th December 2021. Available online: <https://app.vlex.com/#vid/879208110> (accessed on 30 June 2023).
28. SPSC 3910/2019 of 11 December 2019. Available online: <https://www.poderjudicial.es/search/AN/openDocument/391dc14089c47a93/20191218> (accessed on 30 June 2023).
29. SPSC 2223/2014 of 13 May 2014. Available online: <https://www.poderjudicial.es/search/AN/openDocument/e4c9e54da3a1cbde/20140613> (accessed on 30 June 2023).
30. SPSC 671/2010 of 2 July 2010. Available online: <https://app.vlex.com/#vid/220938579> (accessed on 30 June 2023).
31. SPSC 752/2009 of 3 July 2009. Available online: <https://app.vlex.com/#vid/76466400> (accessed on 30 June 2023).

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