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# The Impact of Training on Use of Force by Police in an English police force; Evidence from a Pragmatic Stepped Wedge Randomised Controlled Trial

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## ABSTRACT

We aim to test the impact of a new national curriculum for public and personal safety training (PPST) developed by the College of Policing, which aims to reduce the use of force by police. We conduct a large-scale Stepped Wedge Pragmatic Controlled Trial with a single police force and 1843 participating police officers. Officers were assigned to be trained during a particular week of the year. We find statistically significant reductions in the use of force by police officers as a result of the training. These effects are a reduction of between 8.0% and 10.9% in the propensity to use force in a given week compared to the counterfactual. The effect is accompanied by a significant reduction in the likelihood of injury to civilians, and no rise in the risk of harm to officers. We conclude that the PPST curriculum appears effective at reducing use of force by police in a large scale, robust trial

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## KEYWORDS

Police training; randomised trial; stepped wedge; use of force

## Introduction

The topic of police officers' use of force is frequently subject to criticism across the world (Piza, Connealy, Sytsma, & Chillar, 2023) and in England (Dawkins, 2023; Flash, 2023) with widespread scrutiny on social media (Ellis, 2023). While there are several systematic reviews available on general police training (e.g., Belur, Agnew-Pauley, McGinley, & Tompson, 2019; Dryer-Beers, Braddock, & Wire, 2020; McQueen & Murphy-Oikonen, 2023; Wheller & Morris, 2010), there is currently a lack of published academic research evaluating the impact of focused police training on the use of force within English settings. Given the adverse effects the use of force can have on both its objects and on general trust in the police, this is a key gap in knowledge about policing. According to Engel, Corsaro, Isaza, and McManus (2022), the path forward in

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police reform is for police executives and researchers to work collaboratively as “builders of evidence” (p. 1246). This means being willing to try, test their efforts and adjust their approach on the findings of those tests, while expanding knowledge to the broader policing profession.

The present paper describes the design, implementation, and results of a collaborative study between King’s College London (KCL) and the College of Policing (the College).<sup>1</sup> We cover the systematic development, implementation, and evaluation of a new police training curriculum focused on enhancing public and personal safety during conflict situations. The paper was created within a framework of: (1) problem identification (the risk of use-of-force incidents by the police); (2) the need for curriculum development based on incident and survey data which underscored the increasing risks faced by officers and the public during use of force incidents; (3) a pilot and evaluation of the new training method; and (4) promoting collaboration between police agencies, academic institutions, and policymakers to build an evidence base and share knowledge to improve police practices.

The research was undertaken within the context of The Angiolini Review (2017) and Officer and Staff Safety Review (OSSR) (National Police Chiefs’ Council and College of Policing, 2020), which underlined the serious risk use-of-force incidents posed to public and police safety. In addition, the College produced evidence-based guidelines on how senior police leaders can support frontline officers to manage conflict situations without needing to use force (College of Policing, 2020), supported by a systematic review of the “what works” evidence (Dryer-Beers et al., 2020) and analysis of recently standardised police use-of-force data (Quinton, Dymond, Boyd, & Teers, 2020). Collectively, these reports indicated a need for improved training to enhance safety outcomes.

In response, the College developed a new national curriculum for public and personal safety training (PPST), which marked a significant shift from traditional training methods. A key part of this new curriculum was a two-day refresher training course for serving frontline officers. The pilot training was developed by the College in partnership with A&S and academic experts with a view to its effectiveness being rigorously evaluated before wider roll-out. The new curriculum represented a radical change, as existing Personal Safety Training (PST) used repetitive drills to “automate” officer use of physical techniques; which techniques were taught was non-standardised and at the discretion of trainers. The new curriculum also represented a significant investment in the frontline. It directly responded to increasing levels of risk faced by officers on a daily basis, their concerns about safety, and their views on existing PST. The new style training aims to support the frontline, so they are better able to manage conflict safely, assess threat, and use force only when lawful, necessary and proportionate.

In this paper we outline the systematic approach taken to develop, implement, and evaluate the new police training curriculum, and highlight its implications for improving public and personal safety through evidence-based practices. The evaluation uses a stepped-wedge design exploiting the quasi-random roll-out of training to officers. It finds a statistically significant reduction in the use of force by officers and decreased likelihood of injury to civilians during use of force incidents, with no impact on injuries

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<sup>1</sup>The College is the professional body for policing in England and Wales; it aims to improve policing practice by setting standards, supporting professional development, and developing and sharing knowledge.

to officers or depolicing (i.e., officers disengaging from discretionary policing activities). This research suggests that the new PPST curriculum achieves its aims of reducing use of force without increasing other harms. Reflecting the positive findings of the evaluation, the new curriculum is now live and being supported by the College for roll out to all police forces in England and Wales.

## Literature review

### *Police training*

This paper is informed by a broad body of literature demonstrating the value of police training and the appropriateness of empirical research methods for the evaluation of training initiatives. However, this literature has key gaps, particularly around the effectiveness of training to reduce use of force in England and Wales. Over the past fifteen years, there has been a notable increase in the publication of studies focusing on the effects of diverse, evidence-informed police training interventions (Jonathan-Zamir, Litmanovitz, & Haviv, 2023).

Most relevant to the present research, Engel et al. (2022) examined the impact of de-escalation training (such as persuasion, calming techniques and negotiation) on police behaviour through the implementation of a stepped wedge randomised controlled trial (RCT). They found reductions in the incidence of the use of force, as well as in citizen and officer injuries in the post-training period. In another stepped-wedge study, the efficacy of a police training program in the USA aimed at reducing and improving interactions with individuals with mental health issues was assessed (Scantlebury et al., 2017). The results found no reduction in incidents recorded but suggested a positive impact on the documentation of incidents involving such individuals by the police. These trials demonstrate the potential value of training interventions in police settings; importantly for the present study, they also show the appropriateness of stepped wedge designs for evaluating training interventions in policing.

Furthermore, recent studies highlight the effectiveness of police training as a means of changing police practice (Huff, Zauhar, & Agniel, 2024; Moreno et al., 2024; Zekiroski et al, 2024). This includes assessing novel new training approaches such as virtual reality (Zechner et al., 2023) and handling of complex situations such as sexual assault (McQueen & Murphy-Oikonen, 2023). This latter study contends that increased training can enhance police attitudes, knowledge, and behaviors pertaining to sexual assault investigations and provide a significant contribution to the critical dialogue concerning police responses to sexual assault (see also Lorenz, 2023; Lorenz & Maskaly, 2018). This is generally promising about the potential of training to change police practice in other areas. However, there remains a need for additional scholarly investigation to rigorously evaluate police training on the use of force, particularly in the English context.

### *Use of force*

Globally, there are significant calls for reform and increasingly visible activism regarding the need for police organisations to prioritise the protection of citizens and reduce the risk of inflicting further harm. This is exemplified in the work undertaken by

Bennell et al. (2021) who argue that, within police, debate on the use of force by officers arguably gets more attention than any other issue. Awareness of instances of excessive use of force as seen in studies by academic activists, such as Joseph-Salisbury et al. (2020) and activism groups like INQUEST (2020), has led to renewed calls for change in the way the police use force. There are specific calls for change in the way police use force against Black citizens (Busby, 2020). Several studies have examined how the murder of George Floyd in police custody in 2020 sparked international protests across the globe and brought an unprecedented focus on police violence (Barrie, 2020; Mendes, 2021; Mollow, 2023; Wu et al., 2023). A lack of public trust in the police acting within the bounds of its authority, like when it is thought to have used force excessively has broader detrimental consequences legitimacy of police (Huq, Jackson, & Trinkner, 2016; Trinkner, Jackson, & Tyler, 2018), making voluntary public compliance with the law and cooperation with the police less likely and effective community policing more difficult (Jackson et al., 2012; Jackson, Bradford, Stanko, & Hohl, 2013). It is urgent and important to understand when and how police use force, and how use of force can be reduced and confined only to instances where it is strictly and clearly necessary.

In the year from April 2022 ending March 2023, police officers in England and Wales recorded 547,002 stop and searches and 668,979 arrests (Home Office, 2024). In the same period, Home Office (2023a) statistics showed 659,372 use-of-force incidents were recorded by police forces in England and Wales. Police officers in England and Wales are routinely unarmed, with a small number of firearms officers available for spontaneous or planned firearms operations. Police use of force statistics capture all incidents of use-of-force, starting with compliant handcuffing and unarmed escorting techniques, all the way up to use of conventional firearms - a full list of tactics included is available in the user guide for the statistics (Home Office, 2023b). In the year ending March 2023, armed police in England and Wales conducted 18,395 firearms operations leading to 10 intentional discharges of firearms at persons (Home Office, 2023c), the highest number since 2019 and the second highest since comparable records began in 2009.

Of those 359,372 use-of-force incidents, 29,104 (4%) involved the person subjected to force being injured as a result, and 19,488 (3%) of incidents involved the officer sustaining an injury (Home Office, 2023a). Recent analysis of police use-of-force data (Quinton et al., 2020) found the use of many types of armed and unarmed tactics were associated with increased injury and hospitalisation risks to the member of the public and assault and injury risks to the officer, relative to use of compliant handcuffing. In recognition of the inherent dangers of restraint, the Angiolini Review (2017) recommended mandatory police training on restraint and greater consistency in the use of force. Despite recognition of the adverse impacts of use of force, incidents where use of force was recorded have been rising.

The use of force by police is not proportionally distributed amongst the population, with over 80% over police use of force incidents in England and Wales involving males (Home Office, 2023a) and significant evidence of racial disparities in the use of force at a national level (Home Office, 2023a). The Police Race Action Plan (National Police Chiefs' Council, 2022), a national programme that aims to create an anti-racist police

service that is trusted by Black people, has highlighted the importance of reducing such disparities and assessing the contribution training can make to their reduction. Furthermore, there are also no UK-based studies that explore the experiences of trans and non-binary people with the police use of force. It is important that evaluations explore practices that could either reproduce unfair power dynamics or help lead to transformative change with greater equity and dignity for historically marginalised groups (Farrell, 2024; Williams, 2024). This is a key aspect of understanding use of force by police.

Alongside the growing calls for the police to prioritise the protection of citizens, especially those from marginalised groups, there is also evidence to suggest officers are also in need of greater protection. The OSSR (National Police Chiefs' Council and College of Policing, 2020) pointed to a steady increase in recorded assaults against officers despite officer assaults being under-reported and recorded. The most recent Home Office (2022a) statistics showed 41,221 assaults on officers in England and Wales in the year ending March 2022, an 11.5% increase from the year ending March 2021 (Home Office, 2022b). Moreover, over 90% of officers responding to the national police safety survey commissioned for the OSSR (Clark-Darby & Quinton, 2020) felt assaults had "gone up" in recent years, while two-thirds said it was "likely" they would be assaulted in the next 12 months. In recognition of the growing risk of assaults, the OSSR recommended that police training be overhauled to better prepare officers for conflict situations.

### ***Existing training to improve police and public safety in England and Wales***

PST has been mandatory for all officers below the rank of superintendent since the mid-1990s. Prior to the development of the new curriculum, PST was equipment-based, with an emphasis on proficient use of baton, irritant spray and handcuffs. In addition, officers are also supposed to receive training on unarmed skills, de-escalation, and the medical and legal implications of using force. However, training content and method of delivery is not consistent.

The earliest reviews (Her Majesty's Inspectorate of Constabulary (HMIC), 2007) of PST recommended that training was a minimum of 12 h, delivered annually at a minimum and be quality assured and evaluated for effectiveness. When the College was established and given responsibility for the standard of police training in 2012, it did not adopt the 12-h recommendation, but focused instead on encouraging forces to deliver PST that achieved particular "learning outcomes." An unintended consequence has been the erosion of the length of PST courses delivered by forces. The OSSR (National Police Chiefs' Council and College of Policing, 2020) found that training time ranged from five hours in some forces to 16 h in others. In addition, training time was sometimes found to have been used for the delivery of other non-PST activities, such as fitness testing and first aid training. PST content and methods of delivery were also found to be inconsistent and largely at trainer discretion. Not unexpectedly, survey research for the OSSR showed low levels of satisfaction with training, with around one-third of officers not satisfied with the PST they had received (Clark-Darby & Quinton, 2020). PST training is highly variable both in its content and duration, limiting its effectiveness.

Researchers have also been critical of PST. Observational research and experiments found that existing PST encouraged pre-emptive use of force without clear guidelines (Buttle, 2007); did not suitably prepare officers for stressful conflict situations (Renden, Landman, Savelsbergh, & Oudejans, 2015); disadvantaged female officers (Cushion, 2020); and was disjointed or unrealistic, based on “traditional,” “militaristic” models of training rooted in obsolete and counter-productive practices (Cushion, 2022). Cushion (2020) also found little time was spent “on-task,” with officers spending over half of their training time passively observing or listening. The author speculated that officers might be less able to put their training into practice in real-life situations as a result. These findings highlight the need to review and propose new methods of training to ensure that officers are better equipped to apply their skills effectively in practical contexts.

Our literature review highlights the ongoing and critical debate around the use of force in policing, highlighting its significance as an issue in law enforcement. Instances of excessive force, particularly against Black citizens, have led to widespread calls for reform. The need for reform in the UK was already known: at present a substantial minority of arrests in the UK result in injuries to civilians and officers. However, the international reaction to the murder of George Floyd in 2020 highlighted the unsustainable status quo of police use of force, and its impact on public trust. Current training practices in England and Wales have been criticised for being inadequate, inconsistent, and outdated, failing to properly prepare officers for real-life conflict scenarios. These findings highlight the necessity to develop and implement more effective, equitable, and comprehensive training methods that could enhance both police and public safety which the present study aimed to help address.

## **Materials and methods**

### ***The intervention***

Avon & Somerset Police was the first force to replace its old-style PST refresher course with the new PPST curriculum. A&S is a territorial police service in South-West England. They police a mixture of significant urban centres with diverse populations, such as the cities of Bristol and Bath, but also cover large rural areas in the counties of Somerset and South Gloucestershire. The force employs around 6,000 people, of whom around 3,000 are police officers in a variety of roles; they serve a population of approximately 1.72 million people over an area of around 1,800 square miles.

A&S implemented the new curriculum over the course of 12 months. The pilot was targeted at officers in a frontline role, considered to be facing the public and therefore likely to need to use force as part of their daily duties.

The new curriculum was designed through an experience-based, iterative process headed by a subject area specialist. This specialist created a subject matter expert (SME) group populated by representatives from academia, the College and police forces. An initial action for the SME group was to review existing training practice against the best available evidence. This involved the SME group reviewing the literature provided by the academics and observing scenario-based training in non-policing contexts.

The SME group then reviewed use of force data published by the Home Office and body-worn video footage and incident logs from participating police forces to identify the most common situations for police-public conflict to inform the selection and development of scenarios that were to be the principal method of training delivery. These points of conflict were operationalised into five plausible role play scenarios: custody, domestic incident, a fight in the street, stop and search, and a vulnerable person. A sixth scenario (drunk and disorderly) was not developed in time for the pilot, but has been included in the PPST curriculum that is being rolled out across England and Wales.

The design of each scenario involved the SME group identified potential public behaviours that officers were to be confronted with during training and which were tiered according to the level of resistance on display (i.e., compliance, verbal resistance, passive resistance, active resistance, aggressive resistance and aggravated resistance). For full details of how these levels of subject response are defined, and for examples of the scenario briefings, please see the tables in Annex 1 (reproduced with permission from Chetwynd, Sanders, Meakins, & Quinton, 2024). In addition, to help trainers provide personalised instruction to officers during the scenarios, the SME group also identified specific techniques from the existing PST manual that were considered most appropriate for officers to use, mapped against the level of resistance on display.

The SME group delivered two train-the-trainer sessions to all A&S training staff to instruct them in the new curriculum. After these train-the-trainer courses, A&S made their own plans to deliver the pilot, which were then monitored by the College.

A&S introduced training based on the new curriculum from 1st September 2021. Participating officers attended a new style refresher training course with 12 h of contact time split over two consecutive days. During these 12 h, a small amount of time was taken for officers to complete their mandatory annual fitness test and first-aid course. These were not considered formally part of the pilot, but their inclusion was necessary for the force's operational requirements. The remaining time was then divided between the five role play scenarios.

At the start of day one of the refresher course, officers received an initial briefing about the training, including safety information. Officers were informed they would be allocated to small groups and expected to take part in a series of scenarios multiple times, rotating between three roles; they would be the "police officer" or "member of the public" in the role play or act as an observer. They were told about the levels of resistance they could expect to confront in the scenarios, that the level of resistance would change every time they took part, and how they could control the speed of the scenarios (e.g., "pausing" or "rewinding" situations were encouraged). The specifics of the individual scenarios were not revealed.

The briefing continued by explaining that training staff were there to introduce each scenario, assess learner performance and provide a debrief. Learners were told that they were expected to rely on the skills they had already developed in training or the field, and that no time would be dedicated to the formal re-training of skills. Instead, the briefing made clear that trainers would pause scenarios and lead a "breakout teaching session" if a learner struggled with a particular technique that was also an area of development for others in the small group.



Following the initial briefing, officers were led through a warmup and a demonstration of a scenario with a trainer playing the “member of the public” role. Learners were then split into small groups. Each was led by a trainer and contained officers from different teams with different lengths of service. At the beginning of day two, learners were given a recap of the key points from the initial briefing and led through a different set of warm-ups. An example timetable of the two-day course is available in Annex 1 (reproduced with permission from Chetwynd et al., 2024).

### ***Trial design & participants***

The research questions for this trial were:

1. Did participation in the new PPST curriculum refresher course change attendees’ use of force?
2. Did participation in the new PPST curriculum refresher course change who force was used upon?
3. Did participation in the new PPST curriculum refresher course change rates of officer and member of the public injury?

The exploration of the use of force data was designed as a pragmatic stepped wedge study. Use of force records were available for 1843 participating police officers in A&S over the course of 52 wk. The intervention was fully implemented by the end of the trial, with all 1843 officers having received the intervention. A&S delivered the course to officers whose training was considered expiring and needed to have their skills refreshed. Due to this need to keep officers’ skills current, it was not possible to assign officers to cohorts in a truly random way. Instead, officers were assigned to cohorts according to when they were required to complete their annual refresher training, which is not associated with their use of force or any officer characteristics. As this requirement is based on the time that has elapsed since they were last trained, assignment to treatment or comparison groups can be considered as-random. With this kind of trial, there is a risk of contamination, with those who have yet to be treated being affected by those who have already been treated. We investigate this in our secondary analysis.

The trial was carried out across 52 wk, with each week being assigned as a “step” in the stepped wedge. 1843 officers in total were assigned to be trained across the 52 wk, with an average of 35.44 participants assigned to be treated in each week. Participating officers were included in the trial by virtue of their job role, and so our sample represents the population of eligible officers in this police force at the outset of the trial period. Our data does not record whether participants actually took the training in the week specified, but A&S reported adherence was high and that all officers were ultimately treated. Nonetheless, we take an intention to treat (ITT) analysis approach and class officers as treated from the step they were assigned to be treated onwards.

Participants are not blinded to allocation, as officers are aware of whether or not they have been treated at a given point in time (because they will have either

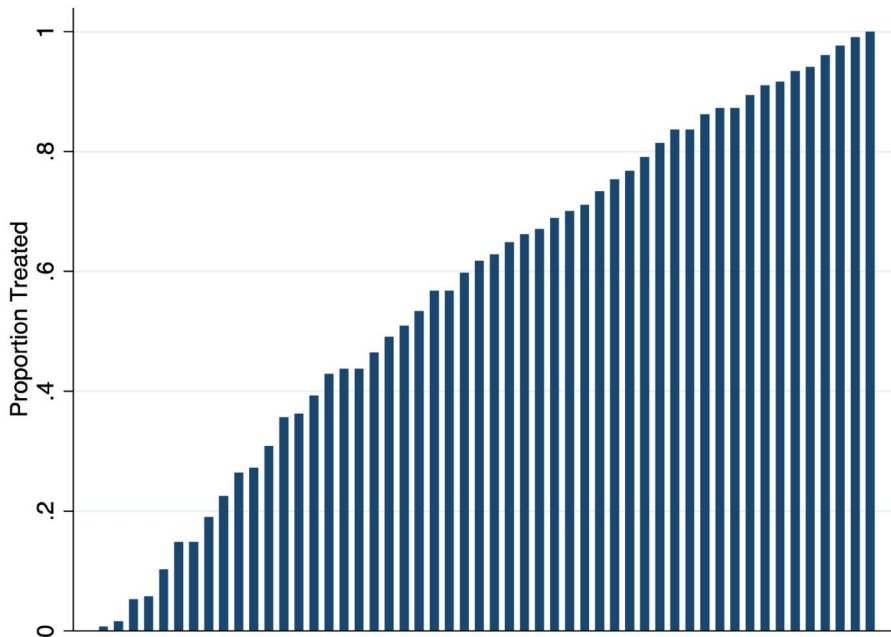


Figure 1. Allocation over waves.

received the training or not). Similarly, analysts cannot be blinded to allocation because of the nature of a stepped wedge trial.

Figure 1 below shows the rollout over the course of the trial period.

### Outcomes

The primary outcome measure for the trial was whether or not, in a given week, a police officer used force on one or more occasions. This was a binary indicator.

The primary source of data was recorded use of force incidents, provided in aggregate form by A&S. Since April 2017, all police forces in England and Wales have been required to capture standardised data on the use of force, with officers expected to complete use of force reporting forms whenever they have used force on members of the public. Uses of force include the use of handcuffs of compliant members of the public, use of unarmed physical tactics (e.g., restraints and strikes) and the drawing or use of different weapons and equipment (e.g., irritant spray baton, Taser or firearms). A full list of tactics included is available in the user guide for the statistics (Home Office, 2023b).

For the purposes of recording, a “use of force incident” is defined as all uses of force by one officer on one member of the public during a particular encounter. One incident could involve an officer using multiple tactics on the same person, each for a different reason and with a different outcome. Any use of force by another officer on that same person would constitute a different use of force incident and require the second officer to complete a separate reporting form. Hence, the number of use of force incidents reported in this paper refers to the number of use of force reports completed by police officers, and not necessarily the number of unique use of force events or the number of people against whom the police used force.

**Table 1.** Use of force categories.

1. COMPLIANT HANDCUFFING	COMPLIANT HANDCUFFING	7,019 (27.2%)
2. WEAPON DRAWN OR AIMED	BATON DRAWN	1,435 (5.5%)
	CED (TASER) AIMED	
	CED (TASER) ARCED	
	CED (TASER) - DRAWN	
	CED (TASER) RED DOT	
	IRRITANT SPRAY – CS DRAWN	
3. USE OF PHYSICAL FORCE	IRRITANT SPRAY - PAVA DRAWN	
	IRRITANT SPRAY – PAVA DRAWN	
	GROUND RESTRAINT	16,069 (62%)
	LIMB/BODY RESTRAINTS	
	NON-COMPLIANT HANDCUFFING	
	OTHER/IMPROVISED	
4. USE OF WEAPON	UNARMED SKILLS/PHYSICAL RESTRAINT	
	BATON USED	1,382 (5.3%)
	CED (TASER) DRIVE STUN	
	CED (TASER) FIRED	
	CED (TASER) THREE POINT CONTACT	
	IRRITANT SPRAY – CS USED	
	IRRITANT SPRAY – PAVA USED	

We also make use of secondary outcome measures, specifically the type of force used by the officers, divided into four predefined categories (see [Table 1](#)). [Table 1](#) also details the number of incidents of each type of use of force that occur.

We are further interested in whether force is used towards particular groups, specifically;

- Members of different ethnic groups (White; Black<sup>2</sup>; Asian<sup>8</sup>; Gypsy, Roma or Traveller (GRT)), and
- Genders (male, female, trans or non-binary).

Finally, we analyse whether or not either officers or members of the public experience an injury as an interaction, which is classed as harms analysis, as it is possible that the decision to use/not to use force, in line with the training, increases risk of injury.

### **Sample size**

Data were collected on a weekly basis about whether each officer used force, and the details of the incidence of the use of force (such as the level, and the demographics of the person who the force was used against, described above). The data were available for the 52 wk of the trial itself, and for the 48 wk prior to the trial. Analysis of the data at this level would have over-represented those officers who used force more, compared to those who used force less. We therefore collapsed our data to the level of the individual officer/week or the purposes of our main analysis. Therefore, our sample consisted of 100 observations (weeks) for each of the 1843 participants in the trial, yielding 184,300 observations in total. The sample size was fixed by the nature of the sample, which saw all officers in A&S eventually receive the training. In addition,

<sup>2</sup>The categories “Black” and “Asian” also included those from a Black mixed background or Asian mixed background respectively.

**Table 2.** Demographics of individuals against whom use of force is recorded.

Characteristic of individual against whom force is used	Number (rate)
White	22417 (85.5%)
Black	2008 (7.7%)
Asian	373 (1.4%)
Gypsy, Roma or Traveller	75 (0.5%)
Ethnicity other/not recorded	1042 (4.9%)
Female	6175 (23.8%)
Male	19554 (75.4%)
Non-binary or gender neutral	46 (0.2%)
Transgender	104 (0.4%)
Gender not recorded	36 (0.2%)

the number of steps in the trial was set by the need for everyone to have completed the training within twelve months.

In our data we observe the gender and ethnicity of people against whom force is used. These are described in [Table 2](#).

### *Statistical methods*

For each officer/week pair, we merged data on incidents of the use of force by that officer in that week. From this, we derived our primary outcome measure, which was a binary indicator of whether or not that officer used force at all, during that week, and a secondary outcome measure which captured the number of times force was used in that week by that officer. We also used details from the incident data to determine the level of force used; to derive binary indicators of whether force was used against someone who was, Black, Asian, or a Gypsy, Roma or Traveller, and whether or not the officer or member of the public was injured during the use of force incident.

As noted above, we analyse on the basis of ITT. Where an officer was scheduled (*via* random assignment) to receive training in a particular week, but ultimately received it later, they were analysed as though they received treatment when intended. There was no missing data.

All analyses were conducted using fixed effects regression analysis in Stata, reflecting the nature of our data, containing a well-balanced panel of officers and weeks, with fixed effects at the level of the officer. In all regressions, our outcome measures were regressed on the treatment variable. The correlation between time and treatment, which is a feature of stepped wedge trials, was variously handled through the inclusion of week fixed effects, week-in-year fixed effects, and a linear time trend, with the former serving as our main analysis.

In addition to linear regression, we conducted robustness checks using logistic regression for all binary outcome measures, Poisson regression for the count of uses of force, and conducted regression inference analysis.

### *Baseline data analysis*

We had no data on participant (officer) demographics, and so were unable to test for any relationship between those demographics and the order in which participants were assigned to treatment. However, we did have 48 wk of baseline data, prior to the start of the trial. Regressing participants' treatment week on their use of force

prior to the trial, we found a significant relationship, with participants treated later being marginally less likely to use force in the baseline period; the equivalent of less than one percent of one percent difference. To the extent that these differences existed, they were not empirically meaningful, and compensated for by the use of fixed effects at the officer level in our analysis.

## Results

### Primary analysis

Table 3 shows the results of our primary analysis. Model 1 in this table reports the results of a fixed effects panel regression of a binary use of force indicator (did this officer use force one or more times in this week of the trial) on treatment assignment and a vector of indicators for week of the year and the year of the study. Model 2 shows the same regression with the outcome measure replaced with the number of uses of force in a week, and the third shows a model with week of study, rather than week of year, controls.

These three regressions produce broadly similar results: a statistically significant reduction in the use of force by officers involved in the trial. Compared with a control group average of 11.2% of officers using force in a given week during the trial period, participants in the treatment group are between 0.90 percentage points and 1.23 percentage points less likely to use force depending on the model chosen. This points to a reduction of between 8.0% and 10.9% in the propensity to use force in a given week, and on average 0.0138 fewer uses of force per week per officer, amounting to an average of 0.72 fewer uses of force for every officer per year. Our findings were robust to being conducted as a logistic (columns 1 and 3) or Poisson (column 2) regression with fixed effects. However, given that logistic regression reduces the amount of data available due to collinearity, we report our linear regression results as the most accurate reflection of the effects observed in the trial for the full sample.

Alongside our regression we also conduct regression inference analysis following Heß (2017), with 100 replications, and our findings remain statistically significant at the 1% level.

### Secondary analyses

We now report the results of our secondary analyses.

**Table 3.** Primary analysis.

	(1) Binary force	(2) Continuous force	(3) Binary force
Treatment	−0.0123*** [0.00265]	−0.0138*** [0.00376]	−0.00903** [0.00276]
Regression constant	0.0820*** [0.00572]	0.104*** [0.00813]	0.0841*** [0.00686]
<i>N</i>	184300	184300	184300
Control group, mean	0.112	0.14	0.112
Controls	Week of year, year	Week of year, year	Week overall

Standard errors in brackets.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Types of force**

The first of these concerns the types of force used by the officers in our trial, using the definitions of the different types of use of force described in Table 1 above. In Table 4, below, each column follows the main regression specification for column 1 in the first table, but with the outcome measure replaced by a binary indicator of whether the participant made use of a particular type of force in a given week.

Here we found significant reductions in officers’ propensity to use physical force, insignificant falls in propensity to use compliant handcuffing or a weapon, and a non-significant increase in the drawing or aiming of weapons. The largest absolute decrease was for the use of physical force, which saw an 14% reduction, while the use of weapons fell by the largest relative amount (of 23.8%), although this should be interpreted with caution given how uncommon the use of weapons was (six uses per 1000 week/officer). As we saw in Table 1, roughly 90% of uses of force were in category 1 or category 3, with the majority of uses of force falling into category 3. Given this, the pattern of results is unsurprising.

Overall, these findings point to a significant decrease in the use of force across the board.

**Ethnicity**

Given the apparent success of the training, an emergent requirement was to explore whether the ethnicities of the people on whom the police used force changed as a result of the treatment. To do this, we broke our analysis down into four ethnic groups, whether the member of the public were White; Black or Black mixed; Asian or Asian mixed; or GRT, and regression whether force was used directed on a person of that ethnicity. The results of this analysis can be found in Table 5.

Relatively, we saw a 11% reduction in force on White people, compared with an (insignificant) 7.3% reduction in use of force on Black people. Although it is not possible to say with confidence that the training reduced use of force on Black people, given the sample size available we consider these findings promising.

**Gender**

We now proceed to look at our analysis of use of force by gender, as perceived by the police officer who used force. This analysis is in Table 6. We found the majority of uses of force (72%) were on men, and that there was a larger reduction in the use of force on men (12.8%) and a smaller reduction on women (10.1%). There was also a

**Table 4.** Impacts of the intervention on different types of use of force.

	(1) Compliant handcuffing	(2) Weapon drawn or aimed	(3) Use of physical force	(4) Use of weapon
Treatment	-0.00143 [0.00158]	0.000407 [0.000750]	-0.0108*** [0.00224]	-0.00143 [0.000749]
Regression constant	0.0306*** [0.00342]	0.00429** [0.00162]	0.0498*** [0.00484]	0.00249 [0.00162]
N	184300	184300	184300	184300
Control group, Mean	0.034	0.004	0.077	0.006
Controls	Week of Year, Year	Week of Year, Year	Week of Year, Year	Week of Year, Year

Standard errors in brackets.  
\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.

**Table 5.** Effects on use of force directed at different ethnic groups.

	(1) White	(2) Black	(3) Asian	(4) GRT
Treatment	−0.0111*** [0.00252]	−0.000698 [0.000894]	0.000487 [0.000399]	0.000102 [0.000179]
Regression constant	0.0763*** [0.00544]	0.00426* [0.00193]	0.00243** [0.000863]	0.000824* [0.000386]
<i>N</i>	184300	184300	184300	184300
Control group, mean	0.098	0.0095	0.0016	0.0002
Controls	Week of Year, Year	Week of Year, Year	Week of Year, Year	Week of Year, Year

Standard errors in brackets.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 6.** Effects on use of force towards people of different gender identities.

	(1) Male	(2) Female	(3) Trans/Non-Binary
Treatment	−0.0110*** [0.00241]	−0.00322* [0.00152]	−0.0000813 [0.000255]
Regression constant	0.0696*** [0.00521]	0.0205*** [0.00329]	0.00106 [0.000552]
<i>N</i>	184300	184300	184300
Control group, mean	0.086	0.032	0.0007
Controls	Week of Year, Year	Week of Year, Year	Week of Year, Year

Standard errors in brackets.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

nonsignificant (11%) reduction in the use of force on people perceived by officers as trans or non-binary. Overall, this pattern suggested that there was not a meaningful gender-based pattern to the reduction in the use of force, relative to baseline levels of force use against each group.

### Contamination

As described in our trial design section, there was a risk of contamination in this kind of trial, with those who have yet to be treated affected by those who have already been treated. To investigate this possibility, we conducted analysis considering only those who were *not yet treated*, looking at the effect on them of the treatment incidence (the proportion of people in the full sample who had been treated so far). This analysis yielded an estimate of a reduction in uses of force of one third of one percentage points ( $p = 0.96$ ). This was roughly one-quarter the size of the estimated impact of the intervention, but was very far from being statistically significant and consistent with no contamination.

### Harms analysis

Our final analyses related to harms: whether officers or members of the public were injured during use of force incidents. [Table 7](#) reports the results of these regressions.

We saw no significant effect on the likelihood of officers being injured in these incidents: although the point estimate was small, it was compared to a very low base. We did however see a significant reduction in the likelihood of a member of the public being injured. This is a reduction of roughly one third compared to the mean in the control group.

**Table 7.** Effects on injuries to officers or members of the public.

	(1) Officer	(2) MoP
Treatment	-0.000866 [0.00049]	-0.00204** [0.00070]
Regression constant	0.00300** [0.00108]	0.00661*** [0.00153]
<i>N</i>	184300	184300
Control group, mean	0.00305	0.0062
Controls	Week of Year, Year	Week of Year, Year

Standard errors in brackets

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .**Table 8.** Other policing activity in a&S and across England and Wales.

Police activity	Number recorded					
	Avon and Somerset			England and Wales*		
	Pre-pilot comparison period (09/20 to 08/21)	Pilot period (09/21 to 08/22)	Difference	2020/21	2021/22	Difference
Calls for service attended	173,058	166,146	-4.0%	-	-	-
Stop and searches	5,721	4,572	-20.1%	694,203	516,642	-25.6%
Arrests	17,058	17,814	+4.4%	645,225	663,036	-2.8%

\*Source: Home Office (2022c), table reproduced from Chetwynd et al. (2024).

## Discussion

### Other policing activity

Data was sought on measures of routine police activity that could contextualise the findings. Unfortunately, data was only available at the aggregate level, but it showed no consistent patterns of change in the number of calls for service received, the numbers of searches conducted, or the number of arrests carried out by officers.

Table 8 shows the number of calls for service attended by officers did go down slightly during the pilot period compared to the pre-pilot comparison period, but this was contrasted by the number of arrests being higher during the pilot period than the pre-pilot comparison period. Finally, the number of searches fell by about one-fifth in A&S, but this was less than the 26% decline seen in the number of searches carried across England and Wales during the same time period. Taken together, this data suggests the training did not have unintended consequences and did not inadvertently result in “depolicing” (Wolfe & Nix, 2016).

### Limitations

Our study was carried out as a pragmatic stepped wedge trial. Because true randomisation was not possible, we relied instead on quasi-random assignment based on the last time an officer completed training. As Figure 1 shows, this allocation was smooth across the year, and any differences in baseline propensity to use force were controlled for using our baseline data. Our secondary analysis investigated, but did not find evidence of, contamination. The pragmatism of the trial also determined the police force in which it was carried out, and so there is an important question of external validity to other police forces with different mixes of urban and rural context.



A substantive limitation was that all participants were treated by the end of the trial (as is a feature of a stepped wedge) preventing us from identifying longer term impacts of the training, or treatment effect attenuation.

However, the most substantive limitation of this study related to ethnicity subgroup analyses. It was more difficult for us to detect the effects of training on uses of force against people from minority ethnic groups because A&S is a “whiter-than-average” police force and even though the sample sizes for our main and subgroup analyses were the same.

## Conclusions

We have reported the results of a large-scale pragmatic controlled stepped wedge pragmatic controlled trial, in which all officers of a police force were allocated to receive training relating to the reduction of force by police. The findings are internally robust, given the sample size, number of steps, and the magnitude of the effect itself. Given that allocation occurred at the level of the individual officer, and that training is often rolled out in this way within police forces, the trial design itself does not pose a challenge to generalisability.

We build on a body of research that demonstrates the potential of police training but is lacking in two key ways: in studies investigating training to reduce use of force, and in studies that take place in the UK context. This study contributes to the literature by addressing this gap, and in so doing provides a pathway for future research into the effectiveness of initiatives to reduce use of force in the UK and more broadly.

In addition, the evaluation of policing interventions is often challenged by operational requirements that make conventional “gold standard” approaches like RCTs impractical. A key contribution of this paper is therefore in providing evidence that a pragmatic stepped-wedge trial can provide robust, actionable evidence about the impact of training approaches.

As we identify above, the largest challenge to generalisability is that the trial took place in a single, relatively small, relatively homogenous, police force in the South-West of England. Further research should consider a trial in a large, more urban and more diverse setting.

Nonetheless, the findings should offer substantial cause for optimism. We found robust estimates of significant, as well as meaningful, impacts of the training on the use of force and injuries to the public within the context of the trial, and no evidence of any backfire effects in terms of injuries to officers or depolicing. Although we do not find significant reductions in police force directed at women or people from minority ethnic groups, the relative effects on force against people from these groups are not qualitatively different to those focused on white people or men, suggesting that there may have been a widespread benefit of this intervention.

## Interpretation of impacts

We have reported the results of a large-scale stepped wedge trial with police officers. Our analysis and robustness checks provide high quality rigorous evidence of the impact of the intervention on use of force by police.

We found consistent evidence across the board of a reduction in the use of force by police having been trained. These effects were meaningful: an 8–10% reduction in use of force overall, depending on the model used and outcome considered. Moreover, the largest reduction in use of force occurred among uses of force categorised as more severe. These findings were consistent with our analysis of injury (a thankfully much rarer occurrence than a use of force), which saw a roughly one-third-reduction in the likelihood of a member of the public being injured, with no change in the likelihood of the officer being injured.

We were able to translate these findings into practical reductions in use of force and injury. The average incidence of use of force in the experimental period was 11.2%, meaning that for each 1000 officers, we anticipated 112 using force in any given week. For A&S, this would have meant that the 1843 officers involved in the trial would have used force 10,320 times over the course of a year. Even the most conservative estimate from our analysis suggested an 8% reduction, or 825 fewer uses of force across A&S per year - or 1,124 under what we would consider to be our most robust analysis.

Similarly, there was a 0.6% probability of an officer being involved in an incident that injures a member of the public in any given week in the control group during the experimental period, which would equate to an average of 11 injuries per week or 575 injuries per year. This was reduced by a third in the treatment condition, suggesting that 191.6 injuries per year were prevented in A&S as a result of the treatment.

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