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1. Work Package 2: Quantitative Research Appendix

1.1. Overview

This accompanying document outlines additional methodological details for the quantitative empirical chapters (i.e., Chapters 8-12). For ease of reference, we have arranged this by Chapter.

1.2. Chapter 8: Analysis using statistics: Some considerations

1.2.1. Interpreting variation in Taser use across the forces.

Here we describe and discuss the degree of variation in reported Taser use across the participating forces. We also consider in more depth some of the issues with missing data.

1.2.1.1. Descriptive statistics

Table 1. shows that the use of Taser varies hugely across forces. In the study period, between 1st January 2018 and 31st December 2021, the number of uses of force forms submitted by officers for each force ranged from 7,911 to 478,406, and the number of reported Taser uses from 669 to 24,390. These numbers on their own are impossible to interpret. For one, we would expect larger forces in bigger cities to have much higher numbers of use of force forms. To create comparable measures, it is important to examine how the volume of submitted use of force forms compares to several factors, such as the size of the population within the jurisdiction, the number of crimes, the number of violent crimes, the number of officers, and so on.

For instance, on average across all force areas, a little over 8 use of force forms were filed for every 100 crimes. Bedfordshire was the most 'typical' force, with Hampshire having only a little over 3 use of force forms per 100 crimes, and the MPS having the highest number with over 14. For every 100 violent crimes, the average was a little over 24 forms filed, with, again, Bedfordshire coming closest to the average with 26, Hampshire the lowest with 8, and the MPS the highest at 54.

Another issue is that the size of the population or the number of officers might be the reason for the disparities in reported use of force, after all, larger populations with more officers seem likely to produce more forms. Per 100 resident population, the average number of uses of force forms filed was 3 over the study period. This time, West Mercia was closest to the mean, with Hampshire and the MPS remaining the two edge cases with around 1 and 5 forms respectively. Focussing just on ethnic minority populations, on average for every 100 people from an ethnic minority background, the number of forms filed was 51. Here, GMP had the lowest rate, at 6 and Bedfordshire the highest, at 86, with West Mercia at 46 being closest to the mean. For each officer, the number of forms filed was on average 7, with Surrey being closest to the mean this time with 7. Derbyshire officers returned the fewest forms at 3 and Gwent officers the most with 12. We can observe that in isolation such descriptive statistics, whilst interesting, alone tell us very little about what is happening and why.

1.2.1.2. What explains the differences between the forces?

The share of Taser use among all uses of force was between 3% and 10% per force, with an average of around 6%. It stands to reason to ask whether these proportions reflect real disparities across the various forces (i.e., do some forces use Taser more frequently) or are they the by-product – at least, to some extent – of varying reporting practices?

To assess this and quantify the potential association between reported Taser use and the above measures, we used bivariate correlation analysis. Notably, due to the small sample size, we do not expect these estimates to be robust, but use them to illustrate the relationship (or lack thereof) between the various measures. The correlation coefficients were all negative, with the relationship between the share of reported Taser uses and the use of force per overall population estimate being strongest ($r=-0.67$, $p<0.05$), closely followed by the number of officers ($r=-0.63$, $p>0.05$), crimes ($r=-0.58$, $p>0.05$), and violent crimes ($r=-0.42$, $p>0.05$). The estimate for ethnic minority population was the weakest ($r=-0.14$, $p>0.05$), implying a spurious association. As a final, further robustness check, we also considered the association between the share of ethnic minority subjects being reported in the use of force forms and the share of Taser use. There was virtually no association between the two variables ($r=-0.08$, $p>0.05$), which instead had a strong negative correlation with use of force per 100 ethnic minority population ($r=-0.90$, $p<0.01$). This suggests that differential reporting practices in the share of Taser use is unlikely to apply to reported ethnic minority membership.

Our analysis implies that these disparities are likely produced by varying levels of reporting. In particular, the figures above seem to indicate that forces with higher number of uses of force forms per population, more officers, and more crimes have a *lower* share of reported Taser use as a proportion of all uses of force. Since Taser is a highly scrutinised use of force and is accompanied by technology-assisted ways in which each incident can be or should be logged (i.e., Taser use often automatically activates the officer's body worn camera), it can by hypothesised that, all else being equal, in forces where the share of Taser use is above average, it is possible that there is some degree of relative underreporting when it comes to other use of force. By contrast, a lower share of reported Taser use may indicate overreporting or repeat reporting of use of force.

1.2.1.3. Missing data

These under/overreporting practices is where missing data enters the picture. At the outset, based on our experience with other police-recorded data we expected that one of our main challenges in this research would be addressing missing data in the use of force forms. To our surprise this did not seem to be the case. For the most part, police forces implemented the use of force forms in a way that made almost all questions mandatory to answer, which meant there were very low levels of missing

data in the forms collected. This type of missing data is usually referred to as ‘question-level’ or ‘item-level’ missing data, and it was markedly low in numbers. By contrast, the issue discussed above can be referred to as ‘unit-level’ missingness. The filed use of force forms seemed unlikely to cover all cases of force, among which certain instances were probably never put to paper.

1.2.1.4. How to address the missing data problem?

At this stage all the above is conjecture. Without further research it is impossible to tell the scale and nature of missing data in the use of force forms. We are aware that some forces have already carried out internal audits regarding use of force forms, such as dip sampling. We believe that there are other potentially more effective tools that could be used.

One approach is asking a random set of officers to anonymously report on their personal experiences with use of force forms and the likelihood that they (or their colleague’s) would (not) submit one of these. Another approach could be encouraging officers in one part of the force but not the other to fill out use of force forms in all circumstances and observe the difference in the volume of forms submitted. Either of the above approaches (or other alternatives) could shed some much-needed light on the extent to which use of force forms submitted reflect the reality on the ground. Simply put: the data contained in the use of force forms is only as good as the data generating process underpinning them. As demonstrated above, there is reason to believe that some of the potential disparities in the data are likely caused by varying reporting practices instead of actual police behaviour on the ground.

1.2.1.5. Implications of missing data

In summary, the available data analysed in this report could potentially lead to erroneous conclusions, especially if the use of force forms are not missing at random but are created due to some (unintended) reporting biases. There is some suggestion in the literature that the lack of findings regarding racial disparities in administrative data might be caused by inappropriate analytical strategies (Knox, Lowe, & Mummolo, 2020) or insufficient data recording (Cai et al., 2022). Either way, due to the limitations discussed above, the results presented in this report should of course be considered with caution.

Table 1. Comparative statistics for police force areas

	Bedfordshire	Derbyshire	GMP	Gwent	Hampshire	MPS	Surrey[1]	Warwickshire	West Mercia	West Yorkshire
Number of use of force incidents (2018-2021)	17,204	19,372	46,299*	26,982	19,136	478,406*[2]	27,471	7,911	36,363	87,380*
Share of Taser use (proportion of all use of force incidents)	6.27% (N=1,079)	4.84% (N= 939)	9.97% (N= 4,618)	3.62% (N=976)	7.11% (N=1,360)	5.09% (N=24,390)	7.47% (N=2,053)	8.46% (N=669)	4.41% (N=1,675)	2.72% (N= 2,383)
Proportion of ethnic minority subjects in use of force records	16.19% (N=2,786)	11.87% (N=2,300)	21.08% (N=9,762)	9.82% (N= 2,650)	10.95% (N= 2,095)	57.15% (N=273,442)	14.87% (N=4,086)	16.48% (N=1,304)	10.86% (N=3,952)	24.70% (N=21,587)
Use of force per 100 crimes (In brackets: number of crimes[3])	8.13 (211,607)	6.56 (295,220[4])	4.69 (987,666)	12.46 (216,473)	3.03 (631,151)	14.39 (3,323,589)	9.45 (290,574)	4.92 (160,751)	10.99 (330,767)	7.78 (1,122,863)
Use of force per 100 violent crimes (In brackets: number of violent crimes)	25.58 (67,258)	17.38 (111,465)	13.84 (334,413)	34.33 (78,602)	7.90 (242,322)	54.07 (884,805)	28.43 (96,628)	13.65 (57,953)	27.53 (132,064)	29.95 (438,021)
Use of force per officer (in brackets: number of officers averaged)[5]	6.76 (2,545)	2.62 (7,393)	3.98 (11,621)	12.01 (2,246)	3.35 (5,700)	10.40 (45,988)	6.60 (4,159)	4.04 (1,957)	8.27 (4,399)	8.34 (10,482)
Use of force per 100 residents in force area (in brackets: population size)[6]	2.44 (704,746)	1.83 (1,055,993)	1.48 (3,137,674)	4.59 (587,711)	0.96 (1,998,312)	5.28 (9,053,204)	2.28 (1,203,113)	1.33 (596,755)	2.59 (1,401,468)	3.72 (2,351,579)
Use of force per 100 residents from an ethnic minority (in brackets: ethnic minority population size)	86.3 (197,222)	20.17 (97,829)	6.39 (724,588)	79.08 (34,121)	10.22 (187,250)	11.58 (4,130,673)	15.75 (174,474)	12.15 (65,092)	45.57 (79,796)	40.68 (214,777)

Table 1. notes:

[1] For Surrey, data was only available between 2019-2022, nevertheless, we wanted to include it in the comparative analysis for the sake of greater transparency.
[2] Out of force (4318) and CTSFO's (1209) removed from the raw dataset
[3] https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/datasets/policeforceareadatatables
[4] At the time of writing, Derbyshire crime figures published by the Home Office are understated compared with locally held force statistics. This impacts the most on violence against the person figures. Work is on-going between the Home Office and the Force to rectify the issue.
[5] https://www.gov.uk/government/statistics/police-workforce-open-data-tables
[6]Census 2021 estimates for police force area
* Non-duplicate

1.2.2. Comparative Statistical Analysis of Use of force forms – Data Challenges

1.2.2.1. Bedfordshire

Bedfordshire provided the raw use of force data in multiple excel files, of which one file covered the period between January 2018 and December 2020 and an additional 12 files for each month in 2021. This presented challenges when attempting to merge the files due to varying variable names. Likewise, the variables on individual tactics were also missing from the files, and thus we had to acquire this information from the tactic sequencing (i.e., the order described in the use of force forms). For example, to determine the number of incidents related to Taser, we combined tactic sequences 1 – 5. A later iteration of the data with individual tactics was provided for the twelve months until December 2021. However, as this was based on public view, it presented different but equally challenging issues. For example, there was no distinction between compliant and noncompliant handcuffing and a lower count of recorded Taser incidents relative to the other files provided. Therefore, we opted to use the datasets initially provided.

Bedfordshire provided a file containing officer characteristics such as ethnicity, age, and length of service, which was to be merged with the use of force data using the officer collar numbers. However, several observations could not be matched which indicates that there were some data processing mistakes. Another possible explanation for this could be that the officer information file only contained a snapshot of active officers on the day the data file was produced, while the use of force data spanned a period of four years. It remains unclear why the officer information could not have been directly incorporated into the use of force data.

Police officers must document their usage of Taser across seven categories: drawn, aimed, arced, red-dot, drive-stun, fired, and angle drive-stun. However, in the data provided by this force, there was no information on the "arced" category, despite the

force confirming that officers were still required to record their usage of this category. This shows that despite having a standardised use of force forms, local reporting practices still appear to be influential in recorded uses of Taser.

1.2.2.2. Derbyshire

Derbyshire Police provided three separate data files: one containing use of force data, one containing complaint data, and the last containing daily calls for service. However, due to delays in receiving the data, we were unable to conduct further in-depth analysis on the provided datasets. As a result, our analysis was limited to the comparative analysis without the opportunity for extensive exploration. A notable omission in the data file from Derbyshire Police was the "Officer ethnicity" variable, which was missing. Despite efforts to obtain this information through enquiries, the reason for its unavailability remains unknown. It is worth mentioning that other officer characteristics such as age and gender were recorded in the provided data.

Additionally, geocoded data, call for service data, and Taser incident data were not included in the dataset provided by Derbyshire Police. This limited the scope of our analysis and restricted the ability to incorporate these important variables into the comparative analysis. Furthermore, the data provided covered the period up until the year ending December 2022. To maintain consistency across all police forces included in the comparative analysis, the data for that particular year was excluded from the analysis. This step ensured that all forces were evaluated over the same time frame, allowing for fair comparisons and reliable insights.

1.2.2.3. Greater Manchester Police

GMP provided one data file containing all use of force data. The data was of very good quality and included the relevant information required to allow for analysis for the most part. Although geo-coding was provided, the areas were not linkable with other data sources and were very large (MSOA+). Furthermore, no data was provided in relation to Taser incidents and calls for service.

1.2.2.4. Gwent

Gwent provided UoF data in four separate Excel files, representing each calendar year from 2018 to 2021. However, the absence of gender information for the involved citizens made it difficult to analyse gender-related trends. One commendable practice in this dataset is the inclusion of incident postcodes, which are not commonly observed in UoF datasets provided by other force areas. Furthermore, in addition to the UoF data, the force area also supplied incident data, which was divided into four separate Excel files. The incident data included postcodes, response grades, incident closing classes, and response methods such as 999 calls, 101 calls, and radio communications. Further supporting information on Local Policing Area beat codes was also supplied.

1.2.2.5. Hampshire

Hampshire provided four data files for each year for the use of force data and four additional files containing call-for-service data, including geo-tags (LSOA names). The force assigned each incident a unique reference number, which was used to merge the two datasets (as further explained in the Hampshire deep-dive). However, it became evident that the force was using old LSOA classifications, making it impossible, in some of the data, to match with other relevant information, such as census estimates. As a result, several observations had to be removed from the deep-dive analysis. More concerningly, the force did not seem to have a process in place to update data classified using the expired LSOA classification system.

1.2.2.6. Metropolitan Police Service

The MPS provided two separate data files: one containing information on the use of force, and the other containing officer demographics. The primary challenge we encountered was that all the tactics used during incidents were merged into a single variable. As a result, each row represented a different tactic, leading to duplicated observations. For instance, if an incident involved multiple tactics such as ground restraint, handcuffing, and Taser usage, each tactic would appear as a separate row in the dataset. To address this issue of duplication, we examined the individual URN numbers provided in the dataset. The goal was to ensure that each URN number was unique, avoiding the inclusion of duplicate incidents in our analysis. Due to the large size of the dataset, the process of loading and cleaning the data took longer than expected. This was primarily due to the presence of duplicate observations, which required additional steps to handle properly. Furthermore, it's worth noting that although the dataset included Borough level information, geocoded data, call for service data, and Taser incident data were not provided.

Additionally, during further robustness checks, we discovered that duplicates still existed within the dataset. To address this issue, we implemented a method that involved using custody numbers in combination with other physical characteristics and the date of the incidents. By considering these parameters, we aimed to identify and remove duplicate observations. However, it's important to note that despite these efforts, there is still a possibility of some duplicate observations remaining in the dataset. This is because not all individuals included in the dataset were necessarily dealt with through arrest, and thus may not have custody numbers associated with them. Therefore, while we have taken steps to minimise duplicate observations, it is important to acknowledge this limitation.

1.2.2.7. Surrey

Surrey provided a single data file that contained use of force data. However, it is important to note that the dataset only covered the period between January 2019 and December 2022. This posed a challenge as all the other police forces included in the analysis had data starting from 2018. Due to this discrepancy, the data from Surrey

Police Force was excluded from the analysis to maintain consistency across all police forces included in the comparative analysis.

1.2.2.8. Warwickshire

Warwickshire supplied UoF information in a single Excel file; however, the file was missing crucial information, leading to several issues. Notably, the staff age bands differed from those provided by other force areas. For instance, the dataset used an age grouping of 18-34 years, while other areas adopted a grouping of 30-39 years. Furthermore, no data regarding the length of police service was provided. As a result, we could not conduct the third comparative model, which aimed to examine the relationship between officer characteristics and the use of Tasers. An interesting finding within the data was the complete absence of recorded incidents related to impact factors such as prior knowledge, sex, size and build, and the presence of a weapon throughout the four-year analysis period. This raises questions about the territorial guidance given to officers regarding completing UoF forms, potentially discouraging them from documenting incidents associated with these categories. Similarly, although a variable for the level of Taser use was present, it was discovered to be empty during analysis, possibly indicating a data retrieval issue.

1.2.2.9. West Yorkshire

West Yorkshire provided two separate data files, one containing use of force data and the other containing Taser incident data. The merging of these datasets posed a significant challenge due to incomplete or missing incident references. These missing or incomplete incident references made it difficult to establish reliable links between the two datasets. Another obstacle encountered was the unavailability of geocoded data. In the Taser incident data, only partial postcodes were recorded, which made it impossible to accurately determine the locations of the incidents or link them to other data sources. This limitation restricted the ability to conduct geospatial analysis or investigate spatial patterns related to the use of force or Taser incidents.

Furthermore, one notable officer characteristic that was missing from the data file provided by West Yorkshire was "Officer ethnicity." Unfortunately, this information could not be included in the dataset due to data protection grounds. These challenges highlight the complexities involved in merging and analysing the datasets provided. The absence of complete incident references, geocoded data, and certain officer characteristics poses limitations on the depth of analysis.

1.2.2.10. West Mercia

West Mercia provided one data file initially. This file contained use of force form data, however, the dataset was missing information on the different levels of Taser use (i.e., whether the Taser was drawn, aimed, etc.). The force then provided older forms which contained the different levels of Taser usage. The data provided was linkable through officer names and collar numbers, however, the recording of officer names varied in

the way they were recorded on the old Taser forms (surname and collar number) and on the new use of force forms (first name and surname). These had to be manually amended to allow for merging as this was the only way to advance with the analysis of Taser usage. Additionally, geocoded data was not provided, and neither was call for service data and Taser incident data.

1.3. Chapter 9: Cross-force comparison

1.3.1. Table 3. Taser use with other uses of force across the force areas

Table 3. Taser use with other uses of force across the force areas

Force area	**On its own**	**…with handcuffing**	**…with unarmed skills**	**…with ground/limb/body restraints**	**…with spit guard /dogs/shield/spray**	**…with baton**	**…with firearms**	**…with other improvised**	**TOTAL**
Bedfordshire	575 (48.36%)	392 (32.97%)	129 (10.85%)	64 (5.38%)	5 (0.42%)	7 (0.59%)	10 (0.84%)	7 (0.59%)	1,189 (100%)
Gwent	578 (53.87%)	306 (28.52%)	136 (12.67%)	34 (3.17%)	5 (0.47%)	6 (0.56%)	1 (0.09%)	7 (0.65%)	1,073 (100%)
Derbyshire	682 (63.50%)	136 (12.66%)	143 (13.31%)	26 (2.42%)	28 (2.61%)	2 (0.19%)	4 (0.37%)	53 (4.93%)	1,074 (100%)
Hampshire	507 (26.13%)	719 (37.06%)	346 (17.84%)	296 (15.26%)	55 (2.84%)	7 (0.36%)	-	10 (0.52%)	1,940 (100%)
GMP	2,151 (40.64%)	1,403 (26.51%)	537 (10.15%)	1,031 (19.48%)	97 (1.83%)	13 (0.25%)	15 (0.28%)	46 (0.87%)	5,293 (100%)
MPS	20,112 (59.53%)	7,616 (22.54%)	2,656 (7.86%)	2,485 (7.36%)	150 (0.44%)	74 (0.22%)	386 (1.14%)	303 (0.90%)	33,782 (100%)
Surrey	1,174 (57.18%)	424 (20.65%)	274 (13.35%)	69 (3.36%)	43 (2.09%)	5 (0.24%)	18 (0.88%)	46 (2.24%)	2,053 (100%)
Warwickshire	218 (33.64%)	218 (33.64%)	66 (10.19%)	49 (7.56%)	22 (3.40%)	1 (0.15%)	55 (8.49%)	19 (2.93%)	648 (100%)
West Mercia	762 (45.49%)	160 (9.55%)	40 (2.39%)	118 (7.04%)	21 (1.25%)	1 (0.06%)	44 (2.63%)	529 (31.58%)	1,675 (100%)
West Yorkshire	1,655 (61.23%)	484 (17.91%)	377 (13.95%)	47 (1.74%)	77 (2.85%)	5 (0.18%)	42 (1.55%)	16 (0.59%)	2,703 (100%)

1.3.2. Cross-force analysis statistical tables and robustness checks

This section contains the supporting tables for the multivariate analysis discussed in Chapter 9. In particular:

- Table A2.1 has the results for the six models with odds ratios estimated
- Table A2.2 has the results for the same six models but with marginal effects
- Table A2.3 also contains the marginal effects for the same six models with the p-values added
- Table A2.4 includes the counts and proportions of firearm uses across the seven forces included in the analysis
- Table A2.5 fits the six models with the firearm cases excluded and estimates the odds ratios
- Table A2.6 fits model 6 with the three different weighting schemes estimating the odds ratios for the variables

Table A2.1
Binary logistic regression analysis for Taser use vs others uses of force (odds ratios)
Cross Force comparison with fixed effects (Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.92***	0.87***	0.91***	0.84***	0.92***	0.82***
Black	1.27***	1.24***	1.21***	0.97*	1.28***	1.00
Other	0.89***	0.87***	0.91**	0.84***	0.91**	0.88***
Missing	1.48***	1.48***	1.43***	1.41***	1.48***	1.47***
Mixed	1.15***	1.16***	1.17*	0.97	1.17***	1.06
Female		0.37***				0.52***
Age						
18-34		1.11***				1.40***
35-49		0.99				1.45***
50+		0.93*				1.40***
Mental Health		1.76***				1.84***
Officer demographics						
Age						
30-39			1.11***			1.12***
40-49			0.78***			0.93**
50+			0.45***			0.63***
Length of service						
2-5 years			7.20***			7.02***
6-10 years			23.8***			19.2***
11 years or more			23.5***			18.9***
Other factors						
Alcohol				0.77***		0.71***
Drugs				0.84***		0.80***
Prior knowledge				1.85***		1.94***
Sex, size, build				1.53***		1.45***
Weapon				12.6***		11.2***
Lockdown 1					1.09***	1.15***
Lockdown 2					0.82***	0.92
Lockdown 3					0.78***	0.90***
Morning					0.74***	0.78***
Afternoon					0.75***	0.74***
Night					1.23***	1.37***
Tjur's R^2	0.007	0.013	0.032	0.089	0.010	0.128
N	666318	663585	639603	666318	666287	636868

* p<0.05, ** p<0.01, *** p<0.001

Table A2.2
Taser use vs any other use of force, marginal effects model (Average Marginal Effect)
Cross Force comparison with fixed effects (Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	-0.004***	-0.006***	-0.004***	-0.007***	-0.003***	-0.008***
Black	0.011***	0.010***	0.009***	-0.001*	0.012***	0.000
Other	-0.005***	-0.006***	-0.004**	-0.007***	-0.004**	-0.005***
Missing	0.019***	0.019***	0.017***	0.015***	0.019***	0.016***
Mixed	0.007***	0.007***	0.007***	-0.001	0.007***	0.002
Female		-0.047***				-0.028***
Age						
18-34		0.005***				0.014***
35-49		-0.000				0.016***
50+		-0.003*				0.014***
Mental Health		0.027***				0.026***
Officer demographics						
Age						
30-39			0.005***			0.005***
40-49			-0.011***			-0.003**
50+			-0.038***			-0.019***
Length of service						
2-5 years			0.095***			0.084***
6-10 years			0.153***			0.128***
11 years or more			0.152***			0.127***
Other factors						
Alcohol				-0.011***		-0.014***
Drugs				-0.007***		-0.009***
Prior knowledge				0.027***		0.028***
Sex, size, build				0.019***		0.016***
Weapon				0.113***		0.105***
Lockdown 1					0.004***	0.006***
Lockdown 2					-0.009***	-0.003
Lockdown 3					-0.011***	-0.004***
Morning					-0.014***	-0.010***
Afternoon					-0.013***	-0.012***
Night					0.010***	0.013***
N	666318	663585	639603	666318	666287	636868

* p<0.05, ** p<0.01, *** p<0.001

Table A2.3
Taser use vs any other use of force, marginal effects model (Average Marginal Effect) with p-values
Cross Force comparison with fixed effects (Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	-0.0040	-0.0066	-0.0045	-0.0078	-0.0038	-0.0082
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Black	0.0118	0.0108	0.0095	-0.0013	0.0124	0.0001
	(<0.001)	(<0.001)	(<0.001)	(0.043)	(<0.001)	(0.887)
Other	-0.0052	-0.0068	-0.0041	-0.0074	-0.0044	-0.0054
	(<0.001)	(<0.001)	(0.008)	(<0.001)	(0.004)	(<0.001)
Missing	0.0195	0.0192	0.0174	0.0157	0.0195	0.0167
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Mixed	0.0071	0.0072	0.0077	-0.0013	0.0078	0.0028
	(<0.001)	(<0.001)	(<0.001)	(0.366)	(<0.001)	(0.056)
Female		-0.0474				-0.0281
		(<0.001)				(<0.001)
Age						
18-34		0.0054				0.0147
		(<0.001)				(<0.001)
35-49		-0.0003				0.0164
		(0.724)				(<0.001)
50+		-0.0030				0.0147
		(0.021)				(<0.001)
Mental Health		0.0278				0.0266
		(<0.001)				(<0.001)
Officer demographics						
Age						
30-39			0.0051			0.0050
			(<0.001)			(<0.001)
40-49			-0.0114			-0.0031
			(<0.001)			(0.002)
50+			-0.0385			-0.0199
			(<0.001)			(<0.001)
Length of service						
2-5 years			0.0955			0.0846
			(<0.001)			(<0.001)
6-10 years			0.1534			0.1283
			(<0.001)			(0.054)
11 years or more			0.1528			0.1277
			(<0.001)			(<0.001)
Other factors						
Alcohol				-0.0113		-0.0146
				(<0.001)		(<0.001)
Drugs				-0.0077		-0.0096
				(<0.001)		(<0.001)
Prior knowledge				0.0278		0.0289
				(<0.001)		(<0.001)
Sex, size, build				0.0193		0.0163
				(<0.001)		(<0.001)
Weapon				0.1137		0.1052
				(<0.001)		(<0.001)
Lockdown 1					0.0042	0.0064
					(<0.001)	(<0.001)
Lockdown 2					-0.0092	-0.0034
					(<0.001)	(0.054)
Lockdown 3					-0.0117	-0.0044
					(<0.001)	(<0.001)
Morning					-0.0147	-0.0104
					(<0.001)	(<0.001)
Afternoon					-0.0136	-0.0129
					(<0.001)	(<0.001)
Night					0.0102	0.0137

					(<0.001)	(<0.001)
N	666318	663585	639603	666318	666287	636868

* p<0.05, ** p<0.01, *** p<0.001

Table A2.4
Number and proportion of Firearms use in Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire

		Proportion of uses
Firearms with Taser	321	0.92%
Total Firearms use	4336	0.65%

Table A2.5
Binary logistic regression analysis for Taser use vs other uses of excluding all Firearms cases (odds ratios)
Cross Force comparison with fixed effects (Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.92***	0.87***	0.91***	0.84***	0.92***	0.83***
Black	1.27***	1.24***	1.21***	0.97*	1.28***	1.00
Other	0.89***	0.86***	0.91**	0.85***	0.91**	0.88***
Missing	1.49***	1.48***	1.44***	1.40***	1.49***	1.50***
Mixed	1.14***	1.14***	1.16***	0.96	1.16***	1.06
Female		0.37***				0.52***
Age						
18-34		1.11***				1.42***
35-49		0.99				1.48***
50+		0.93*				1.43***
Mental Health		1.77***				1.83***
Officer demographics						
Age						
30-39			1.10***			1.12***
40-49			0.78***			0.92***
50+			0.44***			0.61***
Length of service						
2-5 years			7.31***			7.16***
6-10 years			24.3***			19.9***
11 years or more			24.1***			20.3***
Other factors						
Alcohol				0.77***		0.70***
Drugs				0.83***		0.79***
Prior knowledge				1.86***		1.96***
Sex, size, build				1.53***		1.45***
Weapon				12.9***		11.7***
Lockdown 1					1.09***	1.16***
Lockdown 2					0.82***	0.93
Lockdown 3					0.78***	0.90***
Morning					0.73***	0.78***
Afternoon					0.75***	0.73***
Night					1.23***	1.38***
Tjur's R^2	0.007	0.013	0.033	0.091	0.007	0.132
N	661975	659321	635382	661975	661945	632726

* p<0.05, ** p<0.01, *** p<0.001

Table A2.6
Weighted and unweighted binary logistic regression analysis for Taser use vs any other use of force (odds ratios)
Cross Force comparison with fixed effects (Bedfordshire, Derbyshire, GMP, Hampshire, MPS, West Yorkshire)

	Population weighted	Adjustment weights	Nested population weights	Unweighted (Model 6)
Citizen Demographics				
Ethnicity				
Asian	0.80***	0.88**	0.89*	0.82***
Black	0.99	1.01	0.99	1.00
Other	0.85***	1.12	1.00	0.88***
Missing	1.52***	1.60***	1.64***	1.47***
Mixed	1.04	1.01	0.97	1.06
Female	0.55***	0.42***	0.44***	0.52***
Age				
18-34	1.34***	1.33***	1.23***	1.40***
35-49	1.41***	1.27***	1.20***	1.45***
50+	1.38***	1.26***	1.21**	1.40***
Mental Health	1.83***	1.54***	1.48***	1.84***
Officer demographics				
Age				
30-39	1.10***	1.28***	1.28***	1.12***
40-49	0.90***	1.28***	1.28***	0.93**
50+	0.59***	1.12	1.13	0.63***
Length of service				
2-5 years	3.54***	4.70***	3.02***	7.02***
6-10 years	11.1***	8.69***	5.84***	19.2***
11 years or more	11.3***	7.16***	4.77***	18.9***
Other factors				
Alcohol	0.75***	0.90**	0.97	0.71***
Drugs	0.78***	1.09*	1.09*	0.80***
Prior knowledge	1.99***	2.15***	2.20***	1.94***
Sex, size, build	1.44***	1.67***	1.64***	1.45***
Weapon	11.2***	12.8***	13.4***	11.2***
Lockdown 1	1.17***	1.17***	1.20***	1.15***
Lockdown 2	1.01	0.89	0.99	0.92
Lockdown 3	1.01	0.82***	0.96	0.90***
Morning	0.74***	0.91*	0.88**	0.78***
Afternoon	0.72***	0.82***	0.80***	0.74***
Night	1.37***	1.25***	1.23***	1.37***
Tjur's R^2	0.201	0.252	0.245	0.128
N	636868	636868	636868	636868

* p<0.05, ** p<0.01, *** p<0.001

1.3.3. Force-by-force analysis of Taser use

This section revisits the analysis carried out in the comparative chapter (Chapter 9), but considers each force one at a time instead. We believe that this is important both because this analysis highlights the great degree of variation across the forces and also because this is the only way you can provide tailored feedback for each of them on their use of Taser.

We considered two outcome variables of interest. The first one is the same as scrutinised before: a binary variable for Taser being used (Taser use = 1) vs any other use of force (other use of force = 0).

The second outcome variable we used was the level of Taser use, which ranges from drawing the weapon to red-dotting and discharging. As described in cross-force comparison chapter, the level of Taser use varied greatly across forces, and certain categories had very small cell counts. This can be problematic when it comes to multinomial logistic regression, the preferred analytic technique for nominal level variables with multiple categories, as 'perfect predictions' could emerge in such instances. To circumvent this, we created a new outcome variable with three categories, 0 denoting any other use of force, 1 merging the drawn, arced, and aimed categories (all describing preparatory steps before Taser use), and 2 referring to cases when the subject was either red-dotted or was fired upon (threat of Taser use and acting upon that threat).

1.3.3.1. Multivariate analysis – Taser use vs any other use of force

Table A3.1 provides a qualitative summary of the findings from the models (the results in full are available in sections 1.3.4 and 1.3.5 below). All models included ethnicity as an explanatory variable, alongside others, whilst Model 6 added all variables.

The first main takeaway from Table A3.1 is that the models fitted to the data from the eight forces showed limited agreement. In fact, none of the findings were shared by all models (i.e. *none* of the variables had a consistent association with Taser use across *all* forces).

Turning to our main variable of interest, ethnicity, in Model 1, being Black increased the chance of Taser being used in four forces. In addition, in GMP Mixed and Missing ethnic information were also associated with higher odds of Taser use; in the MPS Mixed and Missing ethnic information were associated with higher odds of Taser use, and Asian and Other associated with lower odds; and in Derbyshire Missing ethnic information was also associated with increased odds of Taser use. In Hampshire, Missing ethnic information, was associated with lower odds of Taser use. Notably, even at the bivariate level ethnicity did not seem to have an association with Taser use (vs other uses of force) in Bedfordshire, Gwent and Warwickshire.

As we move through the model specifications from Model 2 to Model 6, the association between ethnicity and Taser use (vis a vis other force modalities) shifts. Most importantly, in the forces where there is a positive association between Black ethnicity and the odds of Taser use – GMP, West Yorkshire, MPS and Derbyshire – this persisted in models 2,3, and 5. This suggests that other demographic variables of the citizens (Model 2), the demographic variables of the police (Model 3), or other contextual variables (Model 5) did not account for the association between ethnicity and Taser use in these three force areas. Adding impact factors to the models, however, seemed to nullify this association for all forces except GMP.

Once all variables were added to the same model (Model 6), the positive association between being Black and Taser use disappeared. Here, controlling for all else, a *negative* association emerged between being Asian and Taser use in West Yorkshire and the MPS, but not the other forces. A positive association emerged between being of Other ethnicity and Taser use in GMP and the MPS, but not the other forces, and a positive association also emerged between Missing ethnic information and Taser use MPS and Derbyshire, but not the other forces.

The citizen demographic model (Model 2) suggested that in several forces, controlling for all else, middle-aged (e.g. West Yorkshire) or older (e.g. GMP) adults (compared to the youngest age group) seemed to have a higher chance of Taser being used against them. More consistently, people suffering from mental health problems had a higher chance of Taser being used against them in seven out of the eight forces. Conversely, being a woman reduced the odds of Taser being used, which was true for all forces except for Gwent where the sex of the individual variable was missing (it is not being recorded).

Model 3, which considered officer characteristics, implied that longer police service had a positive partial association with Taser use in all forces except Warwickshire, but otherwise there was no other agreement across the police forces for the other variables.

Model 4 added the impact factors to the regressions. In all forces except, again, Warwickshire, the subject having a weapon on them and police having prior knowledge of them had a positive partial association with Taser use. While being under the influence of alcohol reduced the chances of Taser use in six forces, it *increased* the chances in Hampshire. Being under the influence of drugs also showed a contradictory picture: it exhibited a negative partial association with Taser use in some forces (e.g. GMP and the MPS) but a positive one in others (e.g. Gwent).

Model 5 included other contextual variables in the modelling, in particular, the time of day the use of force transpired and the three national lockdowns. Night-time was associated positively with Taser use in GMP and the MPS; the second and third lockdown was associated negatively with Taser use in the same forces. Overall,

though, no clear picture emerged here, with no more than two forces aligning on any of the other emerging results.

Finally, Model 6 entered all variables into the model. When comparing these full models, there was no full agreement, as highlighted earlier. In seven of the eight forces (all but Warwickshire) carrying a weapon, prior knowledge, and longer police service had a positive partial association with Taser use. Moreover, the effect of gender was fairly consistent, whereby all else equal being equal being a woman reduced the chances of Taser being used in six of the seven forces where the variable was available (here, Gwent was the outlier). Controlling for all else, living with mental health problems also had a positive partial association with Taser use in seven of the eight forces (in all, but Hampshire). All else considered, being under the influence of alcohol decreased the odds of Taser being used in six out of eight force, but in one force it increased the odds (Hampshire) and in one, it showed no relationship (Bedfordshire). All else being equal, older citizens (compared to the youngest ones) had an increased odds of Taser being used against them compared to other uses of force in five out of eight forces (with Bedfordshire, Gwent, Hampshire, and Warwickshire not showing a partial association). Other than the above, no more than three forces aligned on significant partial associations pointing in the same direction. To highlight the findings where there was considerable agreement across the forces, we created a separate summary Table (Table A3.2).

Table A3.1

Qualitative summary of the comparative analysis (binary logistic regression models of Taser use vs other uses of force)

Models	GMP	West Yorkshire	Hampshire	Bedfordshire	MPS	MPS fixed effects (Borough)	Derbyshire	Gwent*	Warwickshire
Model 1 (citizen ethnicity)	Increased: Black, Mixed, Missing	Increased: Black	Decreased: missing ethnicity	None	Increased: Black, Mixed, Missing Decreased: Asian, Other	Increased: Black, Mixed, Missing Decreased: Asian, Other	Increased: Black, Missing	None	None
Model 2 (citizen ethnicity and other citizen demographics)	Increased: Black, Mixed, older age groups, mental health Decreased: Women	Increased: Black, Mixed, middle-aged, mental health Decreased: Women, Asian	Increased: young-aged, middle-aged, age group missing Decreased: missing ethnicity, women	Increased: mental health Decreased: women	Increased: Black, Missing, Mixed, mental health Decreased: Asian, Other, Women, aged 40-49, being 50 and over	Increased: Black, Missing, Mixed, mental health Decreased: Asian, Other, Women, aged 40-49, being 50 and over	Increased: Black, Missing, age missing, mental health Decreased: Women	Increased: young-aged, middle-aged, older aged	Increased: young-aged, middle-aged, mental health Decreased: women
Model 3 (citizen ethnicity and officer demographics)	Increased: Black, Other ethnicity, longer police service Decreased: Being above 50	Increased: Black, longer police service	Increased: short police service, medium police service, long police service Decreased: missing ethnicity	Increased: long police service Decreased: short police service	Increased: Black Mixed, Missing, officers aged 30-39, longer police service Decreased: Asian, ethnicity other, Officers aged 40-49, Being above 50	Increased: Black, Mixed, Missing, officers aged 30-39, longer police service Decreased: Asian, ethnicity Other, officer aged 40-49, Being above 50	Increased: Black, Missing, longer police service Decreased: officers aged 40-49	Increased: short police service, medium police service, long police service, missing police service Decreased: officer aged 50+	None
Model 4 (citizen ethnicity and impact factors)	Increased: Black, Other ethnicity, weapon, prior knowledge, sex, size, and build Decreased: alcohol, drugs	Increased: weapon, prior knowledge Decreased: alcohol, drugs	Increased: weapon, prior knowledge, sex, size, and build, alcohol, drugs Decreased: mixed ethnicity	Increased: prior knowledge, weapon	Increased: Missing ethnicity, Weapon, Prior knowledge Decreased: Asian, Black, Other, alcohol, drugs	Increased: Missing ethnicity, Weapon, Prior knowledge Decreased: Asian, Black, Other, alcohol, drugs	Increased: Missing, weapon, prior knowledge Decreased: alcohol	Increased: prior knowledge, weapon, drugs Decreased: alcohol	None

Model 5 (citizen ethnicity and other contextual factors)	Increased: Black, Asian, Other, Mixed, Missing, night Decreased: second and third lockdown	Increased: Black	Increased: first and third lockdown Decreased: missing ethnicity	None	Increased: Black, Missing, Mixed, night, first lockdown Decreased: Asian, other, second and third lockdown, morning, afternoon	Increased: Black, Missing, Mixed, night, first lockdown Decreased: Asian, Other, second and third lockdown, morning, afternoon	Increased: Black, Missing Decreased: afternoon	Increased: first lockdown, third lockdown	None
Model 6 (all variables)	Increased: Other ethnicity, Older citizens, mental health, longer police service, weapon, prior knowledge, sex, size, and build, night Decreased: Women, alcohol, drugs, second and third lockdowns	Increased: Older citizens, mental health, longer police service, weapon, prior knowledge, night Decreased: Asian, women, older police officers, alcohol, drugs, third lockdown	Increased: young-aged citizens, middle-aged citizens, missing age group citizen, short police service, medium police service, long police service, weapon, prior knowledge, sex, size, and build, alcohol, first and third lockdown Decreased: missing ethnicity, women	Increased: mental health, long police service, prior knowledge, weapon, third lockdown	Increased: Citizen ethnicity missing, Middle-aged citizens, older citizens, mental health, longer police service, police officers aged 30-39, weapon, prior knowledge, first and third lockdown, night Decreased: Asian, Other citizen ethnicity, Women, police officers aged 40-49, police officers aged above 50, alcohol, drugs, morning, afternoon	Increased: Citizen ethnicity missing, Middle-aged citizens, older citizens, mental health, longer police service, police officers aged 30-39, weapon, prior knowledge, first and third lockdown, night Decreased: Asian, Other citizen ethnicity, Women, police officers above aged 40-49, police officers aged 50 and above, alcohol, drugs, morning, afternoon	Increased: ethnicity Missing, Middle-aged citizens, citizens aged 35-49, older citizens, Age missing citizens, mental health, longer police service, weapon, prior knowledge, first lockdown Decreased: women, alcohol, afternoon	Increased: young-aged citizens, middle-aged citizens, older-aged citizens, short police service, medium police service, long police service, missing police service, prior knowledge, weapon, morning Decreased: alcohol	Increased: young-aged, middle-aged, mental health Decreased: women, alcohol

*No information on gender provided.

Table A3.2

Qualitative summary of the findings where four or more forces showed agreement (binary logistic regression models with Taser use vs any other use of force)

Models	GMP	West Yorkshire	Hampshire	Bedfordshire	MPS	MPS fixed effects (Borough)	Derbyshire	Gwent*	Warwickshire
Full model	Increased: Older citizens, mental health, longer police service, weapon, prior knowledge Decreased: Women, alcohol	Increased: Older citizens, mental health, longer police service, weapon, prior knowledge Decreased: women, alcohol	Increased: long police service, weapon, prior knowledge, alcohol Decreased: women	Increased: mental health, long police service, prior knowledge, weapon	Increased: older citizens, mental health, longer police service, weapon, prior knowledge Decreased: Women, alcohol	Increased: older citizens, mental health, longer police service, weapon, prior knowledge Decreased: Women, alcohol	Increased: older citizens, mental health, longer police service, weapon, prior knowledge Decreased: women, alcohol	Increased: older-aged citizens, long police service, prior knowledge, weapon Decreased: alcohol	Increased: mental health Decreased: women, alcohol

*No information on gender provided.

1.3.3.2. Multivariate analysis – Levels of Taser use vs any other use of force

Turning to our second outcome measure, which captures the level of Taser use, recall that this variable had three categories, 0 denoting any other use of force, 1 representing Taser drawn, arced, and aimed categories, and 2 representing red-dotted or fired. Table A3.3 shows results from a series of multinomial logistic regression models, specified as before, with this measure as the dependent variable. 'Other use of force' was the reference category in each case. These models allow us to simultaneously estimate the odds of a more or less 'serious' use of Taser, compared with another use of force. This outcome variable could not be derived for the data we received from Warwickshire, thus, only the remaining seven forces were included in the analysis.

The main finding here is, again, just how different the forces are. Considering the main variable of interest, ethnicity, we find that that at the bivariate level (Model 1), when the subject was Black this increased the odds of drawn, aimed or arced, and/or red dotted or fired in five of the seven forces (but not in Hampshire or Gwent). Less consistently, incidents with Mixed and 'Missing' subjects were more likely to involve Taser use in four forces.
Moving beyond the bivariate relationship, most of the above associations were rendered non-significant by the addition of other variables (see Models 2 to 5). The exception to this is the partial association between Black and having been red-dotted or fired upon with a Taser instead of other force being used, which remained significant for four forces (GMP, MPS, West Yorkshire, and Derbyshire) in model 2 (other subject demographics), model 3 (officer demographics), and model 5 (contextual variables).

As in the previous subsection with Taser use in general vs other uses of force, the introduction of police recorded impact factors in model 4 accounted for the variation between ethnicity and red-dotting/firing. In the full model 6 ethnicity had almost no association with Taser use in any of the seven forces. There were a few exceptions to this – most notably, given the full model incidents where the subject's ethnicity was recorded as missing were more likely to involve Taser use in the MPS, West Yorkshire, and Derbyshire. As a reminder, a lack of a significant association does not indicate a variable is not important; it merely indicates that there is no significant difference between the use of TASER and other forms of force, I.e. that patterns of Taser use are similar to patterns in other forms of force, regardless of what those patterns may be.

Elsewhere it is difficult to pick out many meaningful patterns. Concentrating on red-dotting or discharged incidents, Model 6 shows that that, all else being equal, 'more serious' Taser use was more likely, compared with other non-Taser force modalities, when: there was a weapon involved (all forces); the officer involved had longer service (in all cases except the MPS fixed effects model); the subject was middle aged (six

forces); when there was a mental health issue (five forces); and where police had prior knowledge of the citizen (four forces). Red-dotting or discharge was less likely when the subject was a woman (all forces where it was measured) and alcohol was involved (three forces).

Incidents that involved Taser drawn, arced or aimed had a similar pattern. Looking at Model 6, all else held constant, there was a significant negative association with being a woman (all forces where data was available) and being under the influence of alcohol (four forces) and a significant positive association with longer police service (all forces); a presence of a weapon (all forces); prior knowledge (six forces); the subject being middle-aged (four forces); and mental health (three forces).

Table A3.3

Qualitative summary of the comparative analysis with different levels of Taser use (multinomial logistic regression models)

	Bedfordshire		Hampshire		Gwent		GMP		MPS		MPS (Borough Fixed effects)		West Yorkshire		Derbyshire	
	Drawn, aimed, or arced (1)	Red-dotted or fired (2)	Drawn, aimed, or arced	Red-dotted or fired	Drawn, aimed, or arced	Red-dotted or fired	Drawn, aimed, or arced	Red-dotted or fired	Drawn, aimed, or arced	Red-dotted or fired	Drawn, aimed, or arced	ed-dotted or fired	Drawn, aimed, or arced	Red-dotted or fired	Drawn, aimed, or arced	Red-dotted or fired
Model 1 (citizen ethnicity)	Increase: Black	Increase: Mixed	None	Decreased: ethnicity missing	None	None	Increased: Black, Missing	Increased: Black, Mixed	Increased: Black, Missing Decreased: Asian, Other	Increased: Black, Missing, Mixed Decreased: Asian, Other	Increased: Asian, Black, Missing Decreased: Mixed	Increased: Black, Missing, Mixed Decreased: Asian, Other	Increased: Missing, Mixed	Increased: Black Decreased: Asian	Increased: Missing Decreased: Other	Increased: Black
Model 2 (citizen ethnicity and other citizen demographics)	Increase: mental health Decrease: women	Increase: Mixed, mental health Decrease: women	Increase: age group missing Decrease: ethnicity missing, women	Increase: young-aged, middle-aged, old-aged, age group missing Decrease: Ethnicity missing, women	Increase: old-aged	None	Increased: Black, Middle-aged, mental health Decreased: Women	Increased: Black, Mixed, middle-aged, aged 35-49, mental health Decreased: Women	Increased: Black, Missing, mental health Decreased: Asian, Women, older-aged	Increased: Black, Missing, Mixed, mental health Decreased: Women, Other, older-aged	Increased: Missing, Mixed Decreased: Asian, Other, middle-aged, Women, mental health	Increased: Black, Missing, Mixed, middle-aged, older-aged, mental health Decreased: Asian, Other, Women	Increased: Mixed. Mental health Decreased: Women,	Increased: Black, middle-aged, older age, mental health Decreased: Asian, Women	Increased: Missing Decreased: Other, Women	Increased: Black, mental health Decreased: Women
Model 3 (citizen ethnicity and officer demographics)	Increase: medium police service, long police service Decrease: short police service	Increase: long police service Decrease: short police service	Increase: short police service, medium police service, long police service Decrease: ethnicity missing	Increase: short police service, medium police service, long police service Decrease: ethnicity missing	Increase: short police service, medium police service, long police service, missing police service	Increase: short police service, medium police service, long police service	Increased: longer police service Decreased: being above 50	Increased: Black, Mixed, longer police service Decreased: being above 50	Increased: Black, Missing, middle-aged, longer police service Decreased: Asian, older aged	Increased: Black, Missing, Mixed, longer police service Decreased: Asian, older aged	Increased: Black, Missing, Mixed, middle-aged officers longer police service Decreased: Officers aged 40-49	Increased: Black, Missing, Mixed, middle-aged, longer police service Decreased: Asian, officers, older aged	Increased: Mixeed, longer police service Decreased: being aged above 50	Increased: Black, longer police service Decreased: Asian, officers aged 40-49	Increased: Missing, longer police service Decreased: Other	Increased: Black, longer police service Decreased: officers aged 40-49

Model 4 (citizen ethnicity and impact factors)	Increase: prior knowledge, weapon	Increase: Mixed, weapon	Increase: prior knowledge, sex, size, build, weapon	Increase: alcohol, drugs, prior knowledge, sex, size, build, weapon Decrease: mixed ethnicity	Increased: prior knowledge, weapon Decreased: alcohol	Increase: drugs, weapon	Increased: Weapon Decreased: alcohol, drugs	Increased: Black, weapon, sex, size and build Decreased: alcohol, drugs	Increased: Missing, weapon, prior knowledge Decreased: Black, Asian, Other, alcohol, drugs	Increased: Missing, weapon, prior knowledge Decreased: Asian, Other, alcohol, drugs	Increased: Black, weapon, prior knowledge Decreased: Missing, alcohol, sex, size and build, drugs	Increased: Missing, weapon, prior knowledge Decreased: Other, sex, size and build, drugs	Increased: weapon, prior knowledge Decreased: alcohol	Increased: weapon, prior knowledge Decreased: Asian, alcohol, drugs	Increased: Missing, weapon, prior knowledge Decreased: Other ethnicity	Increased: weapon, prior knowledge Decreased: alcohol
Model 5 (citizen ethnicity and other contextual factors)	None	Increase: Mixed	Increase: first lockdown Decrease: ethnicity missing	Increase: first and third lockdown Decrease: ethnicity missing	Increase: first and third lockdown	Increase: third lockdown	Increased: Black, Missing, morning, afternoon Decreased: second and third lockdown	Increased: Black, Mixed, night Decreased: second and third lockdown	Increased: Black, Missing, night Decreased: Asian, third lockdown, morning, afternoon	Increased: Black. Missing, Mixed, first lockdown, night Decreased: Asian, Other, second and third lockdown, morning, afternoon	Increased: Black, Missing, night Decreased: Asian, Other, Mixed, first, second and third lockdown, morning, afternoon	Increased: Black, Missing, first lockdown, night Decreased: Asian, Mixed, second lockdown, morning, afternoon	Increased Missing, Mixed	Increased: Black Decreased: Asian, third lockdown, morning, afternoon	Increased: Missing Decreased: Other ethnicity	Increased: Black
Model 6 (all variables)	Increase: long police service, prior knowledge, weapon, third lockdown Decrease: women, short police service, drugs	Increase: mental health, long police service, weapon Decrease: Women, short police service	Increase: young-aged citizen, age group missing citizen, short police service, medium police service, long police service, prior knowledg	Increase: young-aged citizen, middle-aged citizen, age group missing for citizen, short police service, medium police service, long	Increase: young-aged citizen, middle-aged citizen, old-aged citizen, short police service, medium police service, long police service,	Increase: middle-aged citizen, short police service, medium police service, long police service, weapon	Increased: middle-aged citizens, older aged citizens, mental health, longer police service, weapon, night Decreased: Women,	Increased: middle-aged citizens, older aged citizens, mental health, officers aged 30-30, longer police service, weapon, sex, size and build, night	Increased: Missing, middle-aged citizens, older-aged citizens, mental health, officers aged 30-39, longer police service, weapon, prior knowledg	Increased: Missing, middle-aged citizens, older-aged citizens, mental health, older police officers, longer police service, weapon, knowledg	Increased: Missing, middle-aged citizens, older-aged citizens, mental health, officers aged 30-39, longer police service, weapon, prior knowledg	Increased: Missing, middle-aged citizens, older citizens, mental health, weapon, prior knowledge, first and third lockdown, night	Increased: Missing, Mixed, middle-aged citizens, older citizens, mental health, officers aged 40-49, longer police service, weapon	Increased: middle-aged citizens, older citizens, mental health, longer police service, weapon, prior knowledge, sex, size and build, night	Increased: Missing, longer police service, weapon, prior knowledge Decreased: Women	Increased: Missing, middle-aged citizens, mental health, longer police service, weapon, prior knowledge Decreased: Women, officers aged 40-

		e, sex, size, build, weapon Decrease: ethnicity missing, women	police service, alcohol, drugs, prior knowledge, sex, size, build, weapon, first lockdown, third lockdown, night Decrease: mixed ethnicity, women,	missing police service, prior knowledge, weapon, first lockdown, third lockdown Decrease: alcohol		officers above 50, alcohol, drugs, second and third lockdown	Decreased: Women, officers above 50, alcohol, drugs, second and third lockdown, afternoon	e, first lockdown, night Decreased: Asian, Other, Women, older aged officers, alcohol, drugs, morning, afternoon	e, first and third lockdown, night Decreased: Asian, Other, Women, older-aged officers, alcohol, drugs	e, first lockdown, night Decreased: Asian, Women, older aged officers, alcohol, drugs, morning, afternoon,	Decreased: Asian, Other ethnicity, Women, older aged police officers, alcohol, drugs, morning, afternoon	Decreased: Women, alcohol	Decreased: Asian, Other, Women, officers above 50, drugs, third lockdown, morning, afternoon		49, alcohol, afternoon

1.3.3.3. Discussion

After analysing data from eight different police forces, a significant finding emerged: a striking lack of consensus among the models applied to each dataset. None of the variables showed a universally agreed-upon association with the likelihood of an individual being subjected to Taser use. However, in seven of the eight forces, there was a positive partial association between Taser use compared to any other use of force and carrying a weapon and prior knowledge. Additionally, gender consistently influenced the outcome, with Tasers less likely to be used on women in six out of the seven forces when all other factors remained constant. It is also noteworthy that mental health playing a role demonstrated a positive partial association with Taser use in seven out of the eight forces. Long police service also had a positive partial association with Taser use in seven out of eight forces after all else have been considered. Being under the influence of alcohol showed an inconsistent picture: in six out of eight forces, it decreased the odds of Taser being used, in one, it increased, in one, it did not play a factor either way. Lastly, in five out of eight forces being an older citizen decreased the odds of Taser being used, all else being equal.

- Regarding ethnicity as an explanatory variable, it is essential to emphasize that even in Model 1, where only the ethnicity of the citizen was considered, there was not a consistent association between ethnicity and Taser use vis a vis other force modalities. Notably, the correlation between being Black and Taser use, which initially appeared to be the most persistent partial correlation, was no longer statistically significant after controlling for impact factors or when examining the full model. This suggested that the influence of ethnicity was captured by the introduction of other variables in the modelling (i.e. that ethnicity likely operated through them).
- Beyond race, the findings have pointed to certain other important intersectionalities which future studies should focus on such as gender, mental health, and age: older males with mental health problems appeared to be an increased likelihood that Taser was used compared to other use of force instances. From the police reported impact factors, having a weapon on the individual, prior knowledge, and being under the influence seemed to have played either a positive or negative role. Crucially, these impact factors seemed to have accounted for the association between ethnicity and Taser use therefore, these deserve further consideration. Finally, longer police service also had a significant positive association with Taser in most forces. We believe that this likely has to do with the natural progression of police careers where longer serving members are more likely to be equipped with Taser and/or sent to situations where Taser use might be required.

When exploring the different levels of Taser use in seven forces, the picture was strikingly similar to the earlier Taser vs other use of force models with similar associations emerging: the presence of a weapon, prior knowledge, longer police

service, the citizen being middle aged, and mental health in the positive direction; whilst being a woman and being under the influence of alcohol indicating a negative association. As with the earlier models, after controlling for other variables, the bivariate relationship between ethnicity and the outcome variable disappeared with the only exception of the relationship between being Black and 'serious' use of Taser, which was present in four forces until the impact factors were added to the model.

However, beyond these findings, it is crucial to acknowledge that the results cannot be readily generalized. There are very substantial variations among the forces, potentially influenced by local characteristics such as the demographic composition of the areas, unique police tactics and strategies implemented by each force (such as divergent use-of-force guidelines), or even disparities in reporting practices where certain use-of-force incidents may be unrecorded or documented differently (as discussed in the previous chapter in detail). Furthermore, we need to emphasise that these results need to be interpreted in comparison to other uses of force, which means that, should there be disproportionalities in how force is used more broadly, we would not be able to detect any specific disparities for Taser use; an important caveat.

With the above limitations in mind, it is hard to draw firm conclusions from this analysis other, perhaps, that any association between ethnicity and Taser use is likely to be captured by other factors (most importantly, those classified here as impact factors). To be clear, this does not mean that Black people were no more likely to be used Taser upon than White people (at least in the forces where there was a pairwise association between ethnicity and Taser use – see Model 1 in Table A3.1). Nor does it mean that ethnicity is unimportant. Rather, it suggests this association can be explained by other factors in the model – which may, themselves, be associated with the ethnicity of the member of the public. In other words, ethnicity may be showing up in, and cannot easily be separated from, a number of different variables throughout these models. We discuss this point further in the GMP 'deep-dive' above.

1.3.4. Cross-force comparative regression models

1.3.4.1. Bedfordshire

Table A4.1: Binary logistic regression analysis for Taser use (odds ratios) – Bedfordshire (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.11	1.05	1.05	1.07	1.10	0.99
Black	1.18	1.14	1.10	0.94	1.18*	0.93
Mixed	1.32	1.32	1.31	1.30	1.32	1.25
Other	0.71	0.68*	0.78	1.04	0.71*	1.04
Missing	1.54*	1.52*	1.77**	1.39	1.55*	1.59
Female		0.32***				0.54***
Age						
18-34		1.04				1.12
35-49		1.05				1.34*
50+		0.95				1.51*
Mental Health		1.40***				1.36**
Officer demographics						
Age						
30-39			0.82*			0.79*
40-49			0.91			0.92
50+			0.64			0.83
Length of service						
2-5 years			0.27***			0.38***
6-10 years			1.13			1.00
11 years or more			16.75***			8.57***
Other factors						
Alcohol				1.02		1.04
Drugs				0.93		0.78*
Prior knowledge				1.63***		1.61***
Sex, size, build				1.09		1.00
Weapon				38.71***		32.33***
Lockdown 1					1.18	1.07
Lockdown 2					1.03	0.87
Lockdown 3					1.29**	1.62***
Morning					1.05	1.01
Afternoon					0.97	0.84
Night					0.92	1.02
Tjur's R^2	0.001	0.007	0.037	0.263	0.002	0.306

N	17,204	17,204	13,842	17,204	17,204	13,842

* p<0.05, ** p<0.01, *** p<0.001

Table A4.2 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Bedfordshire (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.21*	1.14	1.11	1.17	1.20*	1.03
Black	1.29**	1.24**	1.20*	1.02	1.29**	0.98
Mixed	1.17	1.16	1.22	1.17	1.1	1.20
Other	0.83	0.79	0.92	1.25	0.82	1.27
Missing	1.36	1.32	1.58*	1.22	1.38	1.43
Female		0.34***				0.54***
Age						
18-34		0.96				1.07
35-49		0.99				1.31
50+		0.88				1.48*
Mental Health		1.28**				1.21
Officer demographics						
Age						
30-39			0.86			0.83
40-49			0.91			0.89
50+			0.55*			0.71
Length of service						
2-5 years			0.37***			0.54***
6-10 years			1.33**			1.20
More than 11 years			16.00***			8.45***
Other factors						
Alcohol				0.95		0.99
Drugs				0.86		0.74**
Prior knowledge				1.74***		1.65***
Sex, size, build				1.01		0.91
Weapon				44.25***		39.07***
Lockdown 1					1.13	0.98
Lockdown 2					1.04	0.85
Lockdown 3					1.30**	1.55***
Morning					1.03	1.05

Afternoon					0.96	0.85
Night					0.86	0.97
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.74	0.74	0.87	0.80	0.74	0.94
Black	0.57	0.57	0.50*	0.48*	0.57	0.44*
Mixed	2.55**	2.80**	2.13*	2.65**	2.51**	2.35
Other	0.32	0.32	0.37	0.52	0.32	0.55*
Missing	2.60*	2.91*	3.21*	2.45*	2.59*	3.20*
Female		0.12***				0.19**
Age						
18-34		1.59				1.38
35-49		1.72				1.79
50+		2.42*				2.93*
Mental Health		2.50***				2.80***
Officer demographics						
Age						
30-39			0.66			0.69
40-49			0.69			0.74
50+			1.38			2.31
Length of service						
2-5 years			0.08***			0.13***
6-10 years			0.60			0.61
More than 11 years			37.14***			17.47**
Other factors						
Alcohol				1.42		1.39
Drugs				1.67**		1.15
Prior knowledge				1.53*		1.63*
Sex, size, build				1.54*		1.56*
Weapon				30.92***		23.88***
Lockdown 1					1.07	1.11
Lockdown 2					0.89	0.95
Lockdown 3					0.97	1.58
Morning					1.20	0.87
Afternoon					1.05	1.00
Night					1.15	1.01
McFadden's Adj R^2	0.004	0.020	0.200	0.358	0.005	0.474

N	17,204	17,204	13,842	17,204	17,204	13,842

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.2. Derbyshire

Table A4.3 Binary logistic regression analysis for Taser use vs other uses of force (odds ratios) – Derbyshire all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.15	1.11	1.06	1.01	1.17	0.95
Black	1.47***	1.44***	1.39**	1.15	1.50***	1.14
Other	0.61	0.59	0.69	0.64	0.61	0.60
Missing	1.90***	1.80***	1.94***	2.10***	1.96***	1.90***
Female		0.35***				0.47***
Age						
18-34		1.27				1.65***
35-49		1.15				1.62***
50+		1.18				1.76**
Missing		2.30***				3.36***
Mental Health		1.43***				1.43***
Officer demographics						
Age						
30-39			1.04			1.11
40-49			0.76*			0.85
50+			0.66*			0.85
Length of service						
2-5 years			13.1***			11.2***
6-10 years			18.3***			14.3***
11 years or more			13.8***			11.1***
Other factors						
Alcohol				0.42***		0.45***
Drugs				0.78		0.78
Prior knowledge				1.75***		1.95***
Sex, size, build				1.22		1.23
Weapon				10.6***		9.33***
Lockdown 1					1.20	1.39*
Lockdown 2					1.04	1.33
Lockdown 3					0.99	0.97
Morning					0.80*	0.76*

Afternoon					0.76**	0.69***
Night					1.00	1.14
Tjur's R^2	0.002	0.008	0.023	0.085	0.003	0.128
N	22281	22064	22281	22281	22247	22064

* p<0.05, ** p<0.01, *** p<0.001

Table A4.4 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Derbyshire all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.97	0.93	0.89	0.85	0.96	0.78
Black	1.39	1.34	1.31	1.09	1.39	1.04
Other	<0.01***	<0.01***	<0.01***	<0.01***	<0.01***	<0.01
Missing	3.56***	4.06***	3.69***	3.98***	3.76***	5.12***
Female		0.37**				0.50***
Age						
18-34		0.75				0.90
35-49		0.72				0.93
50+		0.84				1.12
Mental Health		1.33				1.34*
Officer demographics						
Age						
30-39			1.22			1.30
40-49			1.08			1.25
50+			0.58			0.77
Length of service						
2-5 years			11.9***			10.4***
6-10 years			18.0***			14.6***
More than 11 years			10.9***			9.19***
Other factors						
Alcohol				0.64		0.73
Drugs				0.75		0.69
Prior knowledge				1.92***		1.95**
Sex, size, build				1.24***		1.30
Weapon				12.1		10.0***
Lockdown 1					1.05	1.21
Lockdown 2					0.81	1.05

Lockdown 3					1.04	0.97
Morning					0.92	0.91
Afternoon					0.90	0.83
Night					0.80	0.94
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	1.24	1.19	1.14	1.08	1.27	1.03
Black	1.65***	1.61***	1.55***	1.29*	1.68***	1.29
Other	0.86	0.83	0.97	0.91	0.88	0.88
Missing	1.20	1.58*	1.22	1.33	1.24	1.95**
Female		0.31***				0.41***
Age						
18-34		1.26				1.53**
35-49		1.18				1.56**
50+		1.09				1.55*
Mental Health		1.49***				1.45***
Officer demographics						
Age						
30-39			0.97			1.03
40-49			0.64**			0.71*
50+			0.67			0.91
Length of service						
2-5 years			14.7***			12.6***
6-10 years			20.6***			15.9***
More than 11 years			16.6***			13.4***
Other factors						
Alcohol				0.32***		0.33***
Drugs				0.74		0.75
Prior knowledge				1.69***		1.85***
Sex, size, build				1.19***		1.17
Weapon				10.1		8.88***
Lockdown 1					1.59	1.29
Lockdown 2					1.04	1.28
Lockdown 3					0.86	0.83
Morning					0.77*	0.71*
Afternoon					0.73**	0.65***
Night					1.12	1.30**

McFadden's Adj R^2	0.007	0.029	0.070	0.134	0.010	0.201
N	22281	22064	22281	22281	22247	22064

* p<0.05, ** p<0.01, *** p<0.001

Greater Manchester Police

Table A4.5 Binary logistic regression analysis for Taser use (odds ratios) – GMP all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.18**	1.07	1.05	1.01	1.18**	0.85**
Black	1.36***	1.31***	1.21***	1.11*	1.35***	1.02
Other	1.05	0.95	0.98	0.96	1.06	0.89
Missing	1.30*	1.27*	1.23	1.23	1.37***	1.18
Mixed	1.26**	1.30**	1.16	1.07	1.27**	1.06
Female		0.26				0.38***
Age						
18-34		1.57***				1.94***
35-49		1.36***				1.84***
50+		1.25**				1.80***
Mental Health		1.70***				1.72***
Officer demographics						
Age						
30-39			1.09*			1.13**
40-49			0.88*			0.97
50+			0.54***			0.66***
Length of service						
2-5 years			34.2***			32.22***
6-10 years			82.5***			66.15***
11 years or more			70.3***			55.79***
Other factors						
Alcohol				0.53***		0.50***
Drugs				0.83**		0.73***
Prior knowledge				1.67		1.85***
Sex, size, build				1 .53***		1.47
Weapon				7.34***		6.41***
Lockdown 1					1.17**	1.20**
Lockdown 2					0.50***	0.51***
Lockdown 3					0.39***	0.44***
Morning					1.05	0.91
Afternoon					0.96	0.86**
Night					1.13***	1.43***
Tjur's R^2	0.001	0.015	0.072	0.089	0.011	0.194
N	56594	56594	56594	56594	56587	56587

* p<0.05, ** p<0.01, *** p<0.001

Table A4.6 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – GMP all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.18	1.07	1.00	0.97	1.17	0.85
Black	1.36***	1.31***	1.11	1.10	1.33***	1.02
Other	1.02	0.93	0.91	1.15	1.00	0.85
Missing	1.67**	1.61**	1.56	1.56*	1.74**	1.51
Mixed	1.07	1.09	0.92	0.85	1.07	0.89
Female		0.32***				0.46
Age						
18-34		1.42***				1.82
35-49		1.22*				1.71
50+		1.23				1.77
Mental Health		1.50***				1.45
Officer demographics						
Age						
30-39			1.00			1.01
40-49			0.81*			0.88
50+			0.46***			0.54
Length of service						
2-5 years			57.3***			53.8
6-10 years			138.0***			111.4
More than 11 years			114.2***			90.7
Other factors						
Alcohol				0.46***		0.45
Drugs				0.78*		0.69
Prior knowledge				1.78***		1.88
Sex, size, build				1.14		1.08
Weapon				7.12***		6.16
Lockdown 1					1.28*	1.30
Lockdown 2					0.43***	0.43
Lockdown 3					0.44***	0.49
Morning					1.33***	1.17
Afternoon					1.22**	1.09

Night					1.01	1.29
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	1.18**	1.06	1.05	1.01	1.19**	0.84
Black	1.36***	1.31***	1.21***	1.10	1.36***	1.02
Other	1.07	0.97	1.00	0.98	1.09	0.91
Missing	1.14	1.12	1.08	1.08	1.21	1.03
Mixed	1.34**	1.39***	1.23*	1.14	1.36***	1.13
Female		0.24***				0.35
Age						
18-34		1.64***				2.00
35-49		1.43***				1.91
50+		1.27**				1.82
Mental Health		1.80***				1.85
Officer demographics						
Age						
30-39			1.14**			1.19
40-49			0.92			1.02
50+			0.58***			0.72
Length of service						
2-5 years			28.6***			27.0
6-10 years			69.1***			55.2
More than 11 years			59.6***			47.3
Other factors						
Alcohol				0.57***		0.52
Drugs				0.86*		0.74
Prior knowledge				1.62***		1.83
Sex, size, build				1.71***		1.66
Weapon				7.44***		6.53
Lockdown 1					1.12	1.16
Lockdown 2					0.53***	0.54
Lockdown 3					0.37***	0.41
Morning					0.94	0.81
Afternoon					0.86**	0.77
Night					1.18***	1.49
McFadden's Adj R^2	0.002	0.023	0.122	0.087	0.018	0.227
N	56594	56594	56594	56594	56587	46292

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.3. West Yorkshire

Table A4.7 Binary logistic regression analysis for Taser use (odds ratios) – West Yorkshire all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.89	0.84**	0.86*	0.77***	0.89	0.73***
Black	1.36***	1.33***	1.31***	1.07	1.36***	1.06
Other	0.91	0.84	0.92	0.82	0.92	0.75
Missing	1.27*	0.85	1.08	1.05	1.26*	0.75
Mixed	1.31*	1.36**	1.32*	1.07	1.32*	1.17
Female		0.30***				0.43***
Age						
18-34		1.58***				2.08***
35-49		1.36***				1.98***
50+		1.42***				2.01***
Mental Health		1.98***				1.85***
Officer demographics						
Age						
30-39			1.08			1.09
40-49			0.89			1.10
50+			0.29***			0.48***
Length of service						
2-5 years			31.9***			24.3***
6-10 years			61.7***			40.3***
11 years or more			52.6***			33.4***
Other factors						
Alcohol				0.33***		0.35***
Drugs				0.34***		0.32***
Prior knowledge				1.42***		1.60***
Sex, size, build				0.89		0.97
Weapon				13.2***		11.9***
Lockdown 1					0.93	0.93
Lockdown 2					0.86	0.80
Lockdown 3					0.81***	0.81***
Morning					0.87*	0.87*
Afternoon					0.93	0.87*
Night					1.09	1.23***
Tjur's R^2	0.000	0.006	0.014	0.077	0.001	0.117

N	92638	90303	92588	92638	92638	90258

* p<0.05, ** p<0.01, *** p<0.001

Table A4.8 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – West Yorkshire all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.08	1.02	1.06	0.94	1.08	0.93
Black	1.29*	1.24	1.26	1.02	1.29*	1.01
Other	1.03	1.06	1.04	0.93	1.03	0.87
Missing	1.40	0.91	1.26	1.17	1.38	<0.01
Mixed	1.61**	1.67**	1.63**	1.33	1.61**	1.49*
Female		0.35***				0.53***
Age						
18-34		1.40**				2.25***
35-49		1.27				2.21***
50+		1.41*				2.17***
Mental Health		1.94***				1.75***
Officer demographics						
Age						
30-39			1.04			1.04
40-49			1.37**			1.58***
50+			0.22***			0.43*
Length of service						
2-5 years			74.5***			20.4***
6-10 years			113.1***			26.8***
More than 11 years			65.07***			14.8***
Other factors						
Alcohol				0.27***		0.29***
Drugs				0.38***		0.33***
Prior knowledge				1.64***		1.57***
Sex, size, build				0.92		0.74*
Weapon				12.69***		10.5***
Lockdown 1					0.89	1.00
Lockdown 2					0.84	0.71
Lockdown 3					0.93	0.88
Morning					0.99	0.96

Afternoon					1.11	1.03
Night					1.01	1.12
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.78**	0.73***	0.74***	0.67***	0.76**	0.64***
Black	1.40***	1.38***	1.33**	1.10	1.34***	1.11
Other	0.84	0.71	0.85	0.75	0.61	0.58
Missing	1.20	0.81	0.97	0.98	1.20	0.76
Mixed	1.13	1.17	1.14	0.93	1.23	1.00
Female		0.28***				0.40***
Age						
18-34		1.71***				2.33***
35-49		1.44***				2.21***
50+		1.44**				2.23***
Mental Health		2.00***				1.92***
Officer demographics						
Age						
30-39			1.10			1.13
40-49			0.69***			0.88
50+			0.30***			0.35**
Length of service						
2-5 years			21.9***			12.3***
6-10 years			49.6***			22.7***
More than 11 years			51.3***			14.8***
Other factors						
Alcohol				0.36***		0.41***
Drugs				1.28		0.06***
Prior knowledge				1.28**		1.56***
Sex, size, build				0.96		1.13
Weapon				13.5***		12.6***
Lockdown 1					0.08	0.95
Lockdown 2					0.14	0.77
Lockdown 3					0.06	0.80**
Morning					0.07	0.84*
Afternoon					0.06	0.80**
Night					0.06	1.33***
McFadden's Adj R^2	0.002	0.052	0.067	0.154	0.004	0.242

N	92638	90303	92588	92638	92638	90258

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.4. Metropolitan Police Service

Table A4.9 Binary logistic regression analysis for Taser use (odds ratios) – MPS all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.88***	0.83***	0.88***	0.78***	0.88***	0.79***
Black	1.31***	1.28***	1.24***	0.96**	1.33***	0.98
Other	0.79***	0.76***	0.81***	0.71***	0.80***	0.76***
Missing	1.34***	1.31***	1.37***	1.21***	1.34***	1.23***
Mixed	1.01	1.01	1.06	0.84***	1.03	0.95
Female		0.37***				0.52***
Age						
18-34		1.05**				1.33***
35-49		0.93**				1.44***
50+		0.90***				1.39***
Mental Health		1.61***				1.75
Officer demographics						
Age						
30-39			1.07***			1.08***
40-49			0.68***			0.81***
50+			0.33***			0.48****
Length of service						
2-5 years			10.2***			7.73***
6-10 years			46.4***			28.1***
11 years or more			56.7***			32.7***
Other factors						
Alcohol				0.50***		0.42***
Drugs				0.41***		0.40***
Prior knowledge				1.45***		1.44***
Sex, size, build				1.10***		0.97
Weapon				8.96***		7.48***
Lockdown 1					1.09***	1.21***
Lockdown 2					0.88**	1.05
Lockdown 3					0.89***	1.07***
Morning					0.69***	0.76***
Afternoon					0.70***	0.71***
Night					1.25***	1.35***
Tjur's R^2	0.001	0.006	0.020	0.074	0.005	0.106

N	583224	583224	554769	583224	583224	554769

* p<0.05, ** p<0.01, *** p<0.001

Table A4.10 Binary logistic regression analysis for Taser use (odds ratios) – MPS all data with Borough fixed effects

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.89***	0.84***	0.90***	0.80***	0.89***	0.81***
Black	1.27***	1.24***	1.22***	0.95**	1.30***	0.99
Other	0.82***	0.80***	0.85***	0.76***	0.84***	0.80***
Missing	1.39***	1.36***	1.42***	1.26***	1.39***	1.30***
Mixed	1.01	1.02	1.07*	0.86***	1.03	0.99***
Female		0.37***				0.52
Age						
18-34		1.07***				1.36***
35-49		0.95*				1.46***
50+		0.92**				1.42***
Mental Health		1.63***				1.75***
Officer demographics						
Age						
30-39			1.08***			1.08***
40-49			0.70***			0.83***
50+			0.34***			0.49***
Length of service						
2-5 years			10.2***			7.76***
6-10 years			46.0***			28.16***
11 years or more			56.0***			32.4***
Other factors						
Alcohol				0.50***		0.42***
Drugs				0.40***		0.39***
Prior knowledge				1.43***		1.41***
Sex, size, build				1.09**		0.97
Weapon				8.84***		7.38***
Lockdown 1					1.09***	1.21***
Lockdown 2					0.88**	1.05
Lockdown 3					0.89***	1.07***
Morning					0.69***	0.75***
Afternoon					0.71***	0.71***

Night					1.26***	1.36***
Tjur's R^2	0.004	0.008	0.023	0.076	0.007	0.109
N	583224	583224	554769	583224	583224	554769

* p<0.05, ** p<0.01, *** p<0.001

Table A4.11 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – MPS all data

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.91**	0.87***	0.90**	0.81***	0.91**	0.83***
Black	1.26***	1.25***	1.19***	0.93**	1.27***	0.96
Other	0.86**	0.84***	0.87**	0.78***	0.87**	0.81***
Missing	1.64***	1.62***	1.65***	1.48***	1.63***	1.52***
Mixed	1.00	1.00	1.05	0.84**	1.01	0.95***
Female		0.48***				
Age						
18-34		0.97				1.23***
35-49		0.91*				1.40***
50+		0.97				1.45***
Mental Health		0.48***				1.73***
Officer demographics						
Age						
30-39			1.20***			0.89***
40-49			0.75***			0.56**
50+			0.40***			5.51***
Length of service						
2-5 years			7.07***			5.51**
6-10 years			32.0***			20.44***
More than 11 years			37.1***			22.80***
Other factors						
Alcohol				0.52***		0.46***
Drugs				0.47***		0.47***
Prior knowledge				1.50***		1.54***
Sex, size, build				1.05		0.98
Weapon				8.36***		7.32***
Lockdown 1					1.09**	1.22***
Lockdown 2					0.86*	1.03

Lockdown 3					0.85***	1.04
Morning					0.85***	0.92*
Afternoon					0.82***	0.83***
Night					1.13***	1.22***
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.86***	0.80***	0.86***	0.77***	0.87***	0.76***
Black	1.34***	1.30***	1.27***	0.97	1.37***	1.00
Other	0.75***	0.71***	0.77***	0.68***	0.77***	0.70***
Missing	1.18**	1.14*	1.20**	1.05	1.17*	1.07
Mixed	1.02	1.01	1.06	0.85***	1.04	0.44***
Female		0.32***				
Age						
18-34		1.10***				1.39***
35-49		0.94*				1.46***
50+		0.87***				1.35***
Mental Health		1.61***				1.76***
Officer demographics						
Age						
30-39			1.01***			1.01
40-49			0.65***			0.78***
50+			0.30***			0.44***
Length of service						
2-5 years			13.5***			9.93***
6-10 years			60.9***			35.7***
More than 11 years			76.6***			42.6***
Other factors						
Alcohol				0.49***		0.40***
Drugs				0.37***		0.35***
Prior knowledge				1.41***		1.38***
Sex, size, build				1.13***		0.97
Weapon				9.32***		7.58***
Lockdown 1					1.10***	1.21***
Lockdown 2					0.89*	1.06
Lockdown 3					0.91***	1.09***
Morning					0.60***	0.67***
Afternoon					0.64***	0.64***

Night					1.31***	1.42***
McFadden's Adj R^2	0.003	0.013	0.078	0.120	0.010	0.189
N	583224	583224	554769	583224	583224	554769

* p<0.05, ** p<0.01, *** p<0.001

Table A4.12 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – MPS all data with Borough fixed effects

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.96	0.61***	0.94	0.79***	2.93***	0.84***
Black	1.09***	0.84***	1.18***	0.85***	3.18***	0.99
Other	0.98	0.28***	0.91	0.34***	2.22***	0.90
Missing	1.44***	0.06***	1.70***	1.19*	22.3***	1.60***
Mixed	0.97	0.26***	1.05	0.44***	3.15***	0.76***
Female		0.64***				0.66***
Age						
18-34		0.64***				1.44***
35-49		0.18***				1.61***
50+		0.58***				1.77***
Mental Health		2.09***				1.94***
Officer demographics						
Age						
30-39			1.22***			1.39***
40-49			0.77***			1.01
50+			0.42***			0.71***
Length of service						
2-5 years			7.80***			102192***
6-10 years			35.4***			491571***
More than 11 years			41.2***			543262***
Other factors						
Alcohol				0.17***		0.07***
Drugs				<0.01		0.03***
Prior knowledge				1.36***		1.53***
Sex, size, build				0.31***		0.68***
Weapon				10.4***		8.76***
Lockdown 1					0.34***	1.13**
Lockdown 2					3.08***	1.28***
Lockdown 3					0.03***	1.06*
Morning					0.78***	0.99
Afternoon					0.30***	0.89***
Night					0.25***	1.33***
Red-dotted or fired						

Citizen Demographics						
Ethnicity						
Asian	1.23***	0.71***	0.88***	0.53***	0.82***	0.74***
Black	1.32***	1.37***	1.24***	0.67***	1.52***	1.00
Other	0.79***	0.37***	0.82***	0.51***	0.33***	0.84***
Missing	1.53***	0.18***	1.27***	0.22***	0.63***	1.23**
Mixed	1.39***	0.34***	1.08	0.64***	0.91	1.19***
Female		0.05***				0.41***
Age						
18-34		1.16***				1.51***
35-49		1.02				1.63***
50+		0.84***				1.37***
Mental Health		1.38***				1.84***
Officer demographics						
Age						
30-39			1.01			1.01
40-49			0.66***			0.79***
50+			0.31***			0.40***
Length of service						
2-5 years			22.6***			215346***
6-10 years			101.3***			905559***
More than 11 years			126.8***			104962***
Other factors						
Alcohol				0.34***		0.19***
Drugs				0.10***		0.22***
Prior knowledge				1.13**		1.48***
Sex, size, build				1.27***		0.93
Weapon				9.04***		7.94***
Lockdown 1					0.72***	1.21***
Lockdown 2					0.21***	1.03
Lockdown 3					1.12***	1.10***
Morning					0.42***	0.64***
Afternoon					0.84***	0.62***
Night					0.69***	1.44***
McFadden's Adj R^2	-0.020	-0.181	0.083	-0.101	-0.195	0.181
N	583224	583224	554769	583224	583224	554769

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.5. Gwent

Table A4.13 Binary logistic regression analysis for Taser use (odds ratios) – Gwent (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.71	0.73	0.67	0.58*	0.70	5.94*
Black	1.10	1.12	1.09	0.94	1.09	1.02
Mixed	1.17	1.23	1.13	0.96	1.16	1.01
Other	0.65	0.66	0.64	0.62	0.66	6.35
Missing	0.77	0.94	0.89	0.84	0.78	1.13
Age						
18-34		1.74***				2.15***
35-49		1.57**				1.97***
50+		2.38***				2.80***
Missing		1.13				1.22
Mental Health		1.22				1.19
Officer demographics						
Age						
30-39			1.02			1.05
40-49			0.83			7.93
50+			0.42***			5.29**
Missing			0.89			1.19
Length of service						
2-5 years			23.33***			2.10***
6-10 years			28.80***			2.31***
11 years or more			28.46***			2.28***
Missing			11.79***			1.14***
Other factors						
Alcohol				0.78**		7.44***
Drugs				1.24*		1.16
Prior knowledge				1.45***		1.55***
Sex, size, build				1.02		9.71
Weapon				12.83***		1.19***
Lockdown 1					1.58***	1.21
Lockdown 2					1.37	1.31
Lockdown 3					1.40***	1.30**
Morning					0.86	7.25**
Afternoon					1.17	1.02

Night					1.29**	1.37***
Tjur's R^2	0.000	0.001	0.015	0.069	0.002	0.099
N	26,982	26,982	26,982	26,982	26,982	26,982

* p<0.05, ** p<0.01, *** p<0.001

Table A4.14 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Gwent (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.65	0.67	0.63	0.53*	0.64	0.54*
Black	1.22	1.24	1.22	1.05	1.22	1.19
Mixed	1.24	1.29	1.20	1.00	1.22	1.03
Other	0.56	0.57	0.56	0.53	0.57	0.55
Missing	0.62	0.72	0.75	0.67	0.64	0.95
Age						
18-34		1.45*				1.83***
35-49		1.29				1.59**
50+		2.02***				2.37***
Missing		1.08				1.20
Mental Health		1.16				1.14
Officer demographics						
Age						
30-39			1.01			1.05
40-49			0.83			0.79
50+			0.53**			0.66
Missing			0.81			1.12
Length of service						
2-5 years			26.02***			22.58***
6-10 years			31.51***			24.50***
More than 11 years			29.37***			22.86***
Missing			11.50***			10.36***
Other factors						
Alcohol				0.72***		0.68***
Drugs				1.25*		1.18
Prior knowledge				1.62***		1.71***
Sex, size, build				0.90		0.86
Weapon				12.37***		11.75***

Lockdown 1					1.87***	1.44**
Lockdown 2					1.31	1.27
Lockdown 3					1.55***	1.42***
Morning					0.88	0.71*
Afternoon					1.15	0.98
Night					1.31**	1.41***
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.79	0.83	0.75	0.67	0.78	0.62
Black	1.39	1.43	1.32	1.25	1.37	1.30
Mixed	0.46	0.50	0.45	0.40	0.46	0.38
Other	1.16	1.15	1.05	1.15	1.21	1.00
Missing	1.03	1.47	0.88	1.14	1.04	1.52
Age						
18-34		3.02**				3.38**
35-49		3.15**				3.64**
50+		3.35*				3.80**
Missing		1.38				1.10
Mental Health		1.04				0.84
Officer demographics						
Age						
30-39			1.01			1.03
40-49			1.61			1.58
50+			0.65			0.81
Missing			1.70			2.47
Length of service						
2-5 years			18.07***			15.37***
6-10 years			27.92***			22.74***
More than 11 years			28.33***			21.86***
Missing			17.02**			20.71***
Other factors						
Alcohol				0.96		0.87
Drugs				1.44		1.26
Prior knowledge				0.81		0.89
Sex, size, build				1.35		1.31
Weapon				13.75***		12.22***
Lockdown 1					1.35	1.09

Lockdown 2					1.25	1.18
Lockdown 3					1.70**	1.61*
Morning					0.91	0.74
Afternoon					1.04	0.91
Night					1.49*	1.46*
McFadden's Adj R^2	0.001	0.005	0.063	0.100	0.008	0.162
N	26,982	26,982	26,982	26,982	26,982	26,982

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.6. Hampshire

Table A4.15 Binary logistic regression analysis for Taser use (odds ratios) – Hampshire (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.25	1.18	1.33	1.33	1.23	1.21
Black	1.16	1.09	1.16	1.03	1.16	0.98
Mixed	0.60*	0.67	0.63*	0.48**	0.60*	0.54*
Other	0.84	0.86	0.94	1.01	0.82	1.10
Missing	0.14***	0.86***	0.11***	0.29*	0.15***	0.21**
Female		0.21***				0.30***
Age						
18-34		2.30***				2.34***
35-49		2.18***				1.95***
50+		1.67*				1.74*
Missing		2.43***				2.24***
Mental Health		1.20*				1.06
Officer demographics						
Age						
30-39			1.01			1.26*
40-49			0.88			1.08
50+			0.81			1.13
Length of service						
2-5 years			18.24***			13.91***
6-10 years			30.53***			22.95***
11 years or more			24.91***			17.87***
Other factors						
Alcohol				1.22**		1.19*
Drugs				1.36***		1.16*
Prior knowledge				2.27***		2.27***

Sex, size, build				2.15***		1.84***
Weapon				11.56***		11.08***
Lockdown 1					1.64***	1.44***
Lockdown 2					1.42	1.47
Lockdown 3					1.24**	1.45***
Morning					0.87	0.89
Afternoon					1.04	0.98
Night					1.14	1.25**
Tjur's R^2	0.002	0.013	0.039	0.155	0.004	0.221
N	19,136	19,136	19,136	19,136	19,136	19,136

* p<0.05, ** p<0.01, *** p<0.001

Table A4.16 Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Hampshire (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	2.34**	2.20**	2.49***	2.35**	2.35**	2.27
Black	1.34	1.28	1.34	1.12	1.31	1.08**
Mixed	1.19	1.31	1.28	0.93	1.17	1.08
Other	2.00	2.05	2.25	2.27	1.95	2.58*
Missing	1.31***	6.86***	3.64	9.07***	1.21	4.09***
Female		0.33***				0.48***
Age						
18-34		1.79*				2.03*
35-49		1.89*				1.93*
50+		1.03				1.15
Missing		2.33**				2.38**
Mental Health		1.16				0.98
Officer demographics						
Age						
30-39			0.95			1.16
40-49			0.88			1.08
50+			0.76			1.06
Length of service						
2-5 years			18.59***			14.48***
6-10 years			34.20***			26.26***
More than 11 years			29.16***			20.78***

Other factors						
Alcohol				0.93		0.96
Drugs				1.08		0.92
Prior knowledge				2.34***		2.27***
Sex, size, build				2.26***		1.98***
Weapon				10.54***		9.95***
Lockdown 1					1.58**	1.41
Lockdown 2					1.31	1.41
Lockdown 3					1.13	1.37*
Morning					1.17	1.12
Afternoon					1.33*	1.18
Night					0.99	1.09
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.89	0.85	0.94	0.96	0.87	0.85
Black	1.11	1.04	1.10	1.01	1.11	0.95
Mixed	0.40*	0.45*	0.42I	0.32**	0.40*	0.36**
Other	0.45	0.46	0.51	0.55	0.44	0.58
Missing	2.52***	2.10***	3.21***	1.68***	3.23	2.45***
Female		0.17***				0.24***
Age						
18-34		2.54***				2.48***
35-49		2.31***				1.96**
50+		1.96**				2.00**
Missing		2.47***				2.20***
Mental Health		1.21				1.08
Officer demographics						
Age						
30-39			1.03			1.29*
40-49			0.87			1.07
50+			0.83			1.17
Length of service						
2-5 years			18.13***			13.79***
6-10 years			29.12***			21.75***
More than 11 years			23.44***			16.91***
Other factors						
Alcohol				1.36***		1.32***

Drugs				1.47***		1.26**
Prior knowledge				2.27***		2.29***
Sex, size, build				2.12***		1.79***
Weapon				12.10***		11.71***
Lockdown 1					1.67***	1.46**
Lockdown 2					1.48	1.50
Lockdown 3					1.27**	1.48***
Morning					0.77*	0.80
Afternoon					0.96	0.91
Night					1.19*	1.31**
McFadden's Adj R^2	0.007	0.032	0.090	0.182	0.012	0.261
N	19,136	19,136	19,136	19,136	19,136	19,136

* p<0.05, ** p<0.01, *** p<0.001

1.3.4.7. Warwickshire

Table A4.17 Binary logistic regression analysis for Taser use (odds ratios) – Warwickshire (all data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.22	1.18		1.18	1.22	1.12
Black	1.14	1.11		1.09	1.15	1.07
Other	0.82	0.92		0.80	0.82	0.88
Female		0.32***				0.31**
Age						
18-34		1.95***				2.03***
35-49		1.79**				1.87**
50+		1.26				1.28
Missing		1.57				1.69*
Mental Health		1.83***				1.95***
Officer demographics						
Age						
30-39						
40-49						
50+						
Length of service						
2-5 years						
6-10 years						
11 years or more						

Other factors					
Alcohol			0.82*		0.76**
Drugs			1.04		0.88
Lockdown 1				0.68	0.65*
Lockdown 2				1.37	1.31
Lockdown 3				1.23*	1.18
Morning				0.97	0.90
Afternoon				0.90	0.87
Night				0.90	0.92
Tjur's R^2	0.000	0.013	0.001	0.002	0.016
N	7,911	7,911	7,911	7,911	7,911

* p<0.05, ** p<0.01, *** p<0.001

1.3.5. Comparative regression models – without duplicates

1.3.5.1. Bedfordshire

Table A5.1: Binary logistic regression analysis for Taser use (odds ratios) – Bedfordshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.12	1.05	1.06	1.06	1.12	0.98
Black	1.15	1.10	1.09	0.90	1.15	0.89
Mixed	1.31	1.29	1.30	1.27	1.31	1.21
Other	0.72	0.69*	0.79	1.02	0.71	1.03
Missing	1.54*	1.50*	1.76*	1.40	1.55*	1.57
Female		0.32***				0.52***
Age						
18-34		1.01				1.08
35-49		0.99				1.22
50+		0.88				1.35
Mental Health		1.41***				1.41**
Officer demographics						
Age						
30-39			0.81*			0.79*
40-49			0.92			0.92
50+			0.65			0.87
Length of service						
2-5 years			0.26***			0.38***
6-10 years			1.12			0.98
11 years or more			16.89***			8.64***
Other factors						
Alcohol				1.00		1.03
Drugs				0.93		0.78*
Prior knowledge				1.66***		1.62***
Sex, size, build				1.13		1.05
Weapon				37.93***		31.73***
Lockdown 1					1.17	1.07
Lockdown 2					1.04	0.85
Lockdown 3					1.24*	1.55***
Morning					1.06	1.02
Afternoon					0.94	0.81

Night					0.90	1.01
Tjur's R^2	0.001	0.007	0.038	0.265	0.002	0.307
N	16,645	16,645	13,411	16,645	16,645	13,411

* p<0.05, ** p<0.01, *** p<0.001

Table A5.2: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Bedfordshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.20	1.13	1.10	1.15	1.20	1.00
Black	1.24**	1.20*	1.18	0.97	1.25**	0.94
Mixed	1.17	1.15	1.21	1.14	1.17	1.16
Other	0.84	0.80	0.93	1.25	0.83	1.27
Missing	1.36	1.31	1.58*	1.24	1.38	1.42
Female		0.34***				0.53***
Age						
18-34		0.92				0.99
35-49		0.93				1.20
50+		0.83				1.35
Mental Health		1.30**				1.25*
Officer demographics						
Age						
30-39			0.86			0.83
40-49			0.91			0.88
50+			0.57*			0.75
Length of service						
2-5 years			0.36***			0.54***
6-10 years			1.31**			1.19
More than 11 years			16.14***			8.47***
Other factors						
Alcohol				0.94		0.98
Drugs				0.87		0.74**
Prior knowledge				1.78***		1.68***
Sex, size, build				1.04		0.95
Weapon				43.70***		38.67***
Lockdown 1					1.13	0.99
Lockdown 2					1.06	0.84
Lockdown 3					1.24*	1.46**
Morning					1.04	1.05

Afternoon					0.96	0.84
Night					0.86	0.98
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.77	0.76	0.91	0.81	0.77	0.93
Black	0.59	0.58	0.52	0.49*	0.59	0.44*
Mixed	2.62**	2.79**	2.19*	2.65**	2.58**	2.28*
Other	0.33	0.32	0.39	0.51	0.33	0.55
Missing	2.63*	2.88*	3.23	2.49*	2.61*	3.12*
Female		0.13***				0.19**
Age						
18-34		1.56				1.33
35-49		1.67				1.68
50+		2.04				2.34
Mental Health		2.38***				2.82***
Officer demographics						
Age						
30-39			0.66			0.70
40-49			0.73			0.78
50+			1.52			2.70
Length of service						
2-5 years			0.09***			0.14***
6-10 years			0.65			0.65
More than 11 years			34.88***			17.03**
Other factors						
Alcohol				1.37		1.34
Drugs				1.64*		1.12
Prior knowledge				1.54*		1.65*
Sex, size, build				1.61*		1.64*
Weapon				30.35***		23.36***
Lockdown 1					1.10	1.12
Lockdown 2					0.90	0.95
Lockdown 3					0.98	1.58
Morning					1.21	0.88
Afternoon					0.98	0.94
Night					1.14	1.06
McFadden's Adj R^2	0.004	0.019	0.201	0.359	0.005	0.475
N	16,645	16,645	13,411	16,645	16,645	13,411

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.2. Derbyshire

Table A5.3: Binary logistic regression analysis for Taser use (odds ratios) Derbyshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.04	1.00	0.95	0.92	1.04	0.86
Black	1.52***	1.49***	1.43**	1.22	1.54***	1.20
Other	0.64	0.63	0.73	0.66	0.65	0.61
Missing	2.00***	1.88	2.06***	2.16	2.02***	1.99***
Female		0.40***				0.53***
Age						
18-34		1.22				1.63***
35-49		1.11				1.54**
50+		1.15				1.72**
Missing		2.11***				3.00***
Mental Health		1.44***				1.37***
Officer demographics						
Age						
30-39			1.04			1.10
40-49			0.65**			0.72*
50+			0.68			0.88
Length of service						
2-5 years			13.7***			11.8***
6-10 years			18.5***			14.6***
11 years or more			14.7***			11.8***
Other factors						
Alcohol				0.44***		0.47***
Drugs				0.73		0.72
Prior knowledge				1.69***		1.84***
Sex, size, build				1.29		1.28
Weapon				11.4***		10.0***
Lockdown 1					1.28	1.49**
Lockdown 2					1.00	1.29
Lockdown 3					0.98	0.94
Morning					0.90	0.86
Afternoon					0.77**	0.68***
Night					1.00	1.11
Tjur's R^2	0.002	0.008	0.025	0.092	0.003	0.136
N	19372	19188	19372	19372	19348	19188

* p<0.05, ** p<0.01, *** p<0.001

Table A5.4: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Derbyshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.76	0.73	0.70	0.68	0.76	0.62
Black	1.37	1.33	1.29	1.11	1.37	1.05
Other	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Missing	3.65***	3.98***	3.84***	4.02***	3.74***	5.04***
Female		0.41***				0.54**
Age						
18-34		0.77				0.95
35-49		0.73				0.95
50+		0.91				1.26
Mental Health		1.30*				1.24
Officer demographics						
Age						
30-39			1.15			1.22
40-49			0.96			1.12
50+			0.56			0.77
Length of service						
2-5 years			11.9***			10.6***
6-10 years			18.3***			15.3***
More than 11 years			11.9***			9.92***
Other factors						
Alcohol				0.64		0.71
Drugs				0.69		0.61
Prior knowledge				1.98***		1.94**
Sex, size, build				1.20		1.22
Weapon				12.7***		10.4***
Lockdown 1					1.08	1.23
Lockdown 2					0.83	1.08
Lockdown 3					0.97	0.89
Morning					1.04	1.01
Afternoon					0.92	0.82
Night					0.79	0.91
Red-dotted or fired						

Citizen Demographics						
Ethnicity						
Asian	1.19	1.15	1.10	1.06	1.21	1.01
Black	1.72***	1.69***	1.62***	1.39*	1.75***	1.38*
Other	0.94	0.91	1.05	0.95	0.97	0.90
Missing	1.30	1.66*	1.33	1.42	1.32	2.02**
Female		0.35***				0.46***
Age						
18-34		1.21				1.51**
35-49		1.14				1.50*
50+		1.03				1.47
Mental Health		1.53***				1.45***
Officer demographics						
Age						
30-39			0.98			1.04
40-49			0.52***			0.57**
50+			0.71			0.96
Length of service						
2-5 years			16.0***			13.6***
6-10 years			20.9***			16.3***
More than 11 years			17.9***			14.4***
Other factors						
Alcohol				0.35***		0.38***
Drugs				0.70		0.71
Prior knowledge				1.55**		1.70**
Sex, size, build				1.29		1.26
Weapon				11.1***		9.77***
Lockdown 1					1.25	1.40*
Lockdown 2					0.98	1.20
Lockdown 3					0.87	0.83
Morning					0.86	0.81
Afternoon					0.75*	0.65***
Night					1.15	1.28*
McFadden's Adj R^2	0.008	0.029	0.073	0.142	0.011	0.210
N	19372	19188	19372	19372	19348	19188

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.3. Greater Manchester Police

Table A5.5: Binary logistic regression analysis for Taser use (odds ratios) – GMP (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.15*	1.04	1.04	1.00	1.17**	0.86*
Black	1.38***	1.32***	1.22***	1.14**	1.36***	1.03
Other	2.09***	1.92***	2.06***	2.05***	2.11***	2.04***
Missing	1.37**	1.33*	1.34*	1.32*	1.43**	1.27
Mixed	1.30**	1.31**	1.18	1.08	1.31**	1.06
Female		0.28***				0.39***
Age						
18-34		1.56***				1.99***
35-49		1.30***				1.83***
50+		1.22*				1.80***
Mental Health		1.70***				1.65***
Officer demographics						
Age						
30-39			1.09			1.12*
40-49			0.90			1.00
50+			0.69***			0.85
Length of service						
2-5 years			34.4***			32.7***
6-10 years			87.2***			72.3***
11 years or more			71.6***			58.4***
Other factors						
Alcohol				0.53***		0.49***
Drugs				0.78***		0.67***
Prior knowledge				1.53***		1.71***
Sex, size, build				1.48***		1.42***
Weapon				7.23***		6.48***
Lockdown 1					1.14*	1.19*
Lockdown 2					0.47***	0.45***
Lockdown 3					0.37***	0.42***
Morning					1.06	0.92
Afternoon					1.01	0.89*
Night					1.14***	1.41***
Tjur's R^2	0.002	0.016	0.081	0.092	0.014	0.207
N	46299	46299	46299	46299	46292	46292

* p<0.05, ** p<0.01, *** p<0.001

Table A5.6: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – GMP (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.12	1.03	1.01	0.97	1.13	0.85
Black	1.32**	1.26**	1.17	1.10	1.28**	0.99
Other	1.26	1.16	1.22	1.15	1.24	1.11
Missing	1.62**	1.58*	1.58*	1.56*	1.68**	1.52*
Mixed	1.03	1.04	0.94	0.85	1.03	0.83
Female		0.35***				0.49***
Age						
18-34		1.47***				1.94***
35-49		1.22				1.77***
50+		1.28				1.89***
Mental Health		1.50***				1.42***
Officer demographics						
Age						
30-39			0.98			1.00
40-49			0.80*			0.87
50+			0.46***			0.54***
Length of service						
2-5 years			72.4***			68.4***
6-10 years			164.0***			134.8***
More than 11 years			149.5***			122.6***
Other factors						
Alcohol				0.47***		0.46***
Drugs				0.77*		0.72***
Prior knowledge				1.69***		1.84***
Sex, size, build				1.20***		1.14
Weapon				7.49		6.63***
Lockdown 1					1.27*	1.30*
Lockdown 2					0.38***	0.36***
Lockdown 3					0.42***	0.47***
Morning					1.32***	1.17
Afternoon					1.24**	1.09
Night					1.01	1.26**
Red-dotted or fired						

Citizen Demographics						
Ethnicity						
Asian	1.17*	1.05	1.05	1.02	1.18*	0.87
Black	1.41***	1.35***	1.25***	1.17**	1.40***	1.06
Other	1.07	0.97	1.01	0.99	1.08	0.93
Missing	1.20	1.17	1.17	1.17	1.26	1.11
Mixed	1.42***	1.44	1.29**	1.18	1.44***	1.16
Female		0.25***				0.35***
Age						
18-34		1.62***				2.01***
35-49		1.37***				1.87***
50+		1.22*				1.77***
Mental Health		1.81***				1.83***
Officer demographics						
Age						
30-39			1.13*			1.17
40-49			0.91			1.02
50+			0.59***			0.73
Length of service						
2-5 years			27.0***			25.6***
6-10 years			66.6***			54.4***
More than 11 years			59.7***			48.8***
Other factors						
Alcohol				0.59***		0.53***
Drugs				0.84*		0.72***
Prior knowledge				1.55***		1.77***
Sex, size, build				1.70***		1.65***
Weapon				7.57***		6.78***
Lockdown 1					1.11	1.16
Lockdown 2					0.51***	0.50***
Lockdown 3					0.36***	0.41***
Morning					0.96	0.84**
Afternoon					0.89*	0.79***
Night					1.22***	1.50***
McFadden's Adj R^2	0.002	0.023	0.127	0.088	0.019	0.227
N	46299	46299	46299	46299	46292	46292

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.4. Gwent

Table A5.7: Binary logistic regression analysis for Taser use (odds ratios) – Gwent (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.79	0.81	0.78	0.69	0.78	7.10
Black	0.92	0.94	0.91	0.83	0.92	8.73
Mixed	1.10	1.16	1.08	0.95	1.09	1.02
Other	0.73	0.74	0.73	0.69	0.73	7.12
Missing	0.82	1.02	0.98	0.89	0.83	1.17
Age						
18-34		1.66***				2.07***
35-49		1.52**				1.91***
50+		2.35***				2.74***
Missing		1.06				1.29
Mental Health		1.27				1.19
Officer demographics						
Age						
30-39			1.07			1.10
40-49			0.87			8.29
50+			0.48**			6.02*
Missing			1.07			1.43
Length of service						
2-5 years			22.32***			2.06***
6-10 years			25.08***			2.08***
11 years or more			26.22***			2.14***
Missing			8.27***			8.22***
Other factors						
Alcohol				0.80**		7.63**
Drugs				1.29**		1.22*
Prior knowledge				1.53***		1.64***
Sex, size, build				1.03		9.90
Weapon				12.97***		1.19***
Lockdown 1					1.52***	1.12
Lockdown 2					1.19	1.07
Lockdown 3					1.34**	1.22*
Morning					0.87	7.10**
Afternoon					1.14	9.88
Night					1.21*	1.25*

Tjur's R^2	0.000	0.001	0.016	0.070	0.001	0.100
N	23,798	23,798	23,798	23,798	23,798	23,798

* p<0.05, ** p<0.01, *** p<0.001

Table A5.8: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Gwent (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.77	0.78	0.76	0.66	0.75	0.74
Black	1.21	1.23	1.21	1.10	1.21	1.25
Missing	1.25	1.30	1.23	1.06	1.23	1.09
Other	0.64	0.65	0.64	0.60	0.65	0.67
Missing	0.71	0.80	0.86	0.77	0.72	0.96
Age						
18-34		1.40*				1.68**
35-49		1.29				1.57**
50+		2.01***				2.33***
Missing		1.10				1.46
Mental Health		1.19				1.20
Officer demographics						
Age						
30-39			1.05			1.10
40-49			0.86			0.81
50+			0.58*			0.73
Missing			0.82			1.01
Length of service						
2-5 years			25.21***			24.35***
6-10 years			27.79***			23.59***
More than 11 years			27.10***			22.26***
Missing			11.75***			11.73***
Other factors						
Alcohol				0.75**		0.68***
Drugs				1.27*		1.16
Prior knowledge				1.69***		1.84***
Sex, size, build				0.94		0.86
Weapon				12.55***		11.13***
Lockdown 1					1.85***	1.39**
Lockdown 2					1.21	1.13
Lockdown 3					1.45***	1.36**

Morning					0.89	0.71*
Afternoon					1.13	0.94
Night					1.24*	1.25*
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.96	0.99	0.94	0.85	0.95	0.88
Black	0.62	0.64	0.58	0.60	0.61	0.77
Mixed	0.53	0.56	0.53	0.49	0.53	0.60
Other	1.35	1.37	1.27	1.35	1.40	1.27
Missing	1.21	1.67	1.34	1.33	1.21	2.16
Age						
18-34		2.60*				3.27*
35-49		2.48*				3.58**
50+		3.18*				3.96*
Missing		1.26				1.30
Mental Health		1.15				0.62
Officer demographics						
Age						
30-39			1.18			1.19
40-49			1.97*			1.54
50+			0.88			1.31
Missing			3.64			4.82*
Length of service						
2-5 years			15.96***			12.77***
6-10 years			22.70***			11.05***
More than 11 years			22.97***			18.67***
Mixing			2.75			0.06
Other factors						
Alcohol				0.98**		0.99
Drugs				1.74		1.49
Prior knowledge				0.89		0.69
Sex, size, build				1.07		0.94
Weapon				14.79***		13.77***
Lockdown 1					1.15	1.01
Lockdown 2					0.67	0.75
Lockdown 3					1.70**	1.59*
Morning					0.96	0.69
Afternoon					1.00	0.83
Night					1.32	1.20

McFadden's Adj R^2	0.001	0.004	0.065	0.101	0.007	0.160
N	23,798	23,798	23,798	23,798	23,798	23,798

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.5. Hampshire

Table A5.9: Binary logistic regression analysis for Taser use (odds ratios) – Hampshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.17	1.10	1.22	1.26	1.16	1.14
Black	1.14	1.07	1.13	1.01	1.14	0.95
Mixed	0.57*	0.64	0.60	0.45**	0.57*	0.50*
Other	0.84	0.87	0.96	1.00	0.82	1.13
Missing	0.08***	0.06***	0.06***	0.21*	0.08***	0.14**
Female		0.20***				0.30***
Age						
18-34		2.34***				2.32***
35-49		2.18***				1.90***
50+		1.67*				1.71*
Missing		2.49***				2.29***
Mental Health		1.20*				1.05
Officer demographics						
Age						
30-39			1.03			1.28*
40-49			0.92			1.12
50+			0.83			1.19
Length of service						
2-5 years			18.07***			13.64***
6-10 years			29.99***			22.42***
11 years or more			24.23***			17.39***
Other factors						
Alcohol				1.25**		1.22**
Drugs				1.35***		1.15
Prior knowledge				2.33***		2.33***
Sex, size, build				2.17***		1.84***
Weapon				11.53***		10.94***
Lockdown 1					1.64***	1.42**
Lockdown 2					1.44*	1.48
Lockdown 3					1.24**	1.44***
Morning					0.85	0.86
Afternoon					1.03	0.97
Night					1.12	1.23*
Tjur's R^2	0.002	0.014	0.041	0.159	0.004	0.225

N	18,216	18,216	18,216	18,216	18,216	18,216

* p<0.05, ** p<0.01, *** p<0.001

Table A5.10: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – Hampshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	2.03	1.89*	2.12*	2.07*	2.04*	1.95*
Black	1.27	1.20	1.27	1.06	1.24	1.02
Mixed	1.06	1.18	1.13	0.81	1.04	0.92
Other	2.01	2.05	2.29	2.26	1.95	2.68*
Missing	5.67	1.70***	7.37***	2.36	1.27***	1.08***
Female		0.34***				0.51**
Age						
18-34		2.00*				2.23**
35-49		2.06*				2.07*
50+		0.94				1.03
Missing		2.64***				2.69**
Mental Health		1.15				0.95
Officer demographics						
Age						
30-39			0.96			1.17
40-49			0.95			1.16
50+			0.83			1.19
Length of service						
2-5 years			18.45***			14.24***
6-10 years			33.79***			25.92***
More than 11 years			27.16***			19.30***
Other factors						
Alcohol				0.96		1.00
Drugs				1.09		0.93
Prior knowledge				2.32***		2.27***
Sex, size, build				2.22***		1.94***
Weapon				10.67***		10.02***
Lockdown 1					1.64**	1.45*
Lockdown 2					1.36	1.45
Lockdown 3					1.16	1.39*
Morning					1.17	1.11
Afternoon					1.28	1.16

Night					0.96	1.04
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.89	0.84	0.93	0.97	0.87	0.85
Black	1.11	1.03	1.10	1.01	1.11	0.94
Mixed	0.41	0.46*	0.43	0.32**	0.41*	0.36**
Other	0.45	0.47	0.51	0.55	0.44	0.59
Missing	1.27	2.93***	3.08***	5.62	4.33***	4.50
Female		0.15***				0.23***
Age						
18-34		2.47***				2.34***
35-49		2.22***				1.83**
50+		1.95**				1.95*
Missing		2.43****				2.14***
Mental Health		1.22				1.08
Officer demographics						
Age						
30-39			1.05			1.32*
40-49			0.90			1.10
50+			0.83			1.20
Length of service						
2-5 years			17.94***			13.49***
6-10 years			28.73***			21.36***
More than 11 years			23.09***			16.68***
Other factors						
Alcohol				1.38***		1.33***
Drugs				1.44***		1.23**
Prior knowledge				2.34***		2.36***
Sex, size, build				2.15***		1.80***
Weapon				11.93***		11.38***
Lockdown 1					1.65***	1.43**
Lockdown 2					1.49	1.50
Lockdown 3					1.27**	1.46***
Morning					0.74*	0.77*
Afternoon					0.94	0.90
Night					1.17*	1.29**
McFadden's Adj R^2	0.006	0.032	0.090	0.182	0.011	0.261
N	18,216	18,216	18,216	18,216	18,216	18,216

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.6. Metropolitan Police Service

Table A5.11: Binary logistic regression analysis for Taser use (odds ratios) – MPS (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.86***	0.82***	0.86***	0.78***	0.86***	0.79***
Black	1.28***	1.25***	1.21***	0.94***	1.30***	0.98
Other	0.81***	0.78***	0.82***	0.73***	0.82***	0.76***
Missing	1.52***	1.48***	1.53***	1.36***	1.51***	1.36
Mixed	1.10**	1.10**	1.14***	0.91*	1.12**	1.02***
Female		0.43***				0.58***
Age						
18-34		1.01				1.31***
35-49		0.90***				1.43***
50+		0.86***				1.34***
Mental Health		1.80***				1.93***
Officer demographics						
Age						
30-39			1.06***			1.07***
40-49			0.66***			0.80***
50+			0.32***			0.47***
Length of service						
2-5 years			11.4***			8.76***
6-10 years			52.2***			31.9***
11 years or more			63.0***			37.1***
Other factors						
Alcohol				0.52***		0.43***
Drugs				0.38***		0.37***
Prior knowledge				1.35***		1.37***
Sex, size, build				1.06		0.96
Weapon				8.95***		7.62***
Lockdown 1					1.08***	1.21***
Lockdown 2					0.85***	1.03
Lockdown 3					0.87***	1.05**
Morning					0.65***	0.72***
Afternoon					0.69***	0.70***
Night					1.29***	1.40***
Tjur's R^2	0.001	0.005	0.019	0.069	0.005	0.102
N	478406	478406	454941	478406	478406	454941

* p<0.05, ** p<0.01, *** p<0.001

Table A5.12: Binary logistic regression analysis for Taser use (odds ratios) – MPS with Borough fixed effects (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.88***	0.84***	0.89***	0.80***	0.87***	0.82***
Black	1.25***	1.23***	1.20***	0.94***	1.27***	0.99
Other	0.84***	0.82***	0.86***	0.77***	0.86***	0.82***
Missing	1.58***	1.54***	1.60***	1.42***	1.56***	1.44***
Mixed	1.11**	1.11**	1.16***	0.93	1.13***	1.06
Female		0.42***				0.57***
Age						
18-34		1.03				1.33***
35-49		0.92***				1.45***
50+		0.87***				1.37***
Mental Health		1.81***				1.93***
Officer demographics						
Age						
30-39			1.07***			1.07***
40-49			0.67***			0.81***
50+			0.33***			0.48***
Length of service						
2-5 years			11.3***			8.76***
6-10 years			51.8***			31.9***
11 years or more			62.2***			36.7***
Other factors						
Alcohol				0.52***		0.43***
Drugs				0.37***		0.37***
Prior knowledge				1.33***		1.34***
Sex, size, build				1.05		0.95
Weapon				8.86***		7.59***
Lockdown 1					1.08**	1.20***
Lockdown 2					0.85***	1.03
Lockdown 3					0.86***	1.05**
Morning					0.65***	0.71***
Afternoon					0.69***	0.70***
Night					1.30***	1.40***
Tjur's R^2	0.003	0.007	0.021	0.071	0.007	0.105
N	478406	478406	454941	478406	478406	454941

* p<0.05, ** p<0.01, *** p<0.001

Table A5.13: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – MPS (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	0.89**	0.87***	0.89**	0.81***	0.89**	0.84***
Black	1.24***	1.23***	1.18***	0.92**	1.25***	0.96
Other	0.87**	0.86**	0.87*	0.79***	0.87*	0.82***
Missing	1.80***	1.78***	1.80***	1.62***	1.80***	1.65***
Mixed	1.06	1.06	1.09	0.88*	1.07	0.99
Female		0.53***				0.72***
Age						
18-34		0.94				1.22***
35-49		0.90**				1.41***
50+		0.93				1.45***
Mental Health		1.79***				1.89***
Officer demographics						
Age						
30-39			1.15***			1.15***
40-49			0.71***			0.84***
50+			0.38***			0.53***
Length of service						
2-5 years			8.26**			6.47**
6-10 years			38.1***			24.2***
More than 11 years			44.6***			27.5***
Other factors						
Alcohol				0.57***		0.51***
Drugs				0.44***		0.45***
Prior knowledge				1.45***		1.51***
Sex, size, build				1.04		1.01
Weapon				8.74***		7.81***
Lockdown 1					1.06	1.02***
Lockdown 2					0.84*	1.02
Lockdown 3					0.83***	1.02
Morning					0.80***	0.87***
Afternoon					0.80***	0.81***
Night					1.15***	1.25***
Red-dotted or fired						

Citizen Demographics						
Ethnicity						
Asian	0.84***	0.79***	0.84***	0.76***	0.84***	0.76***
Black	1.30***	1.27***	1.23***	0.95*	1.33***	0.99
Other	0.77***	0.74***	0.79***	0.70***	0.79***	0.72
Missing	1.35***	1.31***	1.37***	1.20**	1.33***	1.20***
Mixed	1.13**	1.12**	1.17***	0.93	1.15**	1.04**
Female		0.36				0.49***
Age						
18-34		1.06*				1.37***
35-49		0.90**				1.43***
50+		0.80***				1.27***
Mental Health		1.80***				1.95***
Officer demographics						
Age						
30-39			1.02			1.02
40-49			0.64***			0.77***
50+			0.30***			0.43***
Length of service						
2-5 years			14.7***			11.0***
6-10 years			66.4***			39.5***
More than 11 years			81.4***			46.6***
Other factors						
Alcohol				0.49***		0.39***
Drugs				0.34***		0.33***
Prior knowledge				1.28***		1.28***
Sex, size, build				1.07		0.93
Weapon				9.08***		7.51***
Lockdown 1					1.09**	1.21***
Lockdown 2					0.85**	1.03
Lockdown 3					0.89***	1.07**
Morning					0.57***	0.63***
Afternoon					0.63***	0.63***
Night					1.37***	1.49***
McFadden's Adj R^2	0.003	0.012	0.079	0.121	0.011	0.193
N	478406	478406	454941	478406	478406	454941

* p<0.05, ** p<0.01, *** p<0.001

Table A5.14: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – MPS with Borough fixed effects (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.21***	0.47***	0.97	1.65***	0.43***	0.88**
Black	1.64***	0.98	1.08**	1.29***	1.40***	0.98
Other	1.14*	0.75•••	0.958	1.08	0.52***	0.88*
Missing	1.54***	2.54•••	1.54***	0.46***	2.43***	1.74
Mixed	0.23***	2.09•••	1.42***	0.90	0.55***	1.02***
Female		0.26•••				0.71
Age						
18-34		0.73•••				1.25***
35-49		0.93				1.44***
50+		1.11•				1.48***
Mental Health		0.82•••				1.91***
Officer demographics						
Age						
30-39			1.18***			1.16***
40-49			0.77***			0.85***
50+			0.00			0.53***
Length of service						
2-5 years			9.06***!			30.27*
6-10 years			3.95***!			118.5**
More than 11 years			4.07***!			134.6**
Other factors						
Alcohol				0.00***		0.49***
Drugs				0.63***		0.43***
Prior knowledge				1.50***		1.52***
Sex, size, build				0.15***		1.01
Weapon				10.5***		7.99***
Lockdown 1					0.53***	1.20***
Lockdown 2					0.05***	1.05
Lockdown 3					0.63***	1.02
Morning					0.13***	0.87***
Afternoon					0.86***	0.81***
Night					1.34***	1.26***
Red-dotted or fired						
Citizen Demographics						

Ethnicity						
Asian	0.78***	0.80•••	0.85***	0.98	0.81***	0.78***
Black	1.34***	1.25•••	1.28***	0.98	1.08***	0.99
Other	0.86**	0.80•••	0.88*	0.16***	1.00	0.80***
Missing	1.59***	5.69•••	1.55***	2.48***	1.65***	1.26***
Mixed	1.19***	1.86•••	1.23***	0.89*	0.77***	1.06
Female		0.21•••				0.49***
Age						
18-34		1.47•••				1.40***
35-49		1.23•••				1.45***
50+		1.30•••				1.30***
Mental Health		2.25•••				1.97***
Officer demographics						
Age						
30-39			1.06**			1.02
40-49			0.65***			0.78***
50+			0.00***			0.44***
Length of service						
2-5 years			1.77***!			263.8
6-10 years			7.36***!			963.6
More than 11 years			8.63***!			1124.4
Other factors						
Alcohol				0.82*		0.38***
Drugs				0.03***		0.31***
Prior knowledge				1.54***		1.27***
Sex, size, build				0.73***		0.93
Weapon				22.9***		7.62***
Lockdown 1					1.43***	1.21***
Lockdown 2					0.60***	1.00
Lockdown 3					0.97	1.07**
Morning					0.10***	0.62***
Afternoon					0.64***	0.63***
Night					1.43***	1.49***
McFadden's Adj R^2	-0.010	-0.077	0.025	0.026	-0.066	0.197
N	478406	478406	454941	478406	478406	454941

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.7. West Yorkshire

Table A5.15: Binary logistic regression analysis for Taser use (odds ratios) – West Yorkshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	0.87*	0.85**	0.85*	0.76***	0.88*	0.73***
Black	1.34***	1.31***	1.29***	1.02	1.34***	1.00
Other	0.79	0.78	0.80	0.71	0.80	0.68
Missing	1.38**	0.89	1.19	1.16	1.36**	0.76
Mixed	1.39**	1.44**	1.41**	1.13	1.40**	1.23
Female		0.31***				0.48***
Age						
18-34		1.66***				2.27***
35-49		1.43***				2.19***
50+		1.46***				2.25***
Mental Health		1.99***				1.72***
Officer demographics						
Age						
30-39			1.09			1.11
40-49			0.88			1.18*
50+			0.28***			0.53**
Length of service						
2-5 years			35.3***			24.7***
6-10 years			68.0***			39.4***
11 years or more			58.8***			34.8***
Other factors						
Alcohol				0.34***		0.37***
Drugs				0.45**		0.42***
Prior knowledge				1.55***		1.66***
Sex, size, build				1.21		1.24*
Weapon				21.3***		19.0***
Lockdown 1					0.91	0.91
Lockdown 2					0.84	0.81
Lockdown 3					0.81***	0.81**
Morning					0.86*	0.88
Afternoon					0.93	0.86*
Night					1.10	1.20**

Tjur's R^2	0.000	0.006	0.014	0.088	0.001	0.130
N	87380	84831	87364	87380	87380	84820

* p<0.05, ** p<0.01, *** p<0.001

Table A5.16: Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios) – West Yorkshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Drawn, aimed, or arced						
Citizen Demographics						
Ethnicity						
Asian	1.07	1.02	1.06	0.93	1.07	0.99
Black	1.35*	1.28*	1.32*	1.04	1.34*	0.85
Other	1.12	1.15	1.13	1.02	1.12	1.77*
Missing	1.67**	0.80	1.52*	1.41	1.65**	10.2***
Mixed	1.69**	1.77**	1.72**	1.38	1.69**	1.62**
Female		0.34***				0.60***
Age						
18-34		1.39*				2.73***
35-49		1.24				2.37***
50+		1.34				2.46***
Mental Health		1.89***				1.74***
Officer demographics						
Age						
30-39			1.05			1.01
40-49			1.29*			1.39**
50+			0.21***			0.51*
Length of service						
2-5 years			83.9***			141.5***
6-10 years			130.2***			176.3***
More than 11 years			79.7***			143.2***
Other factors						
Alcohol				0.23***		0.15***
Drugs				0.70		0.66
Prior knowledge				1.56**		1.44*
Sex, size, build				0.92		0.80
Weapon				18.2***		13.3***
Lockdown 1					0.89	0.93
Lockdown 2					0.88	0.80
Lockdown 3					0.93	0.98
Morning					0.99	0.99
Afternoon					1.11	1.04

Night					1.01	1.16
Red-dotted or fired						
Citizen Demographics						
Ethnicity						
Asian	0.76**	0.71***	0.73***	0.66***	0.76**	0.65***
Black	1.34**	1.33**	1.28**	1.01	1.34**	0.96
Other	0.60	0.56	0.61	0.54*	0.61	0.38**
Missing	1.20	0.94	1.00	1.01	1.20	0.56
Mixed	1.22	1.25	1.23	0.98	1.23	0.95
Female		0.29***				0.47***
Age						
18-34		1.88***				3.23***
35-49		1.59***				3.23***
50+		1.56**				2.22***
Mental Health		2.06***				1.83***
Officer demographics						
Age						
30-39			1.11			1.10
40-49			0.70***			0.84
50+			0.30***			0.49**
Length of service						
2-5 years			24.3***			15.0***
6-10 years			54.0***			25.9***
More than 11 years			55.7****			31.4***
Other factors						
Alcohol				0.41***		0.54*
Drugs				0.26**		0.00***
Prior knowledge				1.54***		1.60**
Sex, size, build				1.44**		1.52**
Weapon				23.7***		23.8***
Lockdown 1					0.92	0.99
Lockdown 2					0.81	0.78
Lockdown 3					0.74***	0.77**
Morning					0.79**	0.77**
Afternoon					0.82**	0.79**
Night					1.15*	1.26**
McFadden's Adj R^2	0.002	0.058	0.066	0.187	0.004	0.268
N	87380	84831	87364	87380	87380	84820

* p<0.05, ** p<0.01, *** p<0.001

1.3.5.8. Warwickshire

Table A5.17: Binary logistic regression analysis for Taser use (odds ratios) – Warwickshire (non-duplicate dataset)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Citizen Demographics						
Ethnicity						
Asian	1.21	1.17		1.17	1.20	1.11
Black	1.18	1.15		1.13	1.19	1.10
Other	0.84	0.93		0.82	0.83	0.89
Female		0.30***				0.29***
Age						
18-34		1.88**				1.95***
35-49		1.72**				1.79**
50+		1.21				1.23
Missing		1.44				1.55
Mental Health		1.87***				1.99***
Officer demographics						
Age						
30-39						
40-49						
50+						
Length of service						
2-5 years						
6-10 years						
11 years or more						
Other factors						
Alcohol				0.83*		0.77**
Drugs				1.05		0.89
Lockdown 1					0.67	0.65*
Lockdown 2					1.39	1.29
Lockdown 3					1.24*	1.20
Morning					0.99	0.92
Afternoon					0.90	0.87
Night					0.91	0.93
Tjur's R^2	0.000	0.014		0.001	0.002	0.017
N	7,612	7,612		7,612	7,612	7,612

* p<0.05, ** p<0.01, *** p<0.001

1.4. Chapter 10: Representativeness and 'racialised' reporting practices

1.4.1. Table 10, 11, 12, 13, and 14

Table 10. Binary logistic regression analysis for Taser use (odds ratios)

	Model 1	Model 2	Model 3	Model 4	Model 5
Citizen Demographics					
Female	0.34***	0.28***	0.28***	0.28***	0.33***
Age					
18-34	1.60***	1.61***	1.62***	1.60***	2.09***
35-49	1.40***	1.41***	1.43***	1.41***	1.88***
50+	1.42***	1.41***	1.43***	1.42***	1.78***
Ethnicity					
Asian	1.06	0.78*	0.72*	0.76*	0.65*
Black	1.30***	0.95	0.88	0.88	0.74*
Mixed	1.23*	0.90	0.85	0.86	0.75*
Other	1.08	0.80	0.74	0.75	0.71*
Missing	1.30*	0.94	0.89	0.89	0.91
Officer demographics					
Female	0.57***	0.45***	0.51***	0.50***	0.48***
Age					
30-39	2.45***	2.45***	2.44***	2.46***	2.38***
40-49	3.22***	3.21***	3.27***	3.21***	3.03***
50+	2.14***	2.14***	2.22***	2.20***	2.19***
Ethnicity					
Asian	0.56***	0.45***	0.43***	0.50***	0.47***
Black	0.63**	0.50**	0.51**	0.45**	0.61**
Mixed	0.70**	0.55**	0.54**	0.55**	0.49**
Other	0.45***	0.35***	0.35***	0.36***	0.31***
Demographic match (officer and member of the public)					
Gender		0.72***	0.72***	0.72***	0.76**
Age		0.99	0.99	0.99	0.98
Ethnicity		0.71***	0.73**	0.72**	0.71**
Area					
City of Manchester				1.32***	1.22***
Bolton			0.98		
Bury			0.68***		
Manchester Airport			0.46***		
Oldham			0.99		
Rochdale			0.99		
Salford			0.95		
Stockport			0.44***		

Tameside			0.76***		
Trafford			0.79***		
Outside GMP			0.86*		
Wigan			0.71***		
Other factors					
Mental Health					1.73***
Alcohol					0.55***
Drugs					0.79***
Prior knowledge					1.72***
Sex, size, build					1.59***
Weapon					7.11***
Lockdown 1					1.09
Lockdown 2					0.49***
Lockdown 3					0.41***
McFadden's Adj R^2	0.06	0.08	0.08	0.08	0.17
Tjur's R^2	0.04	0.06	0.06	0.06	0.14
N	56004	56004	56004	56004	56004

* p<0.05, ** p<0.01, *** p<0.001

Table 11. Binary logistic regression analysis for Taser use (marginal effects)

	Model 5
Citizen Demographics	
Female	-0.060***
Age	
18-34	0.040***
35-49	0.034***
50+	0.031***
Ethnicity	
Asian	0.015
Black	0.021***
Mixed	0.014*
Other	0.005
Missing	0.017*
Officer demographics (officer and member of the public)	
Female	-0.039***
Age	
30-39	0.045***
40-49	0.060***
50+	0.042***
Ethnicity	
Asian	-0.023***
Black	-0.032**
Mixed	-0.031**
Other	-0.042***
Demographic match	
Gender	-0.016**
Age	-0.001
Ethnicity	-0.019**
Area	
City of Manchester	0.011***

Other factors	
Mental Health	0.030***
Alcohol	-0.032***
Drugs	-0.012***
Prior knowledge	0.029***
Sex, size, build	0.025***
Weapon	0.106***
Lockdown 1	0.005
Lockdown 2	-0.038***
Lockdown 3	-0.048***
N	56004

* p<0.05, ** p<0.01, *** p<0.001

Table 12. Semi-parametric mediation analysis (odds ratios)

Impact factors	Direct Effect	Indirect Effect	Marginal Indirect Effect
Alcohol:			
Ethnicity			
Asian	0.931	1.100*	0.008*
Black	1.099*	1.184**	0.010**
Mixed	1.051	1.169*	0.009*
Other	0.959	1.073	0.003
Missing	1.065	1.113	0.005
Drugs:			
Ethnicity			
Asian	1.029	0.999	~-0.001
Black	1.013	1.181**	0.010**
Mixed	1.001	1.224**	0.011**
Other	1.002	1.025	0.001
Missing	1.014	1.159*	0.008*
Prior knowledge:			
Ethnicity			
Asian	1.028	0.999	~-0.001
Black	1.000	1.299***	0.015***
Mixed	1.001	1.231**	0.013**
Other	1.032	0.999	~-0.001
Missing	0.996	1.094	0.003
Sex, size, build:			
Ethnicity			
Asian	1.000	1.027	0.001
Black	1.000	1.354***	0.018***
Mixed	1.001	1.284**	0.016**
Other	0.999	1.032	0.002
Missing	1.000	1.089	0.005
Weapon:			
Ethnicity			
Asian	0.956	1.077*	0.006*
Black	1.001	1.115*	0.007*
Mixed	1.009	1.154*	0.008*
Other	1.035	0.992	-0.003
Missing	1.003	1.020	0.001

Table 13. Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (odds ratios)

	Model 1	Model 2	Model 3
Drawn, aimed, or arced:			
Citizen Demographics			
Female	0.41***	0.33***	0.39***
Age			
18-34	1.44***	1.46***	1.98***
35-49	1.25*	1.32*	1.77***
50+	1.36*	1.35*	1.77***
Ethnicity			
Asian	1.07	0.91	0.92
Black	1.29**	1.07	0.77
Mixed	1.05	0.88	0.78
Other	1.19	1.00	0.93
Missing	1.69**	1.40	1.41
Officer demographics			
Female	0.53***	0.43***	0.47***
Age			
30-39	2.24***	2.25***	2.17***
40-49	2.93***	2.90***	2.74***
50+	1.80***	1.79***	1.80***
Ethnicity			
Asian	0.59***	0.53***	0.55**
Black	0.42*	0.37**	0.46*
Mixed	0.92	0.81	0.72
Other	0.37**	0.33**	0.29***
Demographic match (officer and member of the public)			
Gender		0.73*	0.76*
Age		0.97	0.96
Ethnicity		0.84	0.83
Area			
City of Manchester		1.09	1.00
Other factors			
Mental Health			1.47***
Alcohol			0.47***
Drugs			0.74**
Prior knowledge			1.78***
Sex, size, build			1.17
Weapon			6.84***
Lockdown 1			1.21
Lockdown 2			0.43***
Lockdown 3			0.47***
Red-dotted or fired			
Citizen Demographics			
Female	0.31***	0.26***	0.30***
Age			
18-34	1.68***	1.67***	2.14***
35-49	1.48***	1.48***	1.94***
50+	1.44***	1.45**	1.78***
Ethnicity			
Asian	1.06	0.70*	0.60***

Black	1.30***	0.79	0.67**
Mixed	1.31***	0.83	0.73
Other	1.02	0.65*	0.63*
Missing	1.13	0.71	0.72
Officer demographics			
Female	0.59***	0.46***	0.49***
Age			
30-39	2.56***	2.56***	2.48***
40-49	3.37***	3.36***	3.17***
50+	2.30***	2.40***	2.39***
Ethnicity			
Asian	0.54***	0.41***	0.44***
Black	0.73	0.54**	0.66*
Mixed	0.60**	0.44***	0.40***
Other	0.48***	0.36***	0.32***
Demographic match (officer and member of the public)			
Gender		0.72**	0.66**
Age		1.00	0.99
Ethnicity		0.67**	0.66**
Area			
City of Manchester		1.43***	1.32***
Other factors			
Mental Health			1.85***
Alcohol			0.59***
Drugs			0.82**
Prior knowledge			1.69***
Sex, size, build			1.80***
Weapon			7.25***
Lockdown 1			1.04
Lockdown 2			0.52***
Lockdown 3			0.39***
McFadden's Adj R^2	0.06	0.08	0.15
N	56004	56004	56004

Table 14. Multinomial logistic regression analysis for Taser use of varying severity vs other use of force (marginal effects)

	Model 3
Drawn, aimed, or arced:	
Citizen Demographics	
Female	-0.015***
Age	
18-34	0.012***
35-49	0.010***
50+	0.010***
Ethnicity	
Asian	-0.020
Black	-0.004
Mixed	-0.004
Other	-0.001
Missing	0.008
Officer demographics	
Female	-0.013***
Age	
30-39	0.013***
40-49	0.017***
50+	0.010***
Ethnicity	
Asian	-0.008**
Black	-0.010*
Mixed	-0.005
Other	-0.014***
Demographic match (officer and member of the public)	
Gender	-0.005*
Age	~-0.001
Ethnicity	-0.003
Area	
City of Manchester	~0.001
Other factors	
Mental Health	0.006***
Alcohol	-0.013***
Drugs	-0.005**
Prior knowledge	0.010***
Sex, size, build	0.002
Weapon	0.033***
Lockdown 1	0.003
Lockdown 2	-0.015***
Lockdown 3	-0.013***
Red-dotted or fired:	
Citizen Demographics	
Female	-0.044***
Age	
18-34	0.028***
35-49	0.024***
50+	0.021***
Ethnicity	
Asian	-0.017***
Black	-0.014**
Mixed	-0.011
Other	-0.015*
Missing	-0.012
Officer demographics	

Female	-0.026***
Age	
30-39	0.033***
40-49	0.042***
50+	0.032***
Ethnicity	
Asian	-0.023***
Black	-0.014*
Mixed	-0.025***
Other	-0.028***
Demographic match	
Gender	-0.011**
Age	~-0.001
Ethnicity	-0.018**
Area	
City of Manchester	0.009***
Other factors	
Mental Health	0.023***
Alcohol	-0.013***
Drugs	-0.007**
Prior knowledge	0.019***
Sex, size, build	0.022***
Weapon	0.072***
Lockdown 1	0.001
Lockdown 2	-0.023***
Lockdown 3	-0.035***

1.5. Chapter 11: Frequency in officer use of Taser

1.5.1. Table 19. Multilevel regression models of Taser use (versus other uses of force) and frequency of Taser use

Table 19. Multilevel regression models of Taser use (versus other uses of force) and frequency of Taser use

	Multilevel linear regression for Taser use (versus other uses of force)	Multilevel negative binomial regression (rate ratios) for frequency of Taser use
Level-1 (use of force form):		
Citizen Demographics		
Gender		
Female	-0.031***	1.012
Other	-0.037***	0.937
Age		
18-34	0.007	1.050
35-49	0.016***	1.056
50+	0.009	0.985
Ethnicity		
Asian	-0.011	0.973
Black	0.008	0.956
Other	<0.001	1.028
Other factors		
Mental Health	0.025***	0.996
Alcohol	-0.008**	0.993
Drugs	<-0.001	1.027
Snijders/Bosker R^2	0.091	
Bryk/Raudenbush R^2	0.067	
Level-2 (officers):		
Officer characteristics		
Female	-0.021***	0.744**
Age		
30-49	0.095***	1.160***
50+	0.075***	1.649***
Ethnicity		
Asian	<0.001	0.893
Mixed	0.007	1.261
Other or not saying	0.009	2.000
Rank		
Sergeant	-0.032**	1.108
Other	-0.030***	1.044
Uniform	0.015*	1.021
Snijders/Bosker R^2	0.181	
Bryk/Raudenbush R^2	0.233	
ICC-empty	0.232	0.521
ICC-full	0.190	0.498

* p<0.05, ** p<0.01, *** p<0.001