

Candidate number: Pol – 1425  
Darren Henstock  
Wolfson College  
Supervisor: Dr Barak Ariel

# **Testing the Effects of Body Worn Video on Police Use of Force during Arrest: A Randomised Controlled Trial**

Submitted in part fulfilment of the  
Requirements for the  
Masters Degree in Applied Criminology and Police Management

Number of words: 17,994

MSt in Applied Criminology and Police Management  
2015

# Acknowledgements

There are a number of people that have helped to make this research possible. I would like to thank my wife Kelly and daughters, Evie and Tilly, for their support throughout this study. For their encouragement and sacrifice of weekends and evenings of family time I shall always be grateful.

I would also like to show my appreciation for the support of West Midlands Police in allowing me to complete this course, particularly Alex Murray and Jo Smallwood for their confidence and belief.

Finally I would like to thank the academic staff at Cambridge University for their support and guidance throughout my studies. Dr Barak Ariel has been key to this research, motivating and advising me throughout.

# **Abstract**

There is, at present, a worldwide uncontrolled social experiment taking place within policing. Body worn cameras have been rolled out in many forces worldwide, aiming to improve the procedural compliance of officers and reduce the incidence of use of force. Yet rigorous evidence is virtually non-existent on this multibillion dollar industry, on either its efficacy or cost-effectiveness. This study tested the effect of body worn cameras within a large UK force in a six month randomised controlled trial, whilst observing the effect within pre-specified force categories. Overall a 50% reduction in the odds of force being used was recorded when body worn cameras are present compared to control conditions, interpreted to be a result of the deterrence effect body worn cameras have on officers, offenders, or both. However, the effect concentrates in open-hand tactics, with no discernible effect on categories of more aggressive force responses. Furthermore, 40% 'more force' was detected in treatment conditions for handcuffing compliant suspects – contextualised as enhanced transparency and accountability, rather than a backfiring effect. In logical conclusion to this recorded reduction in low level use of force, the study documents a 65% reduction in recorded injuries to persons arrested, but counter-intuitively a corresponding increase in reported injuries to officers. This seemingly unexpected finding is attributed to improved confidence in reporting by officers rather than the cameras creating more aggression towards them. Finally, the dissertation also considers issues surrounding the implementation of body worn camera experiments.

# Table of Contents

Acknowledgements.....	1
Abstract.....	2
List of Figures .....	5
List of Tables .....	5
1. Introduction.....	6
Aims and Objectives.....	8
2. Literature Review.....	10
Police Use of Force .....	10
Situational Theory.....	11
Psychological Theory.....	12
Organisational Theory .....	13
Measuring Police Use of Force .....	13
Injuries During Police Encounters .....	16
Police Injuries .....	16
Suspects Injuries .....	17
Disrespect towards the Police .....	19
Prevalence of Injuries .....	20
The Deterrent Effect of BWC on Police Use of Force.....	23
What We Know about BWC and the Rialto Study .....	25
3. Missing Gaps in the Literature on Body Worn Cameras .....	29
Not all Force Responses are Created Equal .....	29
‘Compliant’ versus ‘Non-compliant’ Handcuffing .....	30
4. Policing and Implementation .....	33

Experimental Discipline .....	34
Models of Implementation .....	35
Change Management.....	37
Implementing Technology .....	39
5. The Birmingham South Body Worn Camera Experiment.....	42
Experimental Setting .....	42
Policy and Equipment.....	43
Unit of Analysis .....	45
Random Allocation Procedure.....	47
Manipulation Checks .....	48
Variables .....	50
Statistical Procedures.....	51
6. Results.....	53
7. Discussion .....	60
Interpreting the Unexpected .....	62
1. Body worn cameras ‘actually’ do backfire.....	63
2. ‘Proper Behaviour’. .....	64
3. Transparency and Accountability.....	65
Policy Implications.....	67
Additional Considerations on Implementing a Body Worn Camera Policy .....	70
Limitations of Study .....	71
Strengths of Study.....	72
8. Conclusions .....	75
REFERENCES .....	76
APPENDIX.....	93

## List of Figures

Figure 1 - Fixsen's Multilevel Model.....	36
Figure 2 - Use of Force Counts with and without Compliant Handcuffs.....	53
Figure 3 - Graphical Representation of all Use of Force Categories.....	54
Figure 4 - Use of Force Rates per Arrest per Shift.....	56
Figure 5 - Offender Injury .....	57
Figure 6 - Officer Injuries .....	57
Figure 7 - Cumulative Harm.....	59

## List of Tables

Table 1 - Comparability of shifts .....	48
Table 2 - Randomisation Guide for Officers.....	49
Table 3 - Use of Force Pre-Specified Categories .....	55
Table 4 - Cumulative Use of Force .....	58

# 1. Introduction

Since 2012 police body worn cameras (BWC) have received extensive media attention across the globe (Stratton et al 2014). There is not a continent left that does not have a law enforcement agency using or piloting body worn cameras. These small devices are perceived by many to be a promising way to achieve several aims in law enforcement, including reducing citizen complaints, reducing incidents of use of force, improving evidence gathering, improving public confidence and improving officers' self-legitimacy (White 2014). In the US, the use of body worn cameras has been recognised by the White House; a notable exemplar being the ruling on 12th August 2013 by Judge Shira A. Scheindlin of the Federal District Court in Manhattan, who ordered the NYPD to set up a one year pilot program that would compel officers to wear cameras in the precincts where the most police stops were being performed (NY Times 12/08/2013). In Europe, the College of Policing have suggested that body worn cameras are the mechanism through which 'dented public confidence' could be restored (BBC 24/10/2013). The idea that body worn cameras are an inevitable necessity, and will soon be common place equipment for police officers, is currently propagated in the media and driven by its' manufacturers (Stratton et al 2014).

Despite these laudable claims, there is little rigorous evidence on the benefits of the body worn camera. A literature review of the evidence on the effectiveness of body worn cameras has suggested that, "despite vast information sources discussing BWC technology the operational evidence to support claims about either the pros or cons of this technology is sparse." (Stratton et al 2014, p.13).

Of particular interest is the potential impact of these devices on police use of force, particularly at a time when police killings seem to be on the rise (Guardian 01/06/2015). Indeed, public as well as political interest in the possible effect of body worn cameras on police use of force is perhaps hardly surprising (Goldsmith 2010; Collins 2009). Use of force is a powerful talisman for those publicising the wrongs of various police forces; a trawl of the internet reveals numerous videos of perceived police brutality (Brown 2015). Whilst most UK forces have a greater level of public support than their US counterparts, there are pockets, in most forces, where mistrust and lack of confidence characterise the community's perception of the police (Ariel, Farrar & Sutherland 2014). Various scholars (Terrill 2001; Geller & Toch 1996; Skolnick & Fyfe 1993) argue how officer use of force damages the public-police contract. However, what can be consistently and accurately predicted are the tensions that arise if the police break this contract and the potentially catastrophic results that may follow; as in the riots after the deaths of Rodney King (1992), Mark Duggan (2011) and Michael Brown in Ferguson County, Missouri (2014 and 2015). Thus, anything that strengthens and reinforces the police-public contract is vitally important to modern police forces. Body worn cameras have entered this discourse with a bang. To illustrate, whilst most agencies in the Western world are facing austerity measures, the Obama administration recently proposed spending \$263 million on supporting the deployment of 50,000 cameras in the US (US Justice Department 1/05/15); similarly, the Metropolitan Police plan to deploy 20,000 cameras at significant cost to the taxpayer (BBC 3/06/15; Greater London Authority 24/06/15). Given these high profile examples, it is reasonable to speculate that many law enforcement agencies worldwide will soon embark on a similar journey purchasing large quantities of these devices.



Much like other pivotal moments in criminal justice research history (Sherman & Berk 1984), the opportunity exists to help guide policy with evidence. Yet the scope of research on these devices is not only expressly limited, but is also underpinned by evidence which reflects varying degrees of methodological rigor. Thus far, there has been only one published US experiment on the effect of body worn cameras on police use of force, now commonly referred to as the Rialto study (Ariel, Farrar & Sutherland 2014); as well as a few quasi-experiments (Katz et al 2014; Ready & Young 2015). To the best of the author's knowledge, there have been no published rigorous tests of the effect of body worn cameras, under satisfactory controlled settings, outside the US. This study is the first proper test of body worn cameras in a British metropolitan police force, aiming to replicate the Rialto study in a large force and within specific settings. This study also seeks to complicate the Rialto study with a more granular analysis of force; not simply as a dichotomous outcome, but rather as a scale, with greater emphasis on force categories than a binary variable. It also takes the opportunity to explore the injuries sustained by both parties during arrest as this is intrinsically linked to use of force, and potentially enhances the benefits of the camera. This more detailed approach has been considered as these analyses echo theoretical debates about policing in late modernity, accountability, transparency and social control practices more broadly.

## ***Aims and Objectives***

This study begins by reviewing the relevant literature on police use of force and how this influences injuries to both officers and suspects. This is then followed by a review of the literature on body worn cameras and how these devices are hypothesised to reduce the prevalence and severity of force in police-public contacts. Moving on there will be a brief

review of the literature surrounding implementation and those issues of implementation of technology specific to policing. The study will then go on to describe the methods used to estimate the causal inference of the effect of the devices on police use of force and injuries, and how data on these incidents was captured. The outcomes and results are presented next, followed by a discussion of the findings for future research and finally considerations for implementation of body worn cameras in police departments worldwide.

## 2. Literature Review

### ***Police Use of Force***

The Peelian principles that underpin modern policing suggest that the degree to which public co-operation can be secured diminishes proportionately to the necessity of the use of physical force by the police. The police should only use physical force to the extent necessary to secure observance of the law, or to restore order, when the exercise of persuasion, advice and warning is found to be insufficient (Lentz 2007). To that effect, Bittner (1970, p.38) contended that “no matter what task the police are involved with, police intervention means making use of the authority and ability to overpower resistance.” Since this auspicious statement was made, there have been multiple studies of the many aspects of police use of force (Wolf et al 2009; Alpert & Dunham 1997, 2004; Sherman 1980, Garner et al 2002; Reiss 1968). Ariel et al (2014, p.511) suggested that “this scholastic interest reflects significant investment by practitioners and decision-makers in better understanding the ways in which law enforcement institutions exercise their power, and how such powers are managed.” Society presents the police force with a paradox in that in order to *stop* violence; police officers may have to *use* violence (Sherman 1980). Indeed, some researchers have claimed that the reason people call the police for help is based on their belief that force may be necessary (Langworthy & Travis 1999). Collectively, these considerations defend the view that police work *is* inevitably about the application of force, when needed.

Far less agreement in the literature exists about *how* to understand the application of these police powers in police work. Some of these postulations and evidence are reviewed below. However it is important to note that, within the spectrum of use of force there are two

situations which are deemed to be unequivocally undesirable; excessive use of force and unnecessary use of force. Either situation is argued to undermine and damage the police' relationship with the community (Reiss 1968; Worden 1996). "Complaints about police conduct do not usually arise because police are apprehending burglars in the middle of the night, or robbers holding up a bank. Trouble arises out of social interaction..."(Skolnick & Fyfe 1993, p.97). Within this prism, it becomes effectively clear why *any* method by which excessive, non-proportional or altogether unnecessary application of force can be reduced, would be a desired outcome.

Terrill (2001, p.14) explores several explanatory perspectives in the understanding of police use of force which he derives from the social science literature of the last 40 years. There are numerous cues which officers recognise, as well as countless interactions between these, that lead to the use of force (Terrill & Mastrofski 2002; Wikstrom et al 2012; Hickman et al, 2008; Garner et al 2002). Simply listing them, however, does not aid in explaining the use of force, although understanding their relevance to police actions is, nevertheless, important. Conceptually speaking, the broad range of variables which constitute use of force can be categorised as situational, psychological and organisational.

### ***Situational Theory***

Situational cues can prompt officers to make assessments about how an incident should be handled and how much force should be applied (Sherman 1980; Black 1976; Ariel & Tankebe 2016). These cues might be the race, gender, age, demeanour, sobriety or mental state of the suspect. The ecological circumstances of the interaction similarly play a part too, such as the neighbourhood in which the police and suspect interact, lighting,

availability of CCTV, or the number of bystanders or officers involved. Reiss (1968) found that 78% of the time, force occurred in police-controlled settings such as the car, precinct or public streets; and in the majority of cases there were no witnesses. Research has further expanded this view, suggesting it is the suspects' actions and resistance during the encounter, which precipitate the level of force used by officers (Alpert & Dunham 1997; Alpert et al, 2004; Terrill 2001). This is the demeanour hypothesis (Engel, Sobol & Worden 2000; Worden & Shepard 1996; Worden, Shepard & Mastrofski 1996), which is one of the leading predictors of police use of force.

### ***Psychological Theory***

A psychological perspective suggests that it is an officers' personal characteristics, experiences, views, training and outlook which determine the application of force (Terrill 2001). There is evidence to suggest some officers are more aggressive in stressful situations, whilst some officers show greater restraint when confronted by disrespectful conduct (Engel 2000). In another study, aggressive and tough-minded characteristics in officers were predictors of greater use of force (Fabricatore et al 1978). Intuitively this might be expected, but Worden (1995) found that officers who were university graduates were *more* likely to use physical force. The wealth of research in this area suggests that psychological variables are important to any study of the use of force, though it is recognised that this area is understudied and requires more scholastic attention.

## ***Organisational Theory***

Finally, research on the use of force has applied two predominant organisational theories to understand what may influence officers' use of excessive or unnecessary force. Wilson (1968) proposed an organisational theory reflecting on the corporate structures and political environment of the time. This model suggests that officers will tend to act similarly to given situations due to organisational rules, regulations, standard operating procedures, incentives and top-down direction. A style of policing develops with a "common vision that becomes part of each officer's mind set of how to handle everyday aspects of policing" (Terrill 2001, p.20). The second theory looks at police subculture (Brown 1998; Skolnick 2008; Baker 1985), and presumes that it allows officers to operate with some impunity as there is tacit approval of their actions by colleagues and a reluctance to inform on what is seen as appropriate. Baker (1985) summarised this in his 'hierarchy of wrongfulness': "dead wrong; wrong, but not bad; wrong but everybody does it." Some authors (Ariel et al 2014) have described this as being how officers see excessive or unnecessary force, but as Skolnick (2008) points out, officers are now more culturally diverse than in 1985, which may distort the neatness of this model. Either way, it seems clear that when considering use of force one cannot solely concentrate on officers and suspects, there needs to be consideration of the organisational environment in which they operate.

## ***Measuring Police Use of Force***

When an officer uses force, he or she is nearly always required to file an official report, even if only in his or her pocket note book. The challenge however, is that not every physical action on the part of an officer is considered force. The very definition can be

subjective, memory-prone, generally unclear and primarily a self-reported measure. What does seem to be clear-cut is that the reporting of use of force is closely linked more broadly to police accountability and transparency. Sound reporting of use of force is the cornerstone of police accountability and is essential if officers are to be held responsible for their actions, regardless of whether or not those actions were justified. As reviewed by other scholars (Mastrofski 2002; Ransley, Anderson & Prenzler 2007; Stenning 2009), police accountability refers to taking responsibility for the actions of the organisation by tracking or measuring its outputs. This requirement demands that the police are accountable for their performance, and will amend it when necessary. The police must act in the public's interest, and are therefore usually assumed to be held to a higher degree of accountability than other citizens – especially given the wide powers they hold in modern society (Bayley 1996; Skolnick & Fyfe 1993; Kupferberg 2008; Walsh 2001). For this and other reasons, Walker (2007, p.5); (see also Walker & Archbold 2013, p.94) contends that:

[T]he first accountability procedure to be considered involves the direction and control officer use of police authority through formal agency policies. This approach, generically known as administrative rulemaking, is a basic feature of modern police management, if not all public and private sector organizations. Administrative rulemaking consists of three elements: specifying approved and forbidden actions in written policies; requiring officers to file written reports on specific actions; requiring administrative review of officer reports.

Some ethnographic work in this area (e.g., Hunt 1985; Rojek et al 2012) suggests that what is construed as a “reportable incident of force” and how much force is appropriate, is often predicated by a police department’s organisational culture (Terrill 2001). For example, police subculture in relation to the reporting of use of force plays a role in accepting or allowing for force to be applied in certain circumstances. Researchers who study police organisations have been claiming for years that use of force and its subsequent reporting are a function of police officers’ attitudinal commitment to certain institutional or organisational cultures around their roles in society and, more broadly, their view of power (Terrill et al 2003; Lester 1996). Certain institutional and sub cultural codes make police agencies particularly resistant to cultural changes and transparency requirements (Skolnick 2008, p.37). Feelings of loyalty sustain this code of silence and make it particularly difficult to investigate purported unnecessary, or excessive, use of force, especially when it goes unrecorded (Baker 1985, p.210-213). For example, placing one’s hand on another’s shoulder in an authoritative way, or using handcuffs, may be considered use of force in some instances and for some individuals, whereas for others they may not. Measuring ‘injury’ or ‘assault’ is also likely to be challenged in terms of definitional threshold, as it is open to interpretation when there are no clear signs of physical contact. Taken collectively, we see that what needs to be reported, or not, is not always as clear cut as it could be, yet it does form a direct and tangible aspect of police transparency.

When officers use force, as mentioned earlier, there is invariably a requirement to record their actions; however there are organisational instructions and biases that mask the true levels of use of force prevalence, frequency and severity (Alpert & Smith 1999). For this reason, amongst others, the scope of the phenomenon is unclear. Adams (1996, p.62) suggests use of force “happens twice as often” than is suggested by official reports,



particularly 'low level' use of force, such as verbal commands or simply taking hold of someone. Still, there seems to be an agreement that, in general, officers do not use force that often, since the majority of officers' daily contacts are with law abiding citizens (Alpert & Dunham 2004; Croft 1985; Fyfe 1988; Bayley & Garofolo 1989). At the same time, it must be recognised that different recording practices exist. Measuring what 'police force' is, at which point it becomes excessive, unnecessary or disproportionate (Worden 1996; Reiss 1968), or even who instigates the use of force beyond what is required, is far from clear (Ariel et al 2014). There is no tracking system of police force that is completely reliable or even valid since the amount of force necessary in any given situation is subjective, primarily self-reported and heavily underreported (Hickman, Piquero & Garner 2008). Yet at its core, police use of some force is an essential requirement against certain offenders, under specific circumstances. The ever present challenge is to minimise the prevalence, frequency and severity of force to its minimal level, without putting officers' lives at risk, whilst still allowing them to gain control in situations when force is required. Enhancing proper recording of every force response, no matter at which 'severity level' or category, would be an equally desired consequence of a professional agency.

## ***Injuries During Police Encounters***

### ***Police Injuries***

Bittner (1970, p.38) suggested that, "no matter what task the police are involved with, police intervention means making use of the authority and ability to overpower resistance." It therefore follows on that police officers are more likely to be affected by intentional injuries or assaults in the workplace (MacDonald et al 2008). There seems to be an agreement

between scholars that, in general, officers do not use force that often, perhaps in less than 2% of police civilian encounters (Adams 1996; Alpert & Dunham 2004; Croft 1985; Fyfe 1988; Bayley & Garofolo 1989). Therefore it would appear that the prevalence of injury to officers and suspects during these relative few incidents is correspondingly high (Durose et al 2005; Alpert & Dunham 2004; Henriquez 1999).

Whilst empirical studies of the police use of force has grown over the past five decades, there has been a paucity of research focusing the injuries sustained by offenders and officers during these encounters (Smith et al 2007). It is perhaps not surprising that the majority of studies done around injuries have concentrated around police shootings and resulting fatalities (Alpert & Dunham 1995; Fyfe 1978; Geller 1982; White 2002), and those incidents that result in officer fatalities (Cardarelli 1968; Kaminski 2002, 2004; Kaminski et al 2000; Mencken et al 2004). Significantly less effort has been expended in the examination of the non-lethal injuries to suspects and officers (Alpert & Smith 1999). Reiss (1980) points out that, “research that is limited to incidents of lethal force or potentially deadly force tells us little about the millions of police-public contacts that do not result in the deaths of police officers or suspects.” The following provides a review of the extant literature on non-lethal injuries sustained by both suspects and officers.

### ***Suspects Injuries***

The most probable reason for being subject to police use of force is resistance. Within this logic, the most common models used in explanation of subject resistance are rational choice frameworks. There are generally two perspectives used to explain resistance during the officer-subject interaction (Bierie et al 2013). The first perspective relates to irrationality in the subject and is based around a person's decision-making capability,

whether temporary or permanent. There are various, well documented, factors that influence ones' decision making, ranging from drug or alcohol influence, through self-control to mental health issues (Engel 2003; Gottfredson & Hirschi 1990, Mastrofski et al 1996; McClusky et al 1999). These can clearly be self-influenced and temporary, or more persistent aspects of the psyche of the person. The latter creates, “stylistic patterns to which individuals are thought to adhere with consistency” (Mastrofski et al 1996, p.275). The implication should be clear to the offender, resistance is a poor choice that ultimately will lead to greater injury and potentially increased penalties once apprehended. However, the rate of incidence of active resistance to an officer increases as rationality decreases.

The second perspective examines the reasons for resistance more holistically, and is the result of “a degree of rationality in the choice of action, albeit a weak one, because of strong emotions, the press of time and habit.” (Mastrofski et al 1996, p.272). This perspective sees human behaviour, “as emerging from a thoughtful weighing of costs and benefits to competing behavioural options.” (Bierie et al 2013). Benefits, in the suspects mind, may include increased standing amongst peers, more freedom prior to incarceration or simply the thrill of the chase or fight. Whilst perceived costs could be greater injury, greater sanctions at Court or shame in the eyes of friends or family. Decisions are made depending on which option is the stronger at the time; the archetypal cartoon image of an angel and devil on each shoulder.

It is clear from these two perspectives that decision making is a complex process, and not only limited to offenders; similar considerations affect officer thinking too. Viewpoints tend to differ amongst commentators as to whether resistance is altered by an offender's normal style of weighing costs and benefits (rational) or a temporary or static

abnormality in judgment (irrational) (Bierie et al 2013). Either way, if there is another variable that could influence this decision making process then it has the potential to reduce assaults and injuries to all parties.

### ***Disrespect towards the Police***

In 1971 Reiss (1971, p.48) stated that, "the police, who frequently face the public at their worst, are expected always to be on their best behaviour." Since the early 1970's a number of studies have shown that a citizen's demeanour is largely predictive of subsequent police action (Reisig et al 2004; Black 1971; Brown 1981; Garner et al 2002; Mastrofski, Reisig & McCluskey 2002). The effect of demeanour, also, does not appear to be contingent on suspect's characteristics or other features of the police-citizen interaction (Engel, Sobol & Worden 2006). This influence of demeanour is an important factor given the explanation in the earlier chapter that resistance is the largest predictor of police use of force; this resistance most likely begins as poor demeanour, or perhaps more generally how a suspect's demeanour is operationalised. In considering the simplest form of demeanour, disrespect, Tedeschi and Felson (1994, p.171) suggested that even "passive disrespect, such as ignoring an officer's orders, and more active, such as profanity and sarcasm, are attempts to undermine the legitimacy and authority of the police." Police officers are for the most part, sensitive to anything that undermines their authority and legitimacy in their daily roles (Reisig et al 2004) and therefore, "more likely to take coercive action against antagonistic or hostile suspects" (Engel et al 2006, p.236). However, as with most such interactions, it is not only the suspect who can offer disrespect, officers can be guilty too. In most forces disrespect, profanity or racial abuse is prohibited by rules and disciplinary action. Reiss (1971, p.143) considers that police officers are far more likely than not to

ignore disrespect and abuse directed towards them, however they are also human and other studies (Reisig et al 2004; Garner et al 2002; Mastrofski et al 2002; Brown 1981) do show that citizen disrespect does, nonetheless, influence police behaviour and practice. Tedeschi and Felson (1994, p.258) suggest, "that a person on the receiving end of disrespect is more likely to reciprocate if the one who initiates it is at most a social equal." Therefore, despite training, social norms and the threat of disciplinary action, police officers are greatly at risk of displaying human nature and responding to disrespect to their detriment, particularly if they believe their behaviour unmonitored. Reisig et al (2004, p.263), during an observational study, found that officers could prevent escalation and increased disrespect if they "intervened authoritatively with less oral and physical coercion." This finding supports the work of other authors (Mastrofski, Snipes and Supina 1996; Muir 1977; Sykes and Brent 1983) who suggest that if police officers act assertively and persistently early on in the encounter, then the prospects for avoiding non-compliance and disrespect are much improved. This early intervention can reduce the need for use of physical force which is also a determinant of increased suspect resistance and injury (Reisig et al 2004; Alpert & Dunham 1997; Smith & Petrocelli 2002).

Despite increased scrutiny, regulations and sanctions against police officers it appears that police moralism is still driven by what suspects do (Mastrofski et al 2002). This is a very valuable insight, and particularly pertinent to the utility of body worn cameras in seeking ways to reduce police incivility in public encounters.

### ***Prevalence of Injuries***

It is generally accepted that prevalence of injuries to suspects from police use of force incidents is low when assessed against the overall volume of police public contacts

(Smith et al 2007). The 2002 National Survey of Contacts between the police and the public found that approximately 1.5% of citizens who had contact with the police reported that officers used or threatened violence against them, with 14% of these respondents claiming that they sustained an injury (Durose et al 2005). Despite the well documented issues around officer and public reporting of use of force incidents (Alpert & Smith 1999, p. 63), these results tally well with officer surveyed use of force studies which have found similar low levels of suspect injury in use of force encounters (Kaminski et al 2004). More surprisingly though, given the public responses, are the few studies using official records that have found significantly higher levels of reported injuries to citizens during use of force encounters, generally around 40% these encounters result in an injury to the citizen (Alpert & Dunham 2004; Henriquez 1999). However, despite these differences in reporting levels, what is consistent throughout the studies are the recorded level of injuries. These are invariably at the low end of the scale of severity and usually involve bruising, abrasions, lacerations and muscle strains or sprains. Bruising and minor lacerations seem to account for almost three quarters of recorded injuries (Alpert & Dunham 2000; Henriquez 1999; Kaminski et al 2004; Smith & Petrocelli 2002).

There may also be a conditional effect on the type of force used. However, there are only a few studies that have looked more deeply into the application of use of force and assessed the injuries sustained against various tactics and weapons (Meyer 1992; Alpert & Dunham 1997; Smith & Petrocelli 2002). A study of the Los Angeles Police Department use of force reports found that the use of a police issue flashlight, apparently a proscribed use of force at that time, caused minor injuries in some 80% of incidents in which it was used. Punching suspects resulted in major or moderate injuries 64% of the time, the use of baton

61% and other bodily force 46% (Meyer 1992). These findings of high likelihoods of physical injury from physical force are supported by similar findings in Alpert and Dunham's (1997) Miami Dade study, Smith and Petrocelli (2002) equally found that suspects exposed to physical force or restraint were most likely to be injured.

A number of studies have attempted to quantify officer injury arising out of use of force encounters but these have largely provided mixed results in relation to the frequency of occurrence (Smith et al 2007). Some scholars (Henriquez 1999; Kaminski et al 2004; Smith & Petrocelli 2002) have generally accepted the figure of around 10% of officers injured during use of force incidents; however analysis of data from the Miami-Dade and Baltimore Police Departments suggest the figure for reported injuries to officers is more likely between 25% and 38% (Alpert & Dunham 1997, 2004; Kaminski & Sorenson 1995). For this discussion, it is perhaps a pertinent point that those studies relating a lower incidence of injuries are police departments that had authorised officers to carry and use Oleoresin Capsicum (OC), or pepper spray; neither Miami-Dade nor Baltimore had authorised its' use at this time. However, similar to those findings for suspect injury, recorded injuries to officers for use of force encounters were relatively minor (Alpert & Dunham 2000; Brandl 1996; Brandl & Stroshine 2003; Kaminski et al 2004; Smith & Petrocelli 2002). In Alpert and Dunham's (1997) study 64% of officers were most likely to suffer a bruise or abrasion, 15% a sprain and 15% a laceration.

Again, as with suspects, some researchers have sought to examine the likelihood of injury to officers when utilising a particular tactic. Rather unsurprisingly, the most common cause of injury to officers during arrest was when officers attempted to subdue a suspect with bodily force (punching, kicking, take downs, wrestling and joint locks), these techniques

accounted for more than 65% of recorded injuries. All but one study (Kaminski & Sorenson 1995) found very similar evidence to this regardless of agency or whether officer surveys, or official use of force reports were used (Meyer 1992; Smith & Petrocelli 2002). Kaminski and Sorenson (1995) found that officers were less likely to be injured when using bodily force than when using a gun or other weapon; however this finding was only significant at the 10% threshold. Overall, the evidence suggests officers are more likely to suffer an injury during an incidence of use of force if they are employing the levels of force at the lower end of the force continuum, those hands on tactics that require close contact with a suspect.

In summary the available research implies that incidents of use of force result in relatively small levels of reported injuries; and whilst suspects injuries are slightly higher when official records are used, injuries to both officers and suspects tend to comparatively minor. That said, even minor injuries should not be accepted in a modern policing era. Tacit acceptance or even approval on the basis the injuries are only minor would have major consequences for legitimacy and accountability (Bottoms & Tankebe 2013). The research is suggestive that bodily force is a distinct contributor to injuries to both officers and suspects, and therefore anything that reduces officer reliance on hands on tactics must be a worthwhile pursuit for a modern police agency.

### ***The Deterrent Effect of BWC on Police Use of Force***

At this juncture, body worn cameras come in. The mechanism behind the hypothesised effect of body worn cameras on use of force is deterrence, driven by the awareness of observation. There is a wealth of research dealing with how people, as well as



other species, amend or change their behaviours when they think they are being watched (Chatrand & Bargh 1999; Dziewieczynski et al 2006; Wicklund 1975; Munger & Shelby 1989). A socio-cognitive process is engendered by the belief, or awareness, of being under observation and is expressed by an increased desire to observe societal rules, manifested by an observable increase in conformity to acceptable patterns of behaviour (Gervais & Norenzayan 2012; Sproull et al 1996; Barclay 2004). Generally speaking, people understand that rule-breaking is a behaviour that can lead to sanctions, and is therefore something that should be avoided (Klepper & Nagin 2006; Nagin 2013a). Kahneman (2011) explains that although genuinely strict rationality in all decision-making is unobtainable by most people, certain cues (even very small ones) that someone is watching, can lead to positive reactions and improved behaviour as non-compliant behaviour can lead to adverse consequences which, ultimately, rational actors wish to avoid.

In criminology, these notions are more widely studied within the framework of deterrence theory. Deterrence theory dictates that the threat of apprehension is causally linked to more compliance and/or less rule-breaking. Police officers and scholars equally assume that the threat of immediate incarceration, or at least interdiction, deters non-compliance. This model is believed to be universal, so it is expected to work on both offenders as well as police officers. As Durlauf and Nagin (2011, p. 19) write, “for criminal decisions, what matters is the subjective probability a potential criminal assigns to apprehension” (see also Groff et al 2015). Nagin (2013a, 2013b), Loughran, Pogarsky, Piquero, and Paternoster (2012), and more recently Nagin, Solow and Lum (2015) have shown some of the necessary conditions in which deterrence exerts an effect on criminal decision-making, and the same can be said for officers who must comply with police regulations. Getting caught doing something morally or socially wrong is often registered as

behaviour that can potentially lead to negative consequences, which is an outcome people generally avoid. Studies have, nevertheless, confirmed a propensity to avoid negative outcomes, and findings generally agree that individuals react compliantly to even the slightest cues indicating that somebody may be watching: being watched is registered as an antecedent to a likely apprehension and therefore this awareness encapsulates a tangible deterrence effect (Dziewieczynski et al 2006).

Thus, deterrence and the awareness of observation work equally on suspects who would otherwise decide to commit crime, and on police officers who might otherwise break the rules of conduct. For this reason, body worn cameras are hypothesised to work simultaneously on both actors in a police-public encounter. When officers and suspects are cognisant of the body worn camera, they are equally assumed to have no preference for rule-breaking, since the risk of apprehension and conviction by the evidence captured on videotape is believed overwhelming. Body worn cameras, unlike CCTV, dashboard cameras or bystanders' mobile-phone cameras can be viewed as "credible threats" (Jervis et al 1989, p. 3; Nagin 2013a). Both parties in the interaction are conscious not only of the fact that they are being watched, but also of the consequences associated with non-compliance. 'Getting away' with rule breaking is far less conceivable if one is being videotaped and one is conscious that the behaviour is in fact videotaped. The evidence from the Rialto study supports this model.

### ***What We Know about BWC and the Rialto Study***

There have been two literature reviews published that, if read together, cover the entire gamut of the research on body worn cameras to date (White 2014; Stratton et al

2014). Only one randomised controlled trial (RCT) on the effectiveness of body worn cameras achieves the requirements of Level 5, in terms of its scientific rigour, on the Maryland Scientific Methods Scale (Sherman et al 1998). This randomised controlled trial, known as the Rialto Study, looked at the effectiveness of body worn cameras in Rialto, California, with specific focus on use of force and complaints. Rialto Police Department, a small jurisdiction in California with just over 50 frontline officers, compared nearly 500 police shifts during which all police-public encounters were equally assigned to either treatment or control conditions. During treatment shifts, Rialto officers were asked to videotape all their encounters with members of the public and to store evidence on a secured cloud. In control shifts, the officers were tasked never to use the devices. Outcomes were then measured, in terms of officially recorded use of force incidents and complaints lodged against Rialto police officers. Following this 12 month experiment, Ariel, Farrar and Sutherland (2014) reported a relative reduction of roughly 50% in the total number of incidents of use of force compared to control conditions, and a 90% reduction in citizens' complaints, compared to the 12 months prior to the experiment.

The findings from the Rialto study have generated heated debates worldwide (Reddit 24/12/14), particularly concerning the transferability of the findings to other jurisdictions, or to larger police departments (Miller et al 2014; NY Times 24/09/14). Questions have also been raised as to whether unique circumstances in Rialto jeopardised the external validity of the test (BenBrucato.com 3/12/14). Major metropolitan cities, and with them large law enforcement agencies, operate on a different scale to small or even medium sized forces (Regoli et al 1989; Cordner 1989; Weber-Brookes & Lieber-Piquero 1998). Likewise, whether or not these US findings are transferable abroad has also been raised. Despite

these discussions, additional research on body worn cameras remains virtually non-existent. White (2014, p.10) concluded that:

[I]ndependent research on body-worn camera technology is urgently needed. Most of the claims made by advocates and critics of the technology remain untested . . . Researchers should examine all aspects of the implementation and impact of the technology—from its perceived civilizing effect, evidentiary benefits, and impact on citizen perceptions of police legitimacy to its consequences for privacy rights, the law enforcement agency, and other outside stakeholders.

The Rialto study is only one test and, in addition to the above, experimental replications are also required in order to show whether its' findings represent an anomaly attributable to the Rialto context, or are due to the novelty of these devices in police operations, or both. At the same time, noteworthy non-RCT studies, nevertheless, do exist on body worn cameras. The United Kingdom police forces were in fact the first to express an interest in body worn cameras. The Plymouth Head Camera Project (Goodall 2007); the Grampian Police study (ODS Consulting 2011); Project Hyperion study in Hampshire (Ellis 2014) – all these are Level 1 or 2 studies on the Maryland Scale but offer some confirmation of the hypothesised effect of body worn cameras. Although these non-controlled before-after studies did not look directly at use of force, they have nonetheless reported reductions in crime, fewer assaults on officers and improvements in criminal justice outcomes. At the

same time however, due to their nature, these studies suffer from risks to internal validity and their results are, consequently, suspect.

A recent randomised controlled trial on body worn cameras, conducted in Essex by The College of Policing (Owens et al 2014), has proved inconclusive due to challenges in the implementation of the experiment. The study was beset with detrimental implementation issues, such as low usage of the cameras and inconsistent use, which damaged both its treatment integrity as well as internal validity and hence rendered the results obtained as challenging to interpret accurately.

Across the Atlantic, the police departments of Mesa and Phoenix in Arizona have also examined the effect of body worn cameras on use of force and complaints against the police. While both studies have confirmed the results of Rialto (Miller et al 2014; Young & Ready 2015; Katz et al 2014), the non-controlled settings and lack of sound comparability between treatment and control sites created interpretation challenges similar to those of the Ellis (2014) experiment and other early evaluations of body worn cameras.

### **3. Missing Gaps in the Literature on Body Worn Cameras**

Beyond replications, there are two areas where the available research is lacking and requires a more granular analysis of the effect of body worn cameras on police use of force. Firstly, a coherent breakdown of what 'force' means, beyond the dichotomous measure of self-reported use of force observed in previous studies is needed and, secondly, a distinction between the compliant and non-compliant handcuffing of suspects, must be made and described.

#### ***Not all Force Responses are Created Equal***

Once body worn cameras are mandated in police operations, is there a reduction in the frequency *and* severity of the use of force? This question about the effects of body worn cameras on the use of force demands that a closer observation be made about the types of force that officers are more, or less, likely to use when body worn cameras are present. Outcome variations are currently unclear. On the one hand, it may be that body worn cameras have an effect on any level of force the police use; this implies that body worn cameras have an effect on all categories of force. On the other hand, the effect of body worn cameras might be located in the lower bands of what is referred to as the 'force continuum' (Terrill 2001) – e.g., verbal commands, empty-hand submission techniques and some aggressive response techniques such as CS spray or baton use. The force continuum is a standard that provides police officers with a guideline about how much force is

appropriate against a resisting suspect, in different circumstances. As such, and under this line of theorisation on the effect of body worn cameras, they are effective, but only up to the point where 'force apparatus' such as intermediate weapons (TASER discharges), dogs or lethal force, are used. Put differently, body worn cameras would only have an effect in instances when the officer was able to convince the suspect to 'step down' using verbal approaches, and therefore avoid the incremental use of force up to the point where 'force apparatus' is applied.

To be sure, one should anticipate that *some* suspects are likely to be aggressive *anyway*, so more forceful responses would be deployed regardless of whether body worn cameras were present or not. To illustrate, deterrence relies heavily on rational calculations and awareness; for this reason, intoxicated or psychotic offenders are unlikely to be responsive to deterrent messages or the credible threat of punishment through their videotaped demeanour. These cases, which may anyway require extreme measures of police force, would be unsusceptible to the effect of body worn cameras.

### ***'Compliant' versus 'Non-compliant' Handcuffing***

The other crucial element which has been ignored in previous body worn camera studies is the distinction between arrests in which the suspect is handcuffed and 'voluntarily' agrees to go to the station, and circumstances in which the suspect is handcuffed but involuntarily escorted to a police station for further questioning. The use of physical restraint or handcuffs is not legally mandated (College of Policing 2013), and the suspect may submit without the use of any physical force; the essential component of the arrest is the exercise of powers over a suspect, with or without a voluntary or involuntary submission

(College of Policing 2015). However, in practice, and particularly when patrol officers patrol on their own, nearly all arrests result in the handcuffing of suspects, simply because this is the health and safety guidance given to officers (Home Office 2014). Whether or not this is good practice is not the issue here, but if these restraints are or are not recorded by the officer as use of force, they create a measurement bias that needs to be addressed. Departmental and jurisdictional guidance on whether or not these handcuffing practices constitute police use of force diverges, and different approaches thus emerge (e.g. see guidelines of West Yorkshire Police 2011; Las Vegas MPD 2011; Warwickshire PCC Office 5/6/15).

Why is this scrutiny being directed at what appears to be a seemingly technical aspect? Because measuring *any* handcuffing as a level of force which requires the officer to log a use of force report, or a policy which stipulates that compliant handcuffing is *not*, but non-compliant handcuffing *is* a recordable event, changes the result. Both would be considered low level force; but one would appear in police records designed to track these incidents, while in another record keeping system it would not. At the very least, and methodologically speaking, the two different tracking policies (Sherman 2013) create a comparability issue between forces. The disparities illustrate the implications on police accountability and particularly around the transparency and the reporting of use of force, which continues to be a contentious area in policing (Lersch et al 2008; Pate et al 1993; Terrill 2001; Garner et al 2006; Wolf et al 2009). This problem is exacerbated when many forces, including West Midlands Police where the present study took place, have stopped requesting their officers to log use of force reports completely (West Midlands Police and Crime Commissioner 2014).



31. There is no longer a requirement for officers to record a use of force on a separate form in relation to open hand techniques, CS spray and baton strikes. Officers are instructed to record the detail of any incident, force used and the rationale supporting the application based on the NDM in their pocket notebooks.

32. The decision to stop recording such data was taken in late 2010 after consultation with Force Health and Safety, Professional Standards and Operations and was ratified by Command Team. Form WG 433 (use of force form) was withdrawn to support the force aim of reducing bureaucracy and reducing repetition of data.

33. Records are maintained on the deployment of firearms officers, TASER usage and police dog bites.

The only forms of systematic tracking available in many police forces, across the United Kingdom, are through custody arrest records, non-computerised pocket notebooks, or particular force types such as TASER discharges or lethal weapons.

## 4. Policing and Implementation

Evidence based policing and academic research has only been a recent phenomenon to enter UK policing, and there remain wide gaps between research and police practice (Lum et al 2012). For most rank and file officers academic study does not sit as the natural bedfellow to policing as it does with medicine for example; in policing there is no provision for academia to inform promotion, which therefore limits its' utility in the eyes of officers. Rousseau (2006) suggested that most new practices suggested by researchers are invariably met with suspicion and resistance by practitioners and managers. This is a very real threat to any research being conducted in a police agency; indeed a majority of officers will treat most new ideas coming from their own command team as simply a passing fad or fashion, and will return to long standing methods whenever possible (Lum et al 2012). When considering an RCT there is often a very real perception by many police officers included in the research processes that there is a moral and ethical concern with allocation of people to treatment and control conditions (Greene 2013). It is difficult for officers to rationalise how an experiment can take place if certain people can seemingly 'get away with it'. This issue, if left unchecked, can easily lead to not only opposition from officers participating in the trial, but all those persons they interact with during the course of the experiment leading to the stalling of any research (Neyroud & Slothower 2015). Potential new ways of working are invariably measured by police agencies in terms of improved service and performance coupled with reduced costs; the researcher however simply wants to maintain scientific rigour and assess whether a positive or negative effect has been found (Strang 2012). This

dichotomy would therefore suggest that police leaders can also exact a heavy influence on the progress and conduct of field experiments.

If we are to appropriately assess what works, and importantly ensure a program or process does no harm then RCT's in policing and justice settings are essential (Sherman 2007). It is, however, an ambitious task to implement an RCT in a police agency and there has been only a small network of academics responsible for the majority of experiments, so there is very little advice for experimenters especially when new technologies are involved (Braga et al 2014, Roman et al 2012). Realistically, more information and guidance can probably be gleaned from the numerous studies of the difficulties of this type of research (Weisburd 2000; Cordray 2000; Greene 2013; Abramowicz et al 2011; Lum et al 2012; Sherman et al 1992). RCT's not only inform whether criminal justice interventions do no harm, but they also provide evidence of the scale of the impact the intervention may have (Sherman 2007). Additionally they can also help understand the severity of the problem being tackled and the best implementation strategies for programmes (Boruch et al 2000). These wider considerations are an essential element in considering initiatives during these times of austerity and are an integral part of the 'what works' research by the College of Policing (2015). If conducted with high fidelity then randomised trials can achieve high levels of internal and external validity, making them the 'gold standard' of evaluation (Sherman 1998).

## ***Experimental Discipline***

Given the nature of the trial then randomisation must clearly be one of the most important factors of the experiment to get right; post randomisation is the most likely place

where the process will fail and attrition will set in (Strang 2012). In relation to body worn cameras, this is the point at which officers use or do not use the cameras during their tour of duty and has been an integral factor in previous body worn camera experiments (Owens et al 2014; Drover & Ariel 2015; Ariel et al *forthcoming*). Efforts to address this concern require continued monitoring, review and feedback by an officer of the appropriate level. Remote leadership is not effective in these circumstances, only direct ownership can lead to the necessary rigour that will achieve high fidelity. The officer who directly owns the experiment has the desire to ensure success; they have the necessary understanding of the intricacies of the experiment, support of the staff and the knowledge of potential threats to the experiment such as personnel or policy changes (Drover & Ariel 2015).

### ***Models of Implementation***

A study focusing on new ideas in policing must consider the appropriate methods of implementation for the very reasons mentioned in the preceding chapters. The ideas of Fixsen (2005) and Innes (2013) are widely respected and provide police leaders with models to reflect upon when considering implementation. Innes focuses mainly on policing and the issues with fear of change, whilst Fixsen gives the wider model of implementation created from a comprehensive review of the literature surrounding evidence based practices. Utilising both fuses police policy experience with the generic models, and so gives relevance to fitting any experiment into policing.

To make it easier to understand the implementation of an evidence based program, Fixsen and colleagues (2005) developed a conceptual framework consisting of five

elements. The initial consideration is the *source*, which is the program being implemented or the best practice being considered. Second, is the *destination* which could be the organisation or group at which the intervention is targeted. Next is the *communication* link which is the person or persons implementing the program. Fourth is the *feedback* mechanism; the communication channels designed to support feedback and staff development. Finally there is the sphere of *influence*: the social, political, & ecological climate in which the organisation exists. These elements help to bring programs and practices into contact with practitioners who will deliver the intervention locally. In order to achieve the above elements the Fixsen model requires consideration of influence factors occurring at three levels: core, organisational and influence factors (Figure 1).

**Figure 1 - Fixsen's Multilevel Model**



The core implementation components must be present for implementation to occur with fidelity and good outcomes. The organisational components must be present to enable and support those core components over the long term, and all of this must be accomplished against prevailing priorities and government changes; the influence factors. The recognisable constants through all these levels is communication, feedback and the

value of training, which are factors recognised as important to implementation by a number of scholars (Lum et al 2012; Strang 2012).

Innes (2013) contends that innovation goes through three main stages, revolution, evolution and involution. Revolution is the process of explaining the need and the context for change. Following revolution, evolution concentrates on providing a link to current practice and developing this as opposed to labelling the innovation as a new process. Finally involution aims to adapt the innovation to local circumstances. This process of linking new developments to current processes, whilst explaining the need and context reduces fear of change and is a valuable strategy in change management within policing.

## ***Change Management***

This study is all about the introduction of new technology and a significant process change at a number of levels within West Midlands Police; therefore it is essential to understand the perceptions of change programs within the police. A number of researchers agree that a consistent response to change in police agencies is resistance (Ariel & Wain 2014; Drover & Ariel 2015; Hobday 2014; Innes 2013).

Skogan (2008) suggests that resistance can come from various levels within the organisation. Front line officers will refuse to accept changes if they see an increased workload or the reasons for change are not easily perceived or understood, whilst middle and first line managers can fear being undermined or having their authority challenged. Given their position between senior leadership teams and front line officers, these middle and first line managers are the key to successful implementation as they can easily

undermine programs (Patton & Boddy 2007). Change programs are common to all organisations; however the likes of Innes (2013) and Reiner (2010) suggest that the police culture is parochial, conservative and actively resistant to innovation. There may be good reason for this as police leaders tend to be risk averse given their role, the perception of the public and the potential for catastrophic consequences as a result of mistakes; however it does not help when trying to offer novel and innovative solutions to problems. Police leaders tend to have an introverted view of how things should be done, relying on personal knowledge and experiential learning rather than accepting that there are other agencies or groups that can offer an altered perception of problems and solutions. Kahneman (2011) sums this up rather more eloquently with his explanation of the 'inside' and 'outside' view. Addressing and resolving these concerns is a critical success factor to any implementation within the police, requiring the project lead or team to be cognisant of the competing pressures and fears of police leaders.

Ford (2007) suggests that organisations have two sides, the visible and the not visible; the visible aspect is the policies, procedures and visible structures whilst leadership and relationships constitute the not visible aspect of the organisation. Engagement of both sides of the organisation is important to ensure the entire context of any implementation is fully appreciated and anticipated. Consideration also needs to be given to obtaining the support of the wider stakeholders in any police agency, such as elected officials, trades unions, the press and the public. All of these can become another influencing factor on the change program who may be able to exert undue control. Policing is a public service and as such the public must be seen as having a large influence on any new policies; the usual vector of communication with the public is the press, and so careful consideration is

required for appropriate consultation (Sabatier & Mazmanian 1989). This need is neatly underlined by the failures of Project Champion in the West Midlands (Birmingham City Council 2010). In response to the terrorist incidents in London and Glasgow Project Champion saw the West Midlands Police, in conjunction with Birmingham City Council, install 216 surveillance cameras in a number of inner city wards in Birmingham. The public messaging that went out at the time was the standard line around preventing local crime and disorder, the fact that the funding had come from counter-terrorism budgets was not mentioned. The majority of the wards in which the cameras were installed had a high Muslim population, and it wasn't long before the increase in cameras in Muslim neighbourhoods began to be publicised on the web (Stirrer 21/4/10). This interest quickly led to the link to counter terrorism budgets being discovered, the inevitable public outcry (Guardian 17/6/10) and the cameras being removed at great expense and embarrassment. Lack of appropriate community engagement proved a fatal error. Whether by accident or design, the approach created a sense of suspicion and deceit that could not be resolved and is still felt today. This shared surveillance theme has created a very tangible concern for the West Midlands Police with the current advent of body worn cameras.

## ***Implementing Technology***

Given the earlier discussion around the resistance of officers to change programs then anything that exacerbates this resistance is deserving of investigation. Ariel and Wain (2014) suggest that increased surveillance of officer's activity is likely to lead to feelings of resentment and defiance, given that historically police patrol and activity is largely predicated on officer discretion. Research into police subculture suggests this scrutiny is



largely viewed as negative (Westley 1970; Skolnick 1994; Terrill et al 2003), and is not embraced favourably by cops. Chan (2001, p.151) suggests that this increases with technologies that monitor behaviour, and certainly body worn cameras take this scrutiny to the extreme. Essentially body worn cameras could be perceived as tracking officer's activity, and whilst the organisation believes that brings increased accountability improving professionalism and legitimacy (Ariel & Wain 2014), it can also lead to institutional tensions as officers feel undermined (Marx 2003). This concern suggests that police managers should be mindful that, contrary to the organisational view, officers may react badly to the thought of being directed, or 'micro-managed' (Ericson & Haggerty 1997). Finding common ground is paramount if the organisation is to ensure effective uptake and use of the technology. For many years police unions in the US resisted the introduction of Automatic Vehicle Location (Manning 1992) for the reasons mentioned above; however after lengthy discussion and negotiation it was eventually introduced as a safety feature for officers, rather than a management tool (Weisburd et al 2012). This example shows how easily a project can be stalled if the message is ill-considered. This resonates with the introduction of body worn cameras, given that some organisations have seen wide and varied reasons from officers as to why cameras were not used, from sudden damage to quality concerns (Ariel & Wain 2014; Drover & Ariel 2015; Owens 2014). These and other examples suggest that whilst, "one would not anticipate the same reaction from all rank and file officers, some may still use 'defensive strategies' to try to subvert or undermine surveillance" (Manning 1992, p.185).

Thus, as with all reviews of implementation strategies we return inexorably to communication, feedback, training and planning. These must be the watchword of any

process to introduce change and cannot be easily overlooked if one is to succeed. Neither are these onetime processes, they should be woven into every stage of implementation especially as staff and the organisational conditions change. The benefits are clear, “in essence, people are motivated to support organisations in which they feel valued members” (Bradford et al 2013, p.113).

## **5. The Birmingham South Body Worn Camera Experiment.**

### ***Experimental Setting***

The trial was conducted on the Birmingham South Local Policing Unit (LPU) in the West Midlands Police (WMP) force area. Birmingham South is a largely residential area populated by roughly 286,000 residents from a wide range of socio-economic levels, but with a limited range of ethnicity in comparison to other areas of the West Midlands (Birmingham City Council 2015). The trial was a field randomised controlled trial (RCT) and ran over a period of six months between June and December 2014. The trial equipped only response officers with body worn cameras, the reasons for this were twofold. First, there was a desire to maintain as closely as possible the trial conditions in Rialto and secondly, with only a small number of cameras it was felt that response was the most effective setting to test the benefits of the devices. Theoretical perspectives suggested that greatest benefits would come from confrontational situations, the ones to which response officers constantly attend. Birmingham South has five response units of roughly 23 officers on each; they are supervised by three Sergeants and an Inspector and cover early, late and night shifts. Budget constraints meant that only sufficient cameras could be obtained to equip 46 officers who covered two response units, B and D Unit. There was no particular decision to pick B and D units apart from the fact that the author, and principal investigator, was at that time the Inspector on D Unit and the B Unit Inspector had expressed a desire to be involved in the trial. However, once the decision was made both units were compared to ensure that their demographic profile was similar; that is say similar numbers of new or experienced

officers, along with similar age, sex and ethnic profiles. This trial was first discussed in August 2013 when it became apparent to the author that West Midlands Police had purchased body worn cameras and simply given them to officers in Birmingham City Centre with no other instruction than, 'see what you think.' In reality this is standard police testing; there was no hypothesis, no targeting, and no tracking. The West Midlands Police, whilst understanding the potential benefits of body worn cameras, is committed to evidence based research and so the Chief Constable was keen to rigorously test the devices first. Since there was little rigorous evidence available to a British metropolitan force, so this trial was not hampered by any expectation of a larger roll out at that time and time was afforded to conduct an RCT. This being the case, personal issue of cameras was favoured in order to make implementation and tracking as easy as possible for the limited project team. Thus prompted a six month process for the author to create and obtain approval for a business case, in conjunction with Dr Barak Ariel, for the appropriate testing of body worn cameras against approved hypotheses in a randomised controlled trial. The cameras were eventually purchased and the trial began on 1st June 2014.

## ***Policy and Equipment***

Officers were advised as to whether they were on camera days or non-cameras days, on non-camera days the cameras were not taken out of the station. During camera days officers were instructed that they were to record all encounters that would usually cause them to make a pocket notebook entry. This recording should begin, on directed incidents, as soon as they left the vehicle and conclude once the situation was resolved. If this was an arrest, then best practice was deemed to be recording until entry to the Custody suite where

dedicated CCTV would take over. There were exceptions to this and the policy written by the author for the West Midlands Police included the following events where recording would not take place:

- Firearms incidents - standing ACPO guidance at the time of writing policy.
- Public Order and Football deployments - pre-planned events where standard recording methods already employed.
- Emergency situations where use of electronic devices may constitute a danger.
- Explicit wishes of the victim.

The first three were reasonably self-explanatory to officers; however the fourth created some ambiguity, and therefore the training input gave significant guidance on the legality of the equipment and its use. Emphasis was also made in the training to the legal requirement of notifying subjects that the officer was using audio and visual recording equipment (College of Policing 2014), and the theoretical benefits of this awareness created. During the training leading up to deployment the Information Commissioners Office (ICO 2014) issued further guidance on the use of body worn cameras, requiring that the equipment had to carry high visibility markings showing audio and visual recording. These stickers were quickly obtained from our suppliers, although the equipment used on Birmingham South was the RevealMedia RS3-sx (Appendix). This camera already benefited from an integral forward facing LCD display screen, which flashed on when recording commenced showing the subject an image of themselves.

Cameras were pre-allocated to officers by the implementation team, so on booking out they needed only to take the camera from the docking station. On return to the station the camera would be re-docked and the process of upload, deletion and recharging

completed as an automated process. Officers were then free to add any metadata at this time, or any time before non-evidential footage was deleted at 31 days. This figure is governed by, and in compliance with, current government retention guidelines (College of Policing 2014). Any footage, once declared evidential, could not be deleted by anyone but the author as the authorised superuser. Due to IT restraints within WMP, the system was standalone and so evidential footage would be burned to DVD when needed.

### ***Unit of Analysis***

Although ideally officers would have been randomised to treatment and control groups on a 50/50 basis, making the officer the unit of analysis, this was not operationally practicable. Whilst the majority of officers work singly, operational need within the response units required some cars to be double crewed and further ad hoc double crewing during a tour of duty. This meant that officers in the control group could, potentially, have been contaminated by interaction with the treatment group, and their behaviours may have altered in response to the presence of their colleague's body worn camera. Similar concerns were also raised regarding groups of control or treatment officers attending incidents together. A further consideration was the sample size; a sample size of only 46 officers would quite possibly generate an underpowered study (Cohen 1988), or one that was “doomed to failure” (Clarke & Weisburd 1994, p.179). Increasing the number of officers was not realistic and would also have created control and coordination problems for the limited implementation team. Using G\*Power (Faul et al 2007) a sample size of 46 would only just have been sufficient if we were to have detected large effects ( $d=0.8$ ) with a probability of 0.05 and a power at 80%.

Instead, by making police temporal shifts (e.g. 07:00-17:00 shift) the unit of analysis, much like the original Rialto study (Ariel, Farrar & Sutherland 2014), the sample size available could be increased significantly, therefore allowing a much smaller effect size to be detected (Cohen 1988). As the trial ran for six months, 430 shifts could be randomly assigned into treatment and control conditions (with a 50/50 split). Using G\*Power (Faul et al 2007), this sample size was sufficient to detect a relatively small effect ( $d=0.3$ ; Cohen 1988) with a probability of 0.05 and a power at 80%. In practical terms, and to remove any temptation to the officers which could result in fidelity concerns as seen in studies by Drover and Ariel (2015) and Owens et al (2014), when officers were on control shifts the cameras remained in the police station. That said this was a trial using operational police officers, if a serious incident occurred during 'off' days that would significantly benefit from the use of cameras, supervisors were instructed that this would be an acceptable breach of protocols. Other details of the trial procedures can be found in the pre-trial experimental protocol (Appendix).

Admittedly, this method of randomisation might still have produced some residual contamination from the treatment groups cameras being carried into the control shift. However, given the rule of maximin (Rawls 1971) and the inherent operational policing pressures, shift randomisation was deemed the best possible option. More details, and further discussions about temporal shifts as a unit of analysis in policing studies, can be found in Ariel, Farrar and Sutherland (2014).

## ***Random Allocation Procedure***

The trial began with a two week exploratory test in order for officers to familiarise themselves with the equipment, the design of the experiment and the various processes involved. This was a necessary stress test allowing feedback against processes; ensuring the whole process operated as planned and, importantly, any required changes could be made prior to full implementation (Strang 2012). The random allocation of shifts was provided on a weekly basis using the Cambridge Randomiser (Ariel, Villa & Sherman 2012) on a pseudo-randomisation basis with 1:1 allocation of day and night shifts, including days of the week (Table 1). In examining comparability of this process no baseline significant differences emerged. These treatment and control shift sequences were communicated to the patrol officers by supervisors, and they would be deployed on patrol with or without the body worn cameras. Over the course of the six months trial, 215 shifts were allocated to treatment and 215 to control conditions.



**Table 1 - Comparability of shifts**

<b>Baseline Comparability of Shifts: Treatment vs. Control</b>		
	<b><u>Treatment</u></b>	<b><u>Control</u></b>
Monday	21	19
Tuesday	17	21
Wednesday	18	22
Thursday	19	19
Friday	16	22
Saturday	16	20
Sunday	21	17
<b>Total Shifts</b>	<b>128</b>	<b>140</b>

### ***Manipulation Checks***

Treatment integrity was checked by the author, or another supervisor, on a daily basis to ensure that the random allocation sequence was preserved. These daily supervisor reviews, including regular checks of the officers' data uploads, ensured 99% compliance with random allocation in both treatment and control conditions. In order that officers were aware of the allocations, and to support experimental fidelity, all supervisors were emailed a spreadsheet of allocations which was printed and placed with the cameras, a sample of which is in Table 2.

**Table 2 - Randomisation Guide for Officers**

Unit	Date	Day	Shift	Assignment	Unit	Date	Day	Shift	Assignment
B	16/06/2014	Mon	RD		D	16/06/2014	Mon	2200 x0700	Cameras On
B	17/06/2014	Tues	RD		D	17/06/2014	Tues	RD	
B	18/06/2014	Wed	0800 x1600	No Cameras	D	18/06/2014	Wed	RD	
B	19/06/2014	Thurs	0700 x1700	Cameras On	D	19/06/2014	Thurs	RD	
B	20/06/2014	Fri	0700 x1700	No Cameras	D	20/06/2014	Fri	0800 x1600	No Cameras
B	21/06/2014	Sat	1500 x2200	No Cameras	D	21/06/2014	Sat	0700 x1700	No Cameras
B	22/06/2014	Sun	1500 x0000	Cameras On	D	22/06/2014	Sun	0700 x1600	No Cameras
B	23/06/2014	Mon	2200 x0700	Cameras On	D	23/06/2014	Mon	1500 x0000	No Cameras
B	24/06/2014	Tues	2200 x0700	Cameras On	D	24/06/2014	Tues	1500 x0000	Cameras On
B	25/06/2014	Wed	RD		D	25/06/2014	Wed	2200 x0700	No Cameras
B	26/06/2014	Thurs	RD		D	26/06/2014	Thurs	2200 x0700	Cameras On
B	27/06/2014	Fri	RD		D	27/06/2014	Fri	RD	
B	28/06/2014	Sat	RD		D	28/06/2014	Sat	RD	
B	29/06/2014	Sun	0700 x1600	No Cameras	D	29/06/2014	Sun	RD	

## ***Variables***

Crime and calls for service data for the study were recorded by West Midlands Police, in accordance with Home Office Counting Rules (Home Office 2014). In order to recover the data required for the study a police software program called *Discoverer 4i* was utilised, this is a standard tool used by West Midland Police analysts to harvest data from all police systems.

As noted in the literature review, systematic recordings of incidents of use of force are not routinely captured by West Midlands Police. An initial consideration, that of returning to the manual recording by officers, of incidents of use of force was vetoed due to well-documented difficulties in maintaining this process and bias in recording from officers (Alpert & Smith 1999, p.63). Independent recording of use of force does, however, routinely take place in the custody suite by the custody officer and is entered onto the custody recording system, or 'ICIS'. The custody officer is legally required to register what type of force was used by the arresting officer, who is equally required to report these incidents to the custody officer. The risk assessment field of ICIS includes a record of force category, covering (1) verbal commands, (2) compliant handcuffing, (3) physical restraint or forcible handcuffing, (4) CS Spray, (5) baton and (6) Taser. Note that firstly, these categories mimic the force continuum categories and secondly, in this recording policy, there is a clear distinction between *compliant* and *forcible* handcuffing by the arresting officer. Following on, national guidelines under safer detention policies mean that the custody officer is legally required to record any injuries to both the detained person and the officers involved, then seek treatment for those injuries from a health care professional if required (College of Policing 2015). The data collated using *Discoverer 4i* captured the relevant ICIS records

which were then reviewed for the types of recorded use of force which the officer had applied, any recorded injuries to suspect or officer and particularly when the arrest was made. This was important in order to then ascertain whether or not the arrest occurred during a treatment or control shift. Unfortunately, all this data is recorded in a free text format and not necessarily always in the correct field, thereby requiring manual coding of each of the 590 logs into a database.

### ***Statistical Procedures***

First, Odds Ratios (OR) were used to assess the differences and to compare the responses (Y: the outcome variables) according to the value of the explanatory variable (X: BWC or controls). With this data, there were two binary variables that each had only two possible levels (counts of observations at each level), displayed in a 2 X 2 binary proportions table. Therefore the total arrest counts were used as the denominator (post-random assignment) and the number of force events within the post-treatment period as the numerator, allowing the OR to be calculated. This procedure was carried out several times to illustrate the outcome variations for different types of use of force responses: (a) physical restraints, (b) non-compliant handcuffs, (c) batons, (d) CS, (e) TASER drawn, (f) TASER used, and (g) Police dogs. This is the pre-specified official categorisation of force response in West Midlands Police, and should therefore not be considered as exploratory subgroup analyses (Assman et al, 2000). The 95% confidence intervals associated with these point estimates was also measured.

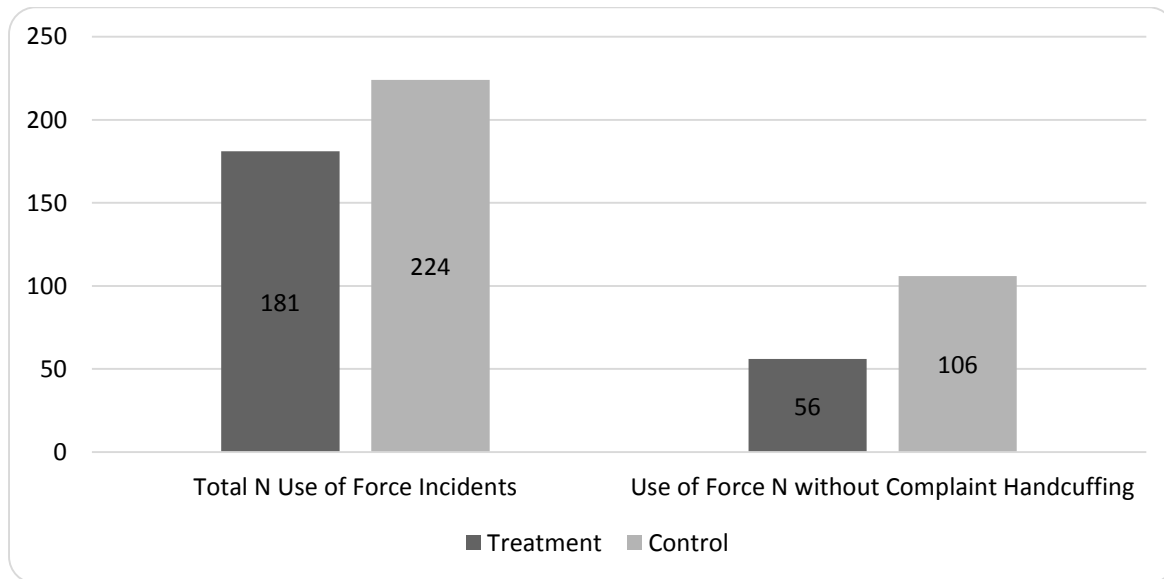
Second, accepting that 'force responses' move up on the force continuum as the level of force applied to the subject increases, several force types could be applied in each case. It is not rare for officers to use both physical restraints, with handcuffs and potentially TASER discharge as well, against the same combatant suspect. Therefore, an overall weighted score was calculated, based on the cumulative ordinal position of each tactic, using a scale based on the force continuum rod, where '1' is assigned to compliant handcuffing and up to '8' for the use of a police dog. The weighted scores were then used as the dependent variables of the effect of body worn cameras.

Finally with regard to injuries, a comparison was made between treatment and control and those recorded injuries to both officers and suspects. Since this is essentially a comparison of groups on a given variable a 2x2 contingency table was created for recorded injuries against treatment or control. Fishers Exact Test was used to assess the statistical significance of the prevalence of injuries between each group. Fisher's Exact Test was employed as it is more accurate than the chi-square test or G-test of independence when the expected numbers are small (Upton 1992).

## 6. Results

As noted, during the course of the six months, 215 shifts were allocated to treatment and 215 to control, totalling 18,224 officer hours. There were 405 individual incidents of police use of force recorded in Birmingham South, out of a cohort of 590 arrests (270 arrests during treatment conditions and 320 during control conditions). Overall, there were 224 incidents of use of force recorded when cameras were *not* present and 181 when cameras were. However, once 'compliant handcuffs' were excluded, 56 and 106 incidents of use of force were recorded in treatment and control conditions, respectively (Figure 2).

**Figure 2 - Use of Force Counts with and without Compliant Handcuffs**



The odds for use of force per arrests when body worn cameras are present compared to body worn cameras not present conditions are not significantly different under the first model (compliant handcuffing included) {OR = .856; 95% CI .567 – 1.292}, but the odds for use of force incident per arrests under the second model are about 48%

significantly lower {OR = .523; 95% CI .339 - .807}. Put differently, the odds of a use of force incident beyond compliant handcuffing, when body worn cameras are not present, are double than when body worn cameras are present.

**Figure 3 - Graphical Representation of all Use of Force Categories**

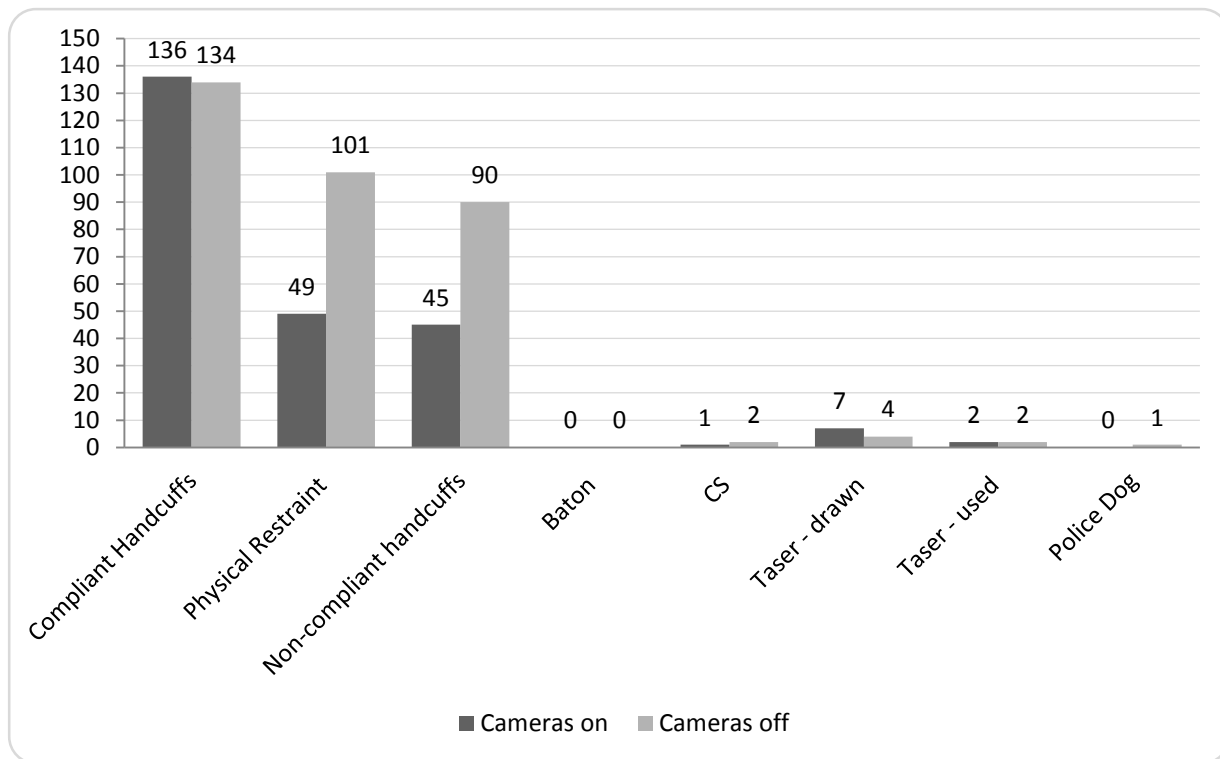


Figure 3 above shows the breakdown of total use of force incidents into individual categories, these raw scores are then shown again in Table 3 alongside the rate of occurrence of each use of force type against arrests.

**Table 3 - Use of Force Pre-Specified Categories**

<b>Use of Force Pre-Specified Categories – Treatment vs. Control Conditions</b>				
	<u>Treatment</u>	<u>Rate per</u> <u>arrest</u>	<u>Control</u>	<u>Rate per</u> <u>arrest</u>
Compliant Handcuffs	136	0.5037	134	0.4188
Physical Restraint	49	0.1815	101	0.3156
Non-compliant Handcuffs	45	0.1667	90	0.2812
Baton	0	--	0	--
CS Spray	1	0.0037	2	0.0063
Taser Drawn	7	0.0259	4	0.0125
Taser Used	2	0.0074	2	0.0063
Police Dog	0	0.0000	1	0.0031

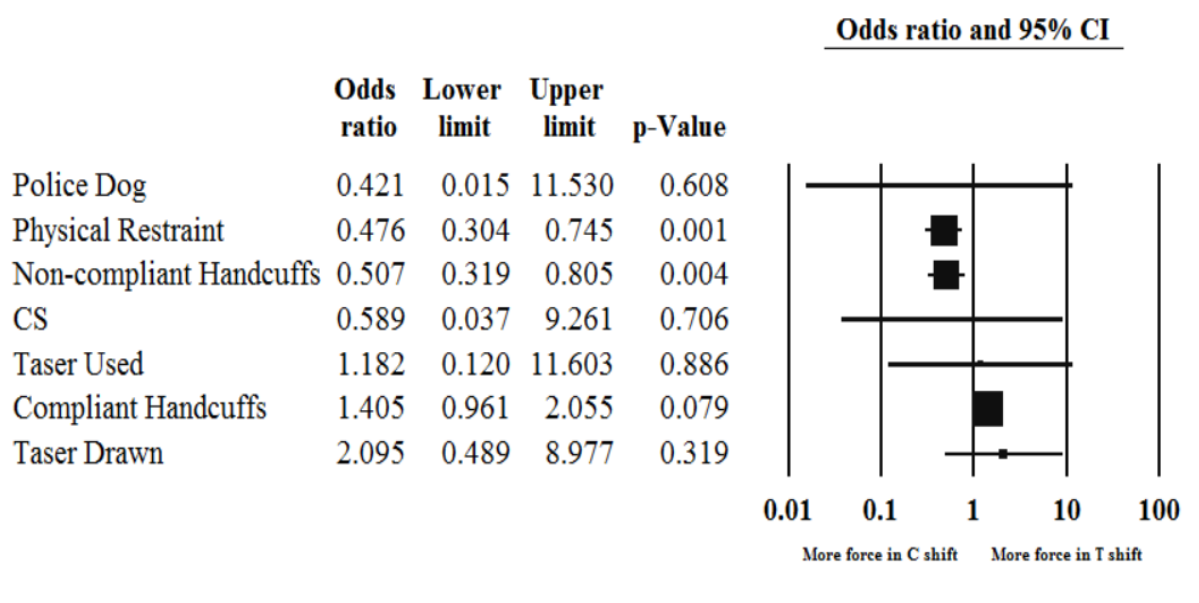
Notice that the number of use of force types exceeds the prevalence counts (240 in treatment and 334 in control conditions), this is because more than one type of force can be applied in the same forceful encounter (i.e. a combination of several force responses against the same suspect).

The pre-specified breakdown of police use of force categories (Figure 4) indicates significant differences in physical restraint and non-compliant handcuffing, and marginally significant differences in terms of compliant handcuffs. However, the directionality of these



effects is reversed: whilst body worn cameras seem to lower the odds of physical restraints by 52% {OR=.476; 95% CI .304 - .754} and non-compliant handcuffing by 49% {OR=.507; 95% CI .319 - .805}, on the other hand body worn cameras seem to *increase* the odds of recorded compliant handcuffing by nearly 40% {OR=1.405; 95% CI .961 – 2.055, p=.079}, compared to control conditions.

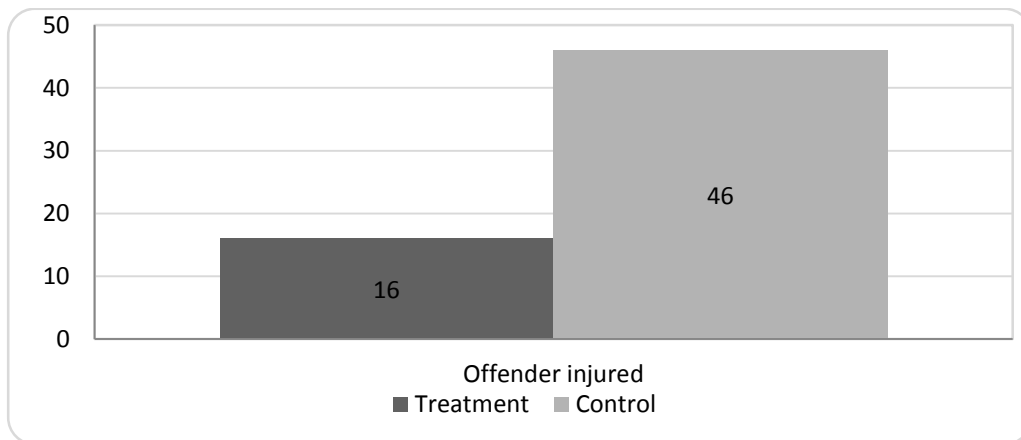
**Figure 4 - Use of Force Rates per Arrest per Shift**



Overall, categories of police use of force above physical restraint represent only 5% of total police use of force in this sample, which may be the reason why none of the comparisons are statistically significant at the 5% threshold (Figure 4). If these results are however indicative, they tend to suggest that body worn cameras *increase* the odds of forceful responses, but these conclusions are suspect given the non-significant outcomes. Lastly, no analyses were conducted of use of batons in police work, as both treatment and control groups experienced nil incidents with this particular weapon.

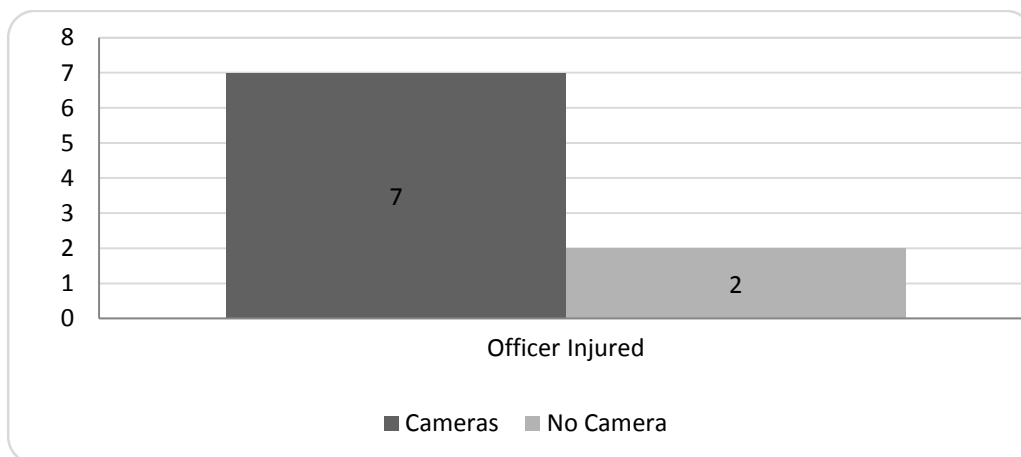
During the trial there were 62 recorded injuries to offenders, these were split between 16 in the treatment conditions and 46 in control; a 188% increase in injuries recorded in control conditions. Here again the result is statistically significant ( $p = 0.0011$ ) (Figure 5).

**Figure 5 - Offender Injury**



There were 9 recorded injuries to officers in the same time frame, 7 in treatment conditions and 2 in control. This translates into a 250% increase in reported injuries to officers under treatment conditions ( $p = 0.0873$ ) (Figure 6).

**Figure 6 - Officer Injuries**



Finally, in terms of the cumulative use of force scores, there is, in comparing treatment and control conditions, a significant increase in the ordinal position of force when the data is arranged as a weighted, cumulative score (Table 4).

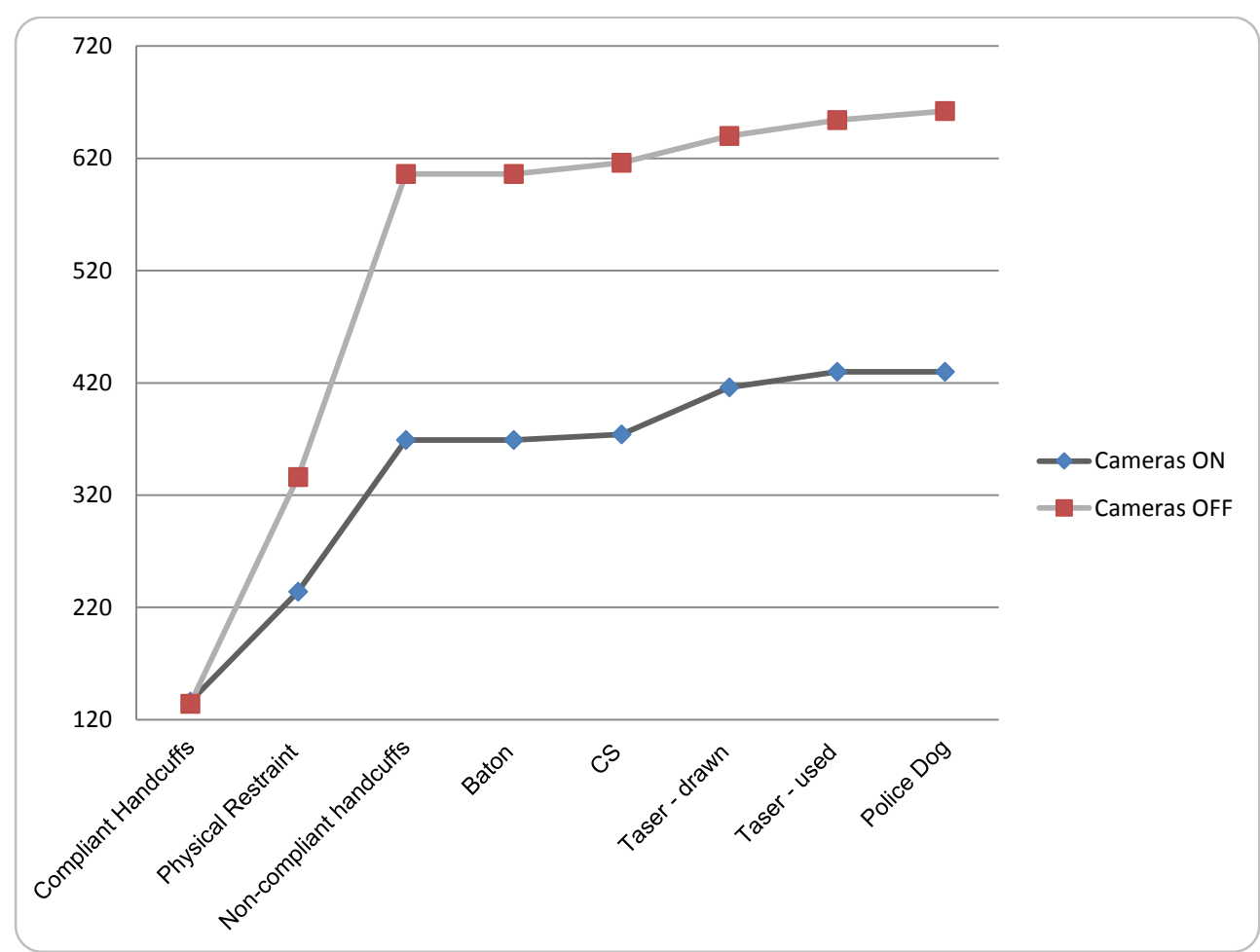
**Table 4 - Cumulative Use of Force**

<b>Cumulative Use of Force Weights - Treatment vs Control conditions</b>						
	<b>Counts</b>		<b>Weighted Scores</b>		<b>Cumulative Scores</b>	
	<u><b>Treatment</b></u>	<u><b>Control</b></u>	<u><b>Treatment</b></u>	<u><b>Control</b></u>	<u><b>Treatment</b></u>	<u><b>Control</b></u>
Compliant handcuffing (1) <sup>^</sup>	136	134	136	134	136	134
Physical Restraint (2)	49	101	98	202	234	336
Non-compliant handcuffing (3)	45	90	135	270	369	606
Baton (4)	0	0	0	0	369	606
CS (5)	1	2	5	10	374	616
Taser - drawn (6)	7	4	42	24	416	640
Taser - used (7)	2	2	14	14	430	654
Police Dog (8)	0	1	0	8	430	662

<sup>^</sup> Score in parentheses, based on the police use of force continuum

This configuration suggests a 35% reduction of weighted force in the treatment group (Figure 7).

Figure 7 - Cumulative Harm



## 7. Discussion

In this experiment the effect of body worn cameras in a non-US setting was robustly tested, with one of the UK's largest police forces. Over a six month period, using the officer's shift as the unit of analysis, this study has contributed to the evidence in four major ways.

It has been demonstrated that the use of body worn cameras in police operations reduces both the prevalence and the severity of police use of force, in a country where police use of force is substantially less significant than it is in countries like the United States (The Independent 24/2/2015). This suggests that police use of force can be curbed down in 'aggressive' police-public contacts that do not involve life-threatening situations, for both officers as well as suspects.

Thirdly, the study exemplifies the importance of validity in experimental designs: the granular analysis of pre-specified outcome variations suggested that body worn cameras can be shown to be efficient when recording force in one way, but not in another. The way force is defined is crucial: when police use of force includes what the professional literature refers to as 'compliant handcuffing' of suspects, then the overall estimates are non-significant. However when only *non*-compliant handcuffing is considered police use of force *per se*, and when these incidents were removed from the data, significant findings emerged. The odds for minimal force responses, such as physical restraints and non-compliant handcuffs, were significantly lower with body worn cameras. The odds for more severe force responses, such as TASER or police dogs, were non-significantly different to the odds in control settings although they seemed to point to *greater* odds when body worn cameras

were used; an anomalous caveat of which future studies should be cognisant. When tactics on the force continuum are broken down, the data from this study suggests that the benefits of body worn cameras are not always significant. A distinct change between 'empty handed' techniques and ones where 'force tools' are used was apparent. This suggests that once the level of force reaches these rare, elevated levels of force, the effect of body worn cameras is less discernible.

One way to understand this is conceptually, in respect of the awareness parties in the police-public interaction need to have for the cameras to have an effect. Once this interaction reaches a heightened state, then the awareness of each actor in the conflict zooms in to those areas important for survival. The physiological response to violent situations is well documented (Ayoob 1984; DuCharme 2001; Hanstaad 2009; Cannon & Cranefield 1915). The responses of the sympathetic nervous system lead to auditory and visual exclusion which removes awareness of anything other than the perceived threat which, in instrumental violence, is the officer (Margarita 1980). This requirement, for an awareness of the camera, seems to be an important factor that is posited as the main reason for CCTV not fulfilling the early expectations of its effectiveness for crime prevention (Welsh & Farrington 2009). Wasserman (2014) suggests that the deterrent effect of cameras, "may not be as great as many hope"; in support of this premise he suggests that the demonstrations in Ferguson, Missouri continued with apparent disregard, by the participants, for the ever-present media and "camera-toting observers". Similarly, he points to the ever increasing number of incidents found on the internet showing apparent police misconduct and officers using excessive force. But to each, consideration must be given to the circumstances in which the conduct was recorded. Were the parties *aware* of the recording? Were they intoxicated or tired? For deterrence to be effective, the participants

have to be *aware* of not only the camera's presence, but also of its utility. People may be aware of CCTV but still commit crime, believing the camera to either unmonitored or not recording. Welsh and Farrington (2009, p.737) suggested that for CCTV to be effective, they must be tailored with additional types of intervention. It is in this nuance that body worn cameras become more effective, coming as they do complete with a 'live' officer highlighting the cameras presence and utility. Therefore, it is not the camera that has the effect, but the 'total experience', along with a clear announcement early on that the encounter is videotaped, which primes the parties into compliant conduct. Without these additional portions of the treatment, body worn cameras could be a "toothless policy" (Ariel 2012) or even backfire. It is suggested that this is an area that would benefit from further research to fully ascertain the influencing factors of the encounter.

Finally, and perhaps most importantly, injuries to suspects have been shown to be drastically reduced when officers use body worn video. Ultimately this is the logical conclusion in showing that body worn cameras can reduce use of force at the lower end of the force continuum. Those open hand and minor control techniques that have been suggested to be the cause of most minor injuries during any use of force by the police (Alpert & Dunham 1999).

### ***Interpreting the Unexpected***

Directly linked to the awareness issue is our attention to the fact that not all force responses are created equal. The granular analysis of the dependent variable, police use of force, indicated greater odds for compliant handcuffs when body worn cameras were used compared to the odds in control conditions. How can these seemingly contradictory results,

in terms of compliant and non-compliant handcuffing, be explained? If body worn cameras are meant to deter, under what circumstances might they actually increase the prevalence of use of force, rather than decrease it? An increase in force is counterintuitive, as it goes against the premise of deterrence theory as reviewed earlier. Below, three interpretations are offered.

**1. *Body worn cameras ‘actually’ do backfire.*** For the first approach let us assume a backfiring effect of body worn cameras: wearing a body worn camera intensifies, rather than lowers, the tension between some officers and some suspects. If this is the case, officers may have used compliant handcuffs more frequently when body worn cameras were in use because the devices triggered more aggression, for particular suspects. Without the compliant handcuffs, the officers perceive that they would have had to resort to tougher force responses, which they would otherwise use if body worn cameras were not in use. There is some merit to this argument: the literature supports the contention that use of force does not occur in isolation and that, ordinarily, it is a result of the demeanour of the suspect that leads to a force response (Rojek et al 2012, Terrill & Mastrofski 2002; Garner et al 2002; Alpert & Dunham 1997; Alpert et al, 2004; Terrill 2001). Officers are trained to match force against subject resistance, either moving up the perceived continuum or applying tactics as appropriate but still moving along an increasing level of options (College of Policing 2013). The key is the officer’s perception that more force is appropriate, and as the only difference between treatment and control conditions is the body worn camera, then the conclusion could be that, in order to gain control of situations that may otherwise end up with more severe types of force responses, officers perceive the encounter as one that merits more prevalent use of compliant handcuffing.



This interpretation, however, is not straightforward because it requires the effect of body worn cameras on use of force to be viewed non-linearly. The odds for use of force in the lower bands of the force continuum has been found to be lower when body worn cameras are present than when they are not, but tend to be higher in the upper bands of the continuum when body worn cameras are present. Thus, under this hypothesis, the findings purport that officers used compliant restraints more often under treatment conditions because they predicted that the encounter would eventually require a relatively aggressive response to the situation in the upper bounds of the continuum; TASER, police dogs or possibly lethal weapons. It is contended that this ability cannot be easily awarded to even the most experienced officer.

**2. 'Proper Behaviour'.** An alternative explanation, which fits comfortably within the construct of deterrence theory, is that the increase in compliant handcuffing is merely an unexpected effect of being observed rather than an indication of more force. Given that an awareness of being scrutinised and observed generally evokes a measurably favourable shift in behaviour, it is feasible that the increase of compliant handcuffing indicates that both players in the encounter are acting in a way they believe is appropriate. The officer is being policeman-like by formally handcuffing the suspect, while the suspect is complying, or being good by allowing themselves to be handcuffed without confrontation. If the handcuffing of all suspects were mandatory in the UK, as in many other countries, then use of force would only be ascribed to non-compliant handcuffing and the results would be significantly different. These contemplations should be further explored in the future, as they refer to broader accountability and legitimacy questions, which this thesis is not in a position to reconnoitre with the appropriate depth (for further reading, see Bottoms and Tankebe 2014).

**3. Transparency and Accountability.** A more parsimonious interpretation would, however, argue that the increase in the use of compliant handcuffs is likely a reporting artefact. As the use of force is a self-reported event that is not consistently recorded, officers had begun logging it more diligently during the experiment. Ariel (*forthcoming*) stipulates that the reporting of use of force is closely linked to police accountability and transparency. Reporting of use of force is a clear marker of police accountability. For democratic institutions to hold their functionaries responsible for their actions, justified or otherwise, accountability is required. The police, as such, are more accountable for their decisions than other institutions, given their monopoly over the use of force. Once body worn cameras are mandated in police operations, reporting of use of force incidents could increase, at least in instances where they are normally underreported, such as is the case with compliant handcuffs. Perhaps naively, it could be argued that it is difficult to see how in large western police departments a TASER discharge, use of batons or police dogs could go unreported. But mid and lower bound force responses are not only easier to conceal, but in fact are not all required to be logged as an independent report – at least in most, if not all, UK police forces. Thus, officers in the treatment group began registering these reports at an increased rate, compared to control conditions. What once was left to ad hoc explanations by officers who did not record lesser types of force can no longer be hidden from the radar. Body worn cameras have caused officers to become more accountable, because the odds of getting caught using force, now on videotape, have substantially increased and, by implication, officers now file lesser uses of force (Black 1976) more frequently, too. Thus, body worn cameras increase transparency.

In support of this contention, recall that there is no general rule or requirement that officers must handcuff a person who is being arrested (College of Policing 2015). In fact,

only about half of all arrests, during the experimental period in Birmingham South, were accompanied by handcuffing. There are a variety of reasons for handcuffing, ranging from prevention of escape, officer safety when executing a warrant and maintaining the integrity of any evidence contained on the person of the arrestee. It is also quite likely that placing someone in handcuffs is considered a practicable way of transporting an arrested person to a police station, despite potentially being considered excessive (Home Office 2014). It may also be practicable, or safer, because an officer cannot risk assess the suspect accurately enough, in the brief encounter they share, to be able to predict the degree to which the suspect may become combatant or chaotic. For these reasons, but most likely as a concern for the officer's safety, officers are, in practice, usually directed to place an arrested person in handcuffs. In this respect, the increase in the incidence of handcuffing might be interpreted as a consequence of the BWC-wearing officers following direction and adhering to custom and practice. One could also argue that it is a fairer policy to handcuff every arrestee, with limited discretion to decide if the arrest warrants handcuffing or not, as this represents a distributive fairness approach (Tankebe 2013). These questions are left for future studies, as these contentions are speculative.

Furthermore, when considering the officer injuries during these confrontational encounters it is noted, albeit only with small numbers, a substantial increase during treatment conditions. If body worn cameras reduce injuries in the offender then surely this should follow through to the officers. An increase in injuries on one side and not the other is counter-intuitive. There are two potential explanations for this. Firstly, it could be that officers, understanding that their actions are recorded, are now more reticent to take pre-emptive action in case it appears overly aggressive on video. Wasserman (2014, p.8) terms this process as “overdeterrence”, and similarly suggests, “police officers steer well clear of

the constitutional line out of fear of having to justify or explain behavior that, while not unconstitutional, may look questionable on video”. Certainly pre-emptive use of force is a concept enshrined in UK law (UK Court of Appeals 1975), but without the benefit of explanation can be perceived badly (Brown 2015). However, research with officers using cameras suggests that the use of body worn video would not alter their use of force (Jennings et al 2014) and that they found body worn cameras were beneficial in “coercive encounters” (Young & Ready 2015). Secondly, a review of these 9 recorded events within this trial confirmed that the incidents were all post-arrest, so the conflict situation requiring physical conflict had largely gone. These reported 'assaults' were those incidents which usually cannot be corroborated by physical evidence, spitting and minor kicks or punches which do not leave any marks. Therefore, this would suggest that the increase in recorded assaults on officers when cameras are present is due to increased confidence on the officers' behalf that the evidence is captured. BWCs have caused officers to become more confident in reporting the assaults against them as they have unequivocal evidence to present to Court. This is the first study to note this counter-intuitive finding and, given its relative importance, to the body worn video debate internationally further detailed research is invited in this area.

## ***Policy Implications***

The incidence and severity of use of force is a noteworthy issue in contemporary policing discussions worldwide, primarily due to recent high profile cases, both here in the UK and in the US body worn video (or cameras) are presented, by many, as the magical panacea to solving this and a number of other problems, not least by the manufacturers

themselves (Stratton et al 2014). Firm, rigorously tested evidence of the benefits of body worn cameras more widely has been lacking (White 2014). Therefore, these findings have implications for policing, particularly given the current climate of a heightened awareness of police use of force against the backdrop of fiscal austerity in many law enforcement organisations across the world. Body worn cameras seem to be a solution that significantly reduces lower levels of use of force, with the knock-on effect of much less injury being caused to those being arrested.

There are a wealth of studies suggesting that legitimate police use of force contributes to a wider public acceptance of the legitimacy of policing (Mawby 2002; Goldsmith 2005; Manning 2010; Reiner 2010). Some incidents of police use of force can irreparably damage the police/public contract, leading to catastrophic outpourings of violence against the state. These only represent a tiny fraction of one percent of the number of times officers use force on members of the public, and the intimate details of why and how the incident flared-up into violence is not always captured in third party recordings because the confrontation does not excite public interest until it becomes heated. These kinds of conflict demand rules for the police officer but none for the citizen (Vunak 2001) and so invariably resemble a street brawl. Video footage of these kinds of events strongly influence the level of the community's trust and confidence and may become a catalyst for what was seen in the UK in 2011 and in Ferguson, USA in 2014 (Alpert & Dunham 2004; Skogan 2006; Lawrence 2000). Brown (2015) explains this entire conundrum for an officer who, having been in a violent confrontation resulting in the offender falling to the floor, moved to restrain the offender who then tried to bite him. The officer, poised to strike the offender again, looked around to see onlookers videoing him on their phones, and from their angle could only record an officer striking an apparently defenceless man on the floor.

Having an entire incident, like this, recorded in HD quality by one of the participants can only serve to diffuse this kind of situation, rather than relying on potentially misleading third party recordings. It is important, also, to understand that police officers have been subject to video scrutiny for many years in custody facilities. Newburn and Hayman (2002, p.167) found that such CCTV, “opens up a form of police governance that has rarely been considered previously, if at all.” Brown's (2015) study makes it clear that officers accept that the environment they work in has changed, they are aware their actions can be recorded in many different ways and over half have attenuated their use of force because of this understanding. That survey-based research is now supported by the current findings of this study. Body worn cameras lessen the incidence of police use of force, or at least some forms of it. The ramifications of lessening the use of force cannot be underestimated.

Over a number of years there have been numerous attempts to inhibit police misconduct, from policy changes and training through to civilian oversight committees. Mostly these have been ineffectual (Walker 2005). The question of whether, and how much, force is used, one that requires split second decision making during periods of extreme stress, is the most difficult police behaviour to influence (Chan 1997, 1999; Ericson 2007). This study has shown there is an effective tool for accomplishing this.

### ***Potential cost to benefit ratios***

Whilst acknowledging public trust and the wider question of legitimacy is hugely important, the other strand of the benefit of this reduction in use of force and injuries is financial. Recent work for the West Midlands Police by Accenture (OBC 25/3/15) has projected a saving of over £874,000 per annum from reductions to officer injury and

complaints investigations. Whilst this is based on scant evidence as it was produced prior to the results of this trial, the outlook is clear. Implementation of body worn cameras can lead to very distinct financial benefits for forces, many of whom are facing some stark choices over the coming five years. In reviewing the wider figures from Accenture, estimated full savings from the implementation of body worn cameras could save in excess of £2.2 million pounds per annum. In the same business case the cost to the West Midlands Police of implementing body worn cameras is only in the region of £800,000, with year on year operating and data storage costs of £350,000. Similarly, injuries sustained by suspects have to be treated in custody at tax payers' expense, a review by Rekrut-Lapa and Lapa (2014) suggested that 26% of detainees claim they have been injured during arrest and 21% state they were assaulted by the police. The total costs to the British tax payer for provision of medical services to police custody suites in England and Wales has been estimated to cost between £23,876,730 and £63, 967,623 (Payne-James et al 2009); 26% of this is a significant burden that our evidence suggests could be significantly reduced by the use of body worn cameras by police. Future studies should look at these cost to benefit implications more closely. Less tangibly, however, when combined with the social and cultural benefits, the “legitimacy benefits” (Ariel et al 2014), the benefits exceed the costs of the technology.

### ***Additional Considerations on Implementing a Body Worn Camera Policy***

Some researchers have recorded difficulties with officers who are reticent about using the cameras (Drover et al 2015; Owens et al 2014). This is a genuine, but by no means intractable issue. Police forces need to understand the lessons from these studies

and from the wider scope of implementation within the law enforcement field. This study achieved 99% compliance with treatment and control only through daily tracking; without a diligent pursuit of treatment integrity, this would not be achieved.

Equally important is ensuring that an efficient body worn camera policy is adopted by police departments. One major element of such policy would be strict guidelines in which officers will be required to announce the presence of the camera. This would cover legal requirements surrounding recording interactions with members of the public, but more importantly it is necessary in order to materialize the deterrence threat. If the reading of the Caution or Miranda Rights warning is required in order to echo the rights of the suspect to protect against involuntary self-incrimination (College of Policing 2015; US Supreme Court 13/05/1991); then a BWC policy must include a clear warning as soon as operationally feasible, that the encounter is videotaped. It is a combination of this awareness and recognition of the technology that changes behaviours, practically as well as legally, and a sound policy should secure the theoretical mechanisms with such an immediate warning.

### ***Limitations of Study***

This study has been conducted on a relatively small scale with only 46 officers, albeit there were 430 shifts randomised to control and treatment. This system of making the shift the experimental unit allowed a much smaller effect size to be noticed; however only 19 arrests that used higher levels of force, those impact techniques that Skolnick and Fyfe (1993) refer to, were obtained. Given the assumptions made earlier that use of force is



limited in these areas, a much larger or longer study would be able to detect smaller effects, for these less frequent events. Further research is invited to consider this possibility.

This study has also ignored the actual conflict point in these scenarios. There is still no robust understanding of the demeanour hypothesis as it pertains to body worn cameras (see Ariel et al 2014). There was no opportunity to either review the recorded footage of each incident, or interview the parties involved. Even if access was granted to the footage, observing recorded footage clearly would be observational only, as incidents could not be viewed during control conditions. This leaves some speculation; whether the camera operates on one or both of the parties involved, and whether the cameras affect the officers' behaviour thereby affecting the offender, or is it the opposite? There may be a double effect; this is simply not known currently. It would be very difficult, time consuming and expensive to study the mechanism at play in these conflict scenarios, but it could be a valid direction for future research.

### ***Strengths of Study***

This study has been very successful in replicating the Rialto study in a British setting and the results, as well as the experience of the author, have been used by a number of Forces in the UK and overseas to develop their body worn camera programmes. Ariel and Farrar (2014) suggests that replication is important in larger metropolitan Forces where there are greater and different pressures both from the public and command teams around body worn cameras. When this study was initially proposed in 2013 body worn cameras were not on the agenda of the West Midlands Police and, whilst it was very difficult to get

authority and funding for a trial, careful presentation of the evidence and future ramifications of not testing the technology adequately allowed this small trial to get off the ground. This difficult beginning was not, in reality, a bad thing since as there was little appetite for a Force rollout there were no Command Team pressure for results until December 2014. This allowed a steady and structured build-up of the trial with key personnel in place and time for officers to see the equipment and have discussion and training sessions in 'slow-time'. Other recent studies (Owens 2014; Ariel & Drover 2014) into the effectiveness of body worn cameras have not had this luxury; time constraints have meant rapid implementation phases resulting in difficulties with officers and equipment. Running this study has, at times, been frustrating as other studies came and went but, in the end, the results have been worth waiting for and will inform the future of the technology.

Treatment fidelity and the level at which the project manager sits within the organisation is crucial. The study was conducted by the author who is a middle level manager within the West Midlands Police and as such that influence greatly increased the fidelity and compliance with the project, it also allowed questions to be managed at source encouraging officers to become more involved. Unfortunately, not all officers can be encouraged with this approach and an effective project manager is at once transformational but also transactional (Strang 2012). The Digital Evidence Management System (DEMS) for the cameras was very effective in allowing dip sampling of footage and could show how much footage was being uploaded by each officer and this was what was relied upon to assess the wider compliance. Notwithstanding this is not an ideal, it did allow an overview of how officers were using the cameras and allowed those not using them at the same level as others to be spoken with. Sometimes there were valid reasons, they may have been on

leave or at Court or on custody watches or at scenes, but the fidelity of the experiment profited from some difficult conversations with some officers who understood the risk of disciplinary actions from their behaviour.

Whilst compliance was at 99% with the randomisation, what the officers actually did was somewhat of an unknown, dip sampling using DEMS, checks with supervisors and talking to officers could only tell so much. Violations of treatment assigned, that is when cameras are assigned but not used, is a very difficult thing to detect. Therefore actual presence of observers, surprise visits or daily reviews of footage would have been beneficial in the early stages, not only to ensure compliance then but to also embed the practice in officers' minds. Future researchers considering larger trials may wish to consider the need for a dedicated project team that can fulfil all the roles required, and provide support to monitor and provide a comprehensive approach to tracking fidelity (Sherman 2013).

## 8. Conclusions

Any level of force exercised by the police over the public can strain relations and “a single critical incident can have deleterious consequences” (Jefferis et al 1997, p.392). Experimental evidence from Birmingham South shows that body worn cameras reduce the odds of use of force in arrests by about 50% and injuries to suspects by 65%. It also seems to offer officers a tool which improves their confidence in the support of the wider criminal justice system. Future studies will be required to pay closer attention to the way force is defined, as the effect of body worn cameras is conditional on the way force is operationalised (compliant handcuffs *versus* without compliant handcuffs, open handed *versus* force apparatus, etc.) alters the outcomes. However, over the years law enforcement agencies around the world have turned to various solutions to help avoid the need for physical conflict between officers and suspects. Body worn cameras appear to offer such a solution which neatly sidesteps the arguments surrounding the health concerns of CS, pepper spray, bean bag rounds or Taser. The study has shown that the treatment effect is concentrated in the lower bounds of the force continuum, with a non-significant effect on aggressive force categories. Body worn cameras are also found to increase accountability and transparency, particularly on those police responses for which there is no requirement to log reports.

## REFERENCES

- Abramowicz, M., Ayres, I., & Listokin, Y. (2011). Randomizing Law. *University of Pennsylvania Law Review*, 929-1005.
- Adams, K. (1996) Measuring the prevalence of police abuse-of-force. In: Geller W and Toch H (eds) *Police violence: understanding and controlling police abuse-of-force*. Yale University Press, New Haven, pp 52–93.
- Alpert, G.P. and Dunham, R.G. (1997) *The force factor: measuring police use-of-force relative to suspect resistance*. Police Executive Research Forum, Washington.
- Alpert, G.P. and Dunham, R.G. (eds) (2004) *Understanding police use-of-force: officers, suspects, and reciprocity*. Cambridge University Press, Cambridge.
- Alpert, G.P., Dunham, R.G. and MacDonald, J.M. (2004) Interactive police–citizen encounters that result in force. *Police Quarterly* 74:475–488.
- Alpert, G.P. and Smith, W.C. (1999) Police Use of Force Data: Where we are and Where We Should Be Going. *Police Quarterly*. 2:1. 57-78.
- Alpert, G.P. and Smith, M.R. (2010) Police Use-of-Force Outcomes: Injuries and Control. *The Police Chief* 77: 108–115
- Ariel, B., Farrar, W.A. (2012). 'Rialto Police Department Wearable Cameras Experiment.' Retrieved 15th September 2015 from <http://www.crim.cam.ac.uk/research/experiments/rex-post/rialto.pdf>.
- Ariel, B., Farrar, W. A., and Sutherland, A. (2014). The effect of police body-worn cameras on use of force and citizens' complaints against the police: A randomized controlled trial. *Journal of Quantitative Criminology*, 1–27.
- Ariel, B., Vila, J. and Sherman, L. (2012) Random assignment without tears: how to stop worrying and love the Cambridge randomizer. *Journal Experimental Criminology* 82:193–208.
- Ariel, B. and Wain, N. (2014) Tracking of Police Patrol. *Policing: A Journal of Policy and Practice*, 8(3), pp. 274-283.

- Assmann, S. F., Pocock, S. J., Enos, L. E., & Kasten, L. E. (2000). Subgroup analysis and other (mis)uses of baseline data in clinical trials. *The Lancet*, 355, pp. 1064-1069.
- Ayoob, M.F. *Stress fire. Gunfighting for police: Advanced tactics and techniques*. Police Bookshelf, Concord, NH. 1984
- Baker, M. (1985) *Cops: their lives in their own words*. Fawcett, New York.
- Barclay: (2004) Trustworthiness and competitive altruism can also solve the “tragedy of the commons”. *Evolution and Human Behaviour*. 254:209–220.
- Bayley, D. H. (1996). *Police for the Future*. Oxford University Press.
- Bayley. D.H. and Garofalo, J. (1989) The management of violence by police patrol officers. *Criminology* 271:1–26.
- BBC News (3/06/2015) 'Metropolitan Police officers to get 20,000 body cameras.' Retrieved 14th September from <http://www.bbc.co.uk/news/uk-england-london-32991516>
- BBC News (24/10/2013) "Police 'cameras on cops' plan for all patrol officers." Retrieved 19th April from <http://www.bbc.co.uk/news/uk-24662243>
- BenBucato.com (03/12/2014) 'Cameras on Cops and Junk Science in Rialto'. Retrieved 14th September from <http://www.benbrucato.com/?p=633#more-633>
- Bierie, D. M., Detar, P. L., & Craun, S. W. (2013). Firearm violence directed at police. *Crime & Delinquency* 1-24.
- Birmingham City Council. (n.d.) 2015 'Population and Census.' Retrieved 14th September from <http://www.birmingham.gov.uk/cs/Satellite?c=Page&childpagename=Planning-and-Regeneration%2FPageLayout&cid=1223096353895&pagename=BCC%2FCommon%2FWrapper%2FInlineWrapper>
- Bittner, E. (1970) *The functions of the police in modern society*. Oelgeschlager, Gunn and Hain, Cambridge
- Black D (1976) *The Behavior of Law*. Academic Press, New York

- Bradford, B., Quinton, P., Myhill, A., & Porter, G. (2013). Why do 'the law' comply? Procedural justice, group identification and officer motivation in police organizations. *European journal of criminology*.
- Boruch, R. (1997). *Randomized experiments for planning and evaluation*. Thousand Oaks, CA: Sage
- Braga, A. and Weisburd, W.L. (2012) 'The Effects of Focused Deterrence Strategies on Crime: A Systematic Review and Meta-Analysis of the Empirical Evidence', *Journal of Research in Crime and Delinquency*, 49 (3), 323 - 467
- Brandl, S. (1996) In the line of duty: a descriptive analysis of police assaults and accidents. *Journal of Criminal Justice*, Vol. 24, pp. 255-64.
- Brandl, S.G. and Stroschine, M.S. (2003) Toward an understanding of the physical hazards of police work. *Police Quarterly*, Vol. 6, pp. 172-91.
- Brown, A. (1998) *Police governance in England and Wales*. Cavendish, London.
- Brown, G. R. (2015). The Blue Line on Thin Ice: Police Use of Force Modifications in the Era of Camera phones and YouTube. *British Journal of Criminology*.
- Brown, M.K. (1981). *Working the street: Police discretion and the dilemmas of reform*. Russell Sage Foundation. New York.
- Cannon, W.B. and Cranefield P.F. (1915) *Bodily Changes in Pain, Hunger, Fear, and Rage: An Account of Recent Researches into the Function of Emotional Excitement*. New York: D. Appleton.
- Chan, J. (1997) *Changing Police Culture: Policing in a Multicultural Society*. Cambridge University Press.
- Chan, J. (1999) Governing Police Practice: Limits of the New Accountability. *British Journal of Sociology*, 50: 251–79.
- Chan, J. (2001). 'The Technological Game: How Information Technology is Transforming Police Practice.' *Criminal Justice* 1(2): 139–159

- Chartrand, T.L. and Bargh, J.A. (1999) The chameleon effect: the perception–behavior link and social interaction. *Journal of Personality and Social Psychology*. 766:893.
- Clarke, R.V., Weisburd, D. (1994) Diffusion of crime control benefits: observations on the reverse of displacement. *Crime Prevention Studies* 2:165–184
- Cohen, J. (1988) *Statistical power analysis for the behavioral sciences*, 2nd edn. Lawrence Earlbaum Associates, Hillsdale.
- College of Policing. (n.d.) 2013 'Police use of force.' Retrieved 15th September 2015 from <https://www.app.college.police.uk/app-content/public-order/core-principles-and-legislation/police-use-of-force/>
- College of Policing. (n.d.) 2014 'National Decision Model.' Retrieved 15th September 2015 from <https://www.app.college.police.uk/app-content/national-decision-model/the-national-decision-model/>
- College of Policing. (n.d.) 2014 'Body Worn Video.' Retrieved 8th April 2015 from <http://library.college.police.uk/docs/college-of-policing/Body-worn-video-guidance-2014.pdf>
- College of Policing. (n.d.) 2015 'Response, arrest and detention.' Retrieved 15th September 2015 from <https://www.app.college.police.uk/app-content/detention-and-custody-2/response-arrest-and-detention/>
- Collins, R. (2009) The micro-sociology of violence. *The British Journal of Sociology*. 60:3
- Cordner, G. W. (1989). Police agency size and investigative effectiveness. *Journal of Criminal Justice*, 17(3), 145-155.
- Cordray, D. S. (2000). Enhancing the scope of experimental inquiry in intervention studies. *Crime & Delinquency*, 46(3), 401-424.
- Croft, E.B. (1985) Police use-of-force: an empirical analysis. Doctoral dissertation, State University of New York at Albany.
- Desmedt, J. C. (1984). Use of force paradigm for law enforcement. *Journal of Police Science and Administration*, 12(2), 170-176.



- Drover, P., & Ariel, B. (2015). Leading an Experiment in Police Body-Worn Video Cameras. *International Criminal Justice Review*.
- DuCharme, S.D. (2001). Search for Reasonableness in Use-of-Force Cases: Understanding the Effects of Stress on Perception and Performance, *The Fordham L. Rev.*, 70, 2515.
- Durlauf, S.N., & Nagin, D.S. (2011). Imprisonment and crime. *Criminology & Public Policy*, 10(1), 13-54.
- Durose, M.R., Schmitt, E.L. and Langan, P.A. (2005), *Contacts Between Police and the Public*, Bureau of Justice Statistics, Washington, DC.
- Dzieweczynski, T.L., Eklund, A.C. and Rowland, W.J. (2006) Male 11-ketotestosterone levels change as a result of being watched in Siamese fighting fish, *Betta splendens*. *General and Comparative Endocrinology* 147:184–189.
- Ellis, T., Jenkins, C. and Smith: (2014) The Impact of Personal Issue Body Worn Video Cameras on the Isle of Wight: Interim key findings. Presentation to BODY WORN CAMERAS, Birmingham UK.
- Engel, R. S., Sobol, J. J., & Worden, R. E. (2000). Further exploration of the demeanor hypothesis: The interaction effects of suspects' characteristics and demeanor on police behavior. *Justice Quarterly*, 17(2), 235-258.
- Engel, R. S. (2003). Explaining suspects' resistance and disrespect toward police. *Journal of Criminal Justice*, 31, 17.
- Ericson, R. (2007) Rules in Policing: Five Perspectives, *Theoretical Criminology*. 11:367–401.
- Ericson, R. V. and Haggerty, K. D. (1997). Policing the Risk Society. Toronto: University of Toronto Press
- Fabricatore, J., Azen, S., Schoentgen, S. and Snibbe, H. (1978) Predicting performance of police officers using the sixteen personality factor questionnaire. *American Journal Community Psychology*. 61:63–70.

- Farrar, W. (2013) *Self-Awareness to Being Watched and Socially-Desirable Behavior: A Field Experiment on the Effect of Body-Worn Cameras and Police Use-of-Force*. Washington, DC: Police Foundation.
- Faul, F., Erdfelder, E., Lang, A.G., Buchner, A. (2007) G\*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavioural Research Methods* 39:175–191.
- Fixsen, D.L., Naoom, S.F., Blaze, K.A., Friedman, R.M., Wallace, F. (2005) Implementation Research: A Synthesis of the Literature. *The National Implementation Research Network*, 231, 1- 101
- Ford, J.K. (2007) Building Capability throughout a change effort. Leading the transformation of a police agency to community policing. *American Journal of Community Psychology*. 39, pp. 321-334.
- Fyfe, J.J. (1988) Police use of deadly force: research and reform. *Justice Quarterly*. 52:165–205.
- Garner, J.H., Maxwell, C.D. and Heraux, C.G. (2002) Characteristics associated with the prevalence and severity of force used by the police. *Justice Quarterly* 194:705–746.
- Geller, W. and Toch, H. (1996) *Police Violence: Understanding and Controlling Police Abuse of Force*. Yale University Press, New Haven
- Gervais, W.M. and Norenzayan, A. (2012) Like a camera in the sky? Thinking about God increases public self awareness and socially desirable responding. *Journal of Experimental Social Psychology*. 481:298–302
- Goldsmith, A. (2005). Police reform and the problem of trust. *Theoretical criminology*, 9(4), 443-470.
- Goldsmith, A.J. (2010) Policing's New Visibility. *British Journal of Criminology*. 1:21.
- Goodall, M. (2007) *Guidance for the Police Use of Body-Worn Video Devices*. London: Home Office.
- Gottfredson, M., & Hirschi, T. (1990). *A general theory of crime*. Stanford, CA: Stanford University Press.

- Groff, E.R., Ratcliffe, J.H., Haberman, C.P., Sorg, E.T., Joyce, N.M., & Taylor, R.B. (2015). Does what police do at hot spots matter? The Philadelphia Policing Tactics Experiment. *Criminology* 53(1), 23-53.
- Greater London Authority (24/06/2015). 'The Met to be questioned on rape investigations & body worn cameras.' Retrieved 14th September 2015 from <https://www.london.gov.uk/media/assembly-press-releases/2015/06/the-met-to-be-questioned-on-rape-investigations-body-worn>.
- Greene, J.R. (2013) New Directions in Policing: Balancing Prediction and Meaning in Police Research. *Justice Quarterly*, 31(2). pp. 193-228.
- Guardian (01/06/2015) 'The Counted'. Retrieved 14th September 2015 from <http://www.theguardian.com/us-news/ng-interactive/2015/jun/01/the-counted-police-killings-us-database>
- Haanstad, E. J. (2009). Violence and temporal subjectivity. *Anthropology and Humanism*, 34(1), 71-82.
- Henriquez, M. (1999), *IACP National Database Project on Police Use of Force. In Use of Force by Police: Overview of National and Local Data*, Washington, DC, pp. 19-24, National Institute of Justice and Bureau of Justice Statistics.
- Hickman, M.J., Piquero A.R., and Garner, J.H. (2008) Toward a national estimate of police use of nonlethal force. *Criminology & Public Policy* 7.4 (2008): 563-604.
- Hinton, R. (2004) *Statistics Explained 2nd Ed*. Routledge. London
- Hobday, J. (2015). Targeting Reasons For Rejecting Reasons for Rejecting Random Assignment. Published Thesis, Cambridge University Institute for Criminology.
- Home Office (2014). 'Home Office Counting Rules For Recording Crime.' Retrieved 19th April 2015 from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/419533/count-general-april-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/419533/count-general-april-2015.pdf)

- Home Office, Personal Safety Training (PST) (26/03/14). Retrieved 14th September 2015 from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/298583/PST\\_v3.0EXT.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/298583/PST_v3.0EXT.pdf)
- Hunt, J. (1985). Police accounts of normal force. *Journal of Contemporary Ethnography*, 13(4), 315-341.
- ICO (2014). 'In the picture - A data protection code of practice for surveillance cameras and personal information.' Retrieved 14th September 2015 from <https://ico.org.uk/media/about-the-ico/events-and-webinars/1042753/cctvwebinar-slides.pdf>
- Innes, M. (2013). *Rebooting the PC*, London: Policy Exchange
- Jefferis, E.S., Kaminski, R.J., Holmes, S. and Hanley, D.E. (1997) The effect of a videotaped arrest on public perceptions of police use-of-force. *Journal of Criminal Justice* 255:381–395.
- Jervis, R., Lebow, R.N., & Stein, J.G. (1989). *Psychology and deterrence*. JHU Press.
- Kahneman, D. (2011) *Thinking, fast and slow*. Farrar, Straus and Giroux, New York.
- Kaminski, R.J. and Sorensen, D.W.M. (1995). A multivariate analysis of individual, situational, and environmental factors associated with police assault injuries. *American Journal of Police*, Vol. 14 No 3/4, pp. 3-48.
- Kaminski, R., DiGiovanni, C. and Downs, R. (2004). The use of force between the police and persons with impaired judgment. *Police Quarterly*, Vol. 7, pp. 311-38
- Katz, C. M., Choate, D.E., Ready J.R., & Nuño, L. (2014). *Evaluating the Impact of Officer Worn Body Cameras in the Phoenix Police Department*. Phoenix, AZ: Center for Violence Prevention & Community Safety, Arizona State University.
- Klepper, S. and Nagin, D. (2006) The deterrent effect of perceived certainty and severity of punishment revisited. *Criminology*. 274:721–746.
- Kupferberg, N. (2008). Transparency: A New Role for Police Consent Decrees. *Colum. JL & Soc. Probs.*, 42, 129.

- Langworthy, R. H., and Travis, L. F. (1999). *Policing in America: A balance of forces* (2d ed.). Upper Saddle River. New Jersey, Prentice Hall.
- Las Vegas MPD (n.d.) 2011. 'Use of Force.' Retrieved 15th September 2015 from <http://www.cops.usdoj.gov/pdf/Use-of-Force.pdf>
- Lawrence R. (2000) *The Politics of Force: Media and the Construction of Police Brutality*. University of California Press.
- Lentz, S. A., and Chaires, R.H. (2007) The invention of Peel's principles: A study of policing 'textbook' history. *Journal of Criminal Justice* 35.1: 69-79.
- Lersch, K. M., Bazley, T., Mieczkowski, T., & Childs, K. (2008). Police use of force and neighborhood characteristics: An examination of structural disadvantage, crime, and resistance. *Policing & Society*, 18(3), 282-300.
- Lester, D. (1996). Officer attitudes toward police use of force. In: Geller W, Toch H (eds) *Police violence: understanding and controlling police abuse-of-force*. Yale University Press, New Haven, pp. 180-190.)
- Lum, C., Telep, C.W., Koper, C.S. and Grieco, J. (2012) Receptivity to Research in Policing. *Justice Research and Policy*, 14(1), pp. 61-95.
- Manning, K. (2010). *Democratic policing in a changing world*. Boulder, CO: Paradigm Publishers
- Manning, P. K. (1992). 'Information Technologies and the Police.' In Tonry, M. and Morris, N. (eds), *Modern Policing: Crime and Justice, A Review of Research*, Vol. 15. Chicago: University of Chicago Press, pp. 349–398.
- Margarita, M. (1980). Police as victims of violence. *The Justice System Journal*, 218-233.
- Marx, G. T. (2003). 'A Tack in the Shoe: Neutralizing and Resisting the New Surveillance.' *Journal of Social Issues* 59(2): 369–390.
- Mastrofski, S. D. (2002). The romance of police leadership. *Crime & Social Organization*, 153-196.

- Mastrofski, S., Snipes, J., & Supina, A. (1996). Compliance on demand: The public's response to specific police requests. *Journal of Research in Crime & Delinquency*, 33, 38.
- Mawby, R.C. (2002), *Policing Images: Policing, Communication and Legitimacy*. Willan, Cullompton
- McCahill, M. and Norris, C. (2002) *CCTV in Britain* Urbaneye, Working Paper no. 3. Centre for technology and Society, Technical University of Berlin.
- McClusky, J., Mastrofski, S., & Parks, R. (1999). To acquiesce or rebel: Predicting citizen compliance with police requests. *Police Quarterly*, 2, 29.
- Mesa Police Department (2012). On-Officer body camera program, Forensic protocols, Mesa Police Administration Manual, Mesa, AZ.
- Meyer, G. (1992). Nonlethal weapons vs conventional police tactics: assessing injuries and liabilities. *The Police Chief*, Vol. 59, pp. 10-17.
- Miller, L., Toliver, J. and Police Executive Research Forum. (2014) *Implementing a Body-Worn Camera Program: Recommendations and Lessons Learned*. Washington, DC: Office of Community Oriented Policing Services.
- Muir, W.K. (1977). *Police: Streetcorner politicians*. University of Chicago Press. Chicago
- Munger, K. and Shelby, J.H. (1989) Effects of an observer on hand washing in a public restroom. *Perceptual and Motor Skills* 69:733–734.
- Nagin, D.S. (2013a) Deterrence in the twenty-first century. In *Crime and Justice: A Review of Research*, Vol. 42, ed. Michael Tonry. Chicago, IL: University of Chicago Press.
- Nagin, D.S. (2013b) Deterrence: A review of the evidence by a criminologist for economists. *Annual Review of Economics* 5:83–105.
- Nagin, D.S., Solow, R.M., & Lum, C. (2015). Deterrence, Criminal Opportunities, and Police. *Criminology*, 53(1), 74-100.

- Neyroud, P., & Slothower, M. (2015). Wielding the Sword of Damocles: The Challenges and Opportunities in Reforming Police Out-of-Court Disposals in England and Wales. *The Management of Change in Criminal Justice: Who Knows Best?*, 275.
- New York Times (12/08/2013) 'Judge Rejects New York's Stop and Frisk Policy.' Retrieved 19th April 2015 from [http://www.nytimes.com/2013/08/13/nyregion/stop-and-frisk-practice-violated-rights-judge-rules.html?\\_r=0](http://www.nytimes.com/2013/08/13/nyregion/stop-and-frisk-practice-violated-rights-judge-rules.html?_r=0)
- New York Times (24/09/2014) 'Washington Police to Test Body Video Cameras.' Retrieved 14th September 2015 from <http://www.nytimes.com/reuters/2014/09/24/technology/24reuters-usa-washington-police-cameras.html>
- Newburn T. and Hayman S. (2002) *Policing, Surveillance, and Social Control: CCTV and Police Monitoring of Suspects*. Willan
- Norris, C. and Armstrong, G. (1999) *The maximum surveillance society. The rise of CCTV*, Oxford: Berg.
- ODS Consulting (2011) *Body Worn Video Projects in Paisley and Aberdeen, Self Evaluation*. Glasgow: ODS Consulting.
- Owens, C., Mann, D. and McKenna, R. (2014). *The Essex Body Worn Video Trial: The impact of Body Worn Video on criminal justice outcomes of domestic abuse incidents*. College of Policing. UK.
- Pate, A. M., Fridell, L. A., & Hamilton, E. E. (1993). Police use of force: Official reports, citizen complaints, and legal consequences, volumes I and II. *Washington, DC: The Police Foundation*.
- Paton, S., & Boddy, D. (2007). Stuck in the middle: a case study investigating the gap between top-down and bottom-up change. *Journal of General Management*, 32(4), 39-52.
- Ransley, J., Anderson, J., & Prenzler, T. (2007). Civil litigation against police in Australia: Exploring its extent, nature and implications for accountability. *Australian & New Zealand journal of criminology*, 40(2), 143-160.
- Rawls, J. (1971) *A Theory of Justice*. Harvard University Press, Cambridge, MA (1971).

- Reddit, (24/12/2014) 'First scientific report shows police body-worn-cameras can prevent unacceptable use-of-force.' Retrieved 14th September from [https://www.reddit.com/r/news/comments/2q9k2n/first\\_scientific\\_report\\_shows\\_police](https://www.reddit.com/r/news/comments/2q9k2n/first_scientific_report_shows_police)
- Regoli, R. M., Crank, J. P., & Culbertson, R. G. (1989). Police cynicism, job satisfaction, and work relations of police chiefs: An assessment of the influence of department size. *Sociological Focus*, 22(3), 161-171.
- Reiner, R. (2010). *The politics of the police*. Oxford University Press.
- Reiss, A.J. (1968) Police brutality-answers to key questions. *Society* 58:10–19.
- Reiss, A.J. (1971). *The Police and the Public*. Yale University Press. New Haven, CT.
- Rojek, J., Alpert, G. P., & Smith, H. P. (2010). Examining officer and citizen accounts of police use-of-force incidents. *Crime & Delinquency*, 58(2), 301-327.
- Roman, C. G., Fontaine, J., Fallon, J., Anderson, J., & Rearer, C. (2012). Defending and managing the pipeline: Lessons for running a randomized experiment in a correctional institution. *Journal of Experimental Criminology*, 8(3), 307-329.
- Rousseau, D.M. (2006). Is There Such A Thing As Evidence Based Management?. *Academy of Management Review*, 31(2), 256-269.
- Sherman, L. W. (2013). The rise of evidence-based policing: Targeting, testing, and tracking. *Crime and Justice*, 42(1), 377-451.
- Sherman, L. W., Gottfredson, D. C., MacKenzie, D., Eck, J., Reuter, S., Bushway, S. (1998) *Preventing Crime: What Works, What Doesn't, What's Promising: A Report to the United States Congress*. U.S. Department of Justice, Office of Justice Programs, Washington, DC.
- Sherman, L. W., & Berk, R. A. (1984). The specific deterrent effects of arrest for domestic assault. *American sociological review*, 261-272.
- Sherman, L.W. (1980) Causes of police behavior: the current state of quantitative research. *Journal of Research in Crime and Delinquency*. 171:69–100.



- Sherman, L.W., Strang, H. (2010) Doing experimental criminology. In: Gadd, D, Karstedt, S, Messner, S (eds) *Handbook of criminological research methods*. Sage, Thousand Oaks, CA.
- Skolnick, J. H. (1994). *Justice without Trial: Law Enforcement in Democratic Society*, 3rd edn. New York: Wiley
- Skolnick J.H. (2008) Enduring Issues of Police Culture and Demographics. *Policing and Society*. Vol. 18, Iss. 1, 200
- Skolnick, J.H. and Fyfe, J.J. (1993) *Above the law: police and the excessive use-of-force*. Free Press, New York.
- Skogan, W. (2006), “*The promise of community policing*”, in Weisburd, D. and Braga, A.A. (Eds), *Police Innovation: Contrasting Perspectives*, Cambridge University Press, Cambridge, pp. 27-43.
- Smith, M. R., Kaminski, R. J., Rojek, J., Alpert, G. P., & Mathis, J. (2007). The impact of conducted energy devices and other types of force and resistance on officer and suspect injuries. *Policing: An International Journal of Police Strategies & Management*, 30(3), 423-446.
- Smith, M.R. and Petrocelli, M. (2002). The effectiveness of force used by police in making arrests. *Police Practice and Research*, Vol. 3 No. 3, pp. 201-15.
- Sproull, L., Subramani, M., Kiesler, S., Walker, J.H. and Waters, K. (1996) When the interface is a face. *Human–Computer Interaction*. 112:97–124.
- Stenning: (2009). Governance and accountability in a plural policing environment—The story so far. *Policing*, 3(1), 22-33.
- Strang, H. (2012) Coalitions for a common purpose: managing relationships in experiments. *Journal of Experimental Criminology*. 8(3):211–225.
- Stratton, M., Clissold, and Tuson, R. (2014) *The Promise of Body Worn Video: Considering the Evidence*. Edmonton Police Service Body Worn Video Pilot Project.
- Sykes, R.E., and Brent, E.E. (1983). *Policing: A social behaviorist perspective*. Rutgers University Press. New Brunswick, NJ.

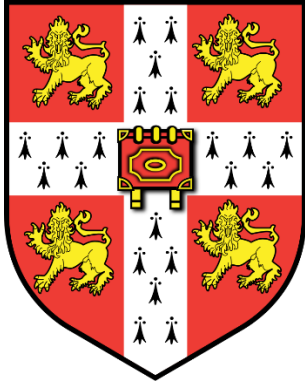
- Tankebe, J. (2013). Viewing things differently: The dimensions of public perceptions of police legitimacy. *Criminology*, 51(1), 103-135.
- Tedeschi, J.T., and Felson, R.B. (1994). *Violence, aggression, and coercive actions*. American Psychological Association. Washington DC.
- Terrill, W. (2001) *Police coercion: application of the force continuum*. LFB Scholarly Pub LLC, New York.
- Terrill, W. and Mastrofski, S.D. (2002) *Situational and officer-based determinants of police coercion*. *Justice Quarterly*. 192:215–248.
- Terrill, W., Paoline, E.A., & Manning K. (2003). Police Culture and Coercion. *Criminology*, 41(4), 1003-1034.
- The Independent (24/02/2015) 'Police use of force: White House told US must learn from UK.' Retrieved 15th September from <http://www.cam.ac.uk/research/news/police-use-of-force-white-house-told-us-must-learn-from-uk#sthash.FVZWNRIL.dpuf>
- Tilley, N. (1993) *Understanding car parks, crime, and CCTV: evaluation lessons from safer cities*. Home Office Police Department, London.
- University of Cambridge. 24/2/15 'Police use of force: White House told US must learn from UK.' Retrieved 15th September from <http://www.cam.ac.uk/research/news/police-use-of-force-white-house-told-us-must-learn-from-uk#sthash.FVZWNRIL.dpuf>
- US Justice Dept Press Release. 1/05/15 'Justice Department Announces \$20 Million in Funding to Support Body-Worn Camera Pilot Program.' Retrieved 14th September from <http://www.justice.gov/opa/pr/justice-department-announces-20-million-funding-support-body-worn-camera-pilot-program>
- US Supreme Court 13/05/2015. *County of Riverside v. McLaughlin* (89-1817), 500 U.S. 44 (1991). Retrieved 14th September from <https://www.law.cornell.edu/supct/html/89-1817.ZO.html>
- Von Hirsch, A., Bottoms, A.E., Burney, E. and Wikstrom O. (1999) *Criminal deterrence and sentence severity: an analysis of recent research*. Hart, Oxford.
- Vunak: (2001). *Anatomy of a street fight*. Burbank, CA: Unique.

- Walker S. (2007). *Police Accountability: Current Issues and Research Needs*. Paper presented at the National Institute of Justice (NIJ) Policing Research Workshop: Planning for the Future, Washington, DC.
- Walker S. (2005). *The New World of Police Accountability*. Sage
- Walker, S.E., & Archbold, C.A. (2013). *The new world of police accountability*. Sage Publications.
- Walsh, W. F. (2001). Compstat: An analysis of an emerging police managerial paradigm. *Policing: An International Journal of Police Strategies & Management*, 24(3), 347-362.
- Warwickshire PCC's Office. (5/6/2015) 'Report on unannounced visit to police custody suites in Warwickshire and West Mercia.' Retrieved 15th September 2015 from <http://www.warwickshire-pcc.gov.uk/wp-content/uploads/2014/12/2015.06.05-Ltr-to-Rt-Hon-T-May-Report-on-Unannounced-Inspection-Visit-to-Police-Custody-Suites.pdf>
- Wasserman, H. M. (2014). Moral Panics and Body Cameras. *Wash. UL Rev. Commentaries* (Nov. 18, 2014), 14-31.
- Weber Brooks, L., & Leeper Piquero, N. (1998). Police stress: does department size matter?. *Policing: An International Journal of Police Strategies & Management*, 21(4), 600-617.
- Weisburd, D. (2000). Randomized experiments in criminal justice policy: Prospects and problems. *Crime & Delinquency*, 46(2), 181-193.
- Weisburd D, Lum CM, Petrosino A (2001) Does research design affect study outcomes in criminal justice? *Annals of American Academy of Political and Social Science*. 578(1):50–70.
- Welsh, B.C. and Farrington, D.P. (2009) Public area CCTV and crime prevention: an updated systematic review and meta-analysis. *Justice Quarterly* 264:716–745.
- West Midlands Police and Crime Commissioner (2/12/2014) 'Use of Force Report to Strategic Policing and Crime Board'. Retrieved 14th September 2015 from <http://westmidlands-pcc.gov.uk/media/355722/07-spcb-02-dec-14-use-of-force.pdf>

- West Yorkshire Police (19/04/2011) 'Use of Force Policy' Retrieved 15th September 2015 from [http://www.westyorkshire.police.uk/sites/default/files/files/disclosure-logs/2014\\_218\\_foi2014514185\\_use\\_of\\_force\\_policy2.pdf](http://www.westyorkshire.police.uk/sites/default/files/files/disclosure-logs/2014_218_foi2014514185_use_of_force_policy2.pdf)
- Westley, W. A. (1970). *Violence and the Police: A Sociological Study of Law, Custom, and Morality*, Vol. 28. Cambridge, MA: MIT Press
- White, M. D. (2014) *Police Officer Body-Worn Cameras: Assessing the Evidence*. Washington, DC: Office of Community Oriented Policing Studies.
- Wicklund, R.A. (1975) Objective self-awareness. *Advances in Experimental Social Psychology*. 8:233–275.
- Wikstrom, P-OH, Oberwittler, D., Treiber, K. and Hardie, B. (2012) *Breaking rules: the social and situational dynamics of young people's urban crime*. Oxford University Press, Oxford
- Wilson, C., Willis, C., Hendrikz, J.K., Le Brocque, R. and Bellamy, N. (2010) *Speed cameras for the prevention of road traffic injuries and deaths*. Cochrane Database Syst Rev 11.
- Wilson, J.Q. (1968) *Varieties of Police Behaviour: The Management of Law and Order in Eight Communities*. Cambridge, MA. Harvard University Press.
- Wolf, R., Mesloh, C., Henych, M. and Thompson, F. (2009) "Police use of force and the cumulative force factor". *Policing: An International Journal of Police Strategies and Management*. Vol. 32 Iss: 4, pp.739 - 757
- Worden, R. E., & Shepard, R. L. (1996). Demeanor, crime, and police behavior: a reexamination of the police services study data. *Criminology*, 34(1), 83-105.
- Worden, R. E., Shepard, R. L., & Mastrofski, S. D. (1996). On the Meaning and Measurement of Suspects' Demeanor Toward the Police: A Comment on "Demeanor and Arrest". *Journal of Research in Crime and Delinquency*, 33, 324-332.
- Worden, R.E. (1996) The causes of police brutality: theory and evidence on police use-of-force. In: Geller W, Toch H (eds) *Police violence: understanding and controlling police abuse-of-force*. Yale University Press, New Haven, pp 23–51.

Young, J.T., Ready, J.T. (2015) The impact of on-officer video cameras on police–citizen contacts: findings from a controlled experiment in Mesa, AZ. *Journal of Experimental Criminology*. 1-14.

## **APPENDIX**



**BIRMINGHAM SOUTH  
WEST MIDLANDS POLICE**



**BODY WORN VIDEOS EXPERIMENT**

**Crim-PORT 1.0:**

*Criminological Protocol for Operating Randomized Trials*

@ 2009 by Lawrence W. Sherman and Heather Strang

**INSTRUCTIONS:** Please use this form to enter information directly into the WORD document as the protocol for your registration on the Cambridge Criminology Registry of EXperiments in Policing Strategy and Tactics (REX-POST) or the Registry of EXperiments in Correctional Strategy and Tactics (REX-COST).

**CONTENTS:**

1. **NAME AND HYPOTHESES**
2. **ORGANIZATIONAL FRAMEWORK**
3. **UNIT OF ANALYSIS**
4. **ELIGIBILITY CRITERIA**
5. **PIPELINE: RECRUITMENT OR EXTRACTION OF CASES**
6. **TIMING**
7. **RANDOM ASSIGNMENT**
8. **TREATMENT AND COMPARISON ELEMENTS**

- 9. MEASURING AND MANAGING TREATMENTS
- 10. MEASURING OUTCOMES
- 11. ANALYSIS PLAN
- 12. DUE DATE AND DISSEMINATION PLAN

## 1. NAME AND HYPOTHESES

### 1.1 Name of Experiment:

Operation Panopticon : The Birmingham South WMP Body Worn Experiment

### 1.2 General Hypotheses:

Wearing body worn videos by patrol police officers will:

- 1.2.1 decrease number of recorded incidents of use of force;
  - 1.2.2 decrease number of citizens' complaints;
  - 1.2.3 increase satisfaction of members of the public who came into contact with the police;
  - 1.2.4 self-legitimacy of police officers wearing cameras;
  - 1.2.5 increase the number of early guilty pleas
  - 1.2.6 increase victims' satisfaction with PTSD measures in domestic violence first-response jobs,
- compared to not wearing wearable video cameras.

## 2. ORGANIZATIONAL FRAMEWORK

**2.1 Dual Partnership:** Operating agency delivers treatments with independent research organization providing random assignment, data collection, analysis **X**

**2.1.1** Name of Operating Agency : **Birmingham South West Midlands Police**

**2.1.2** Name of Research Organization: **University of Cambridge**



### 3. UNIT OF ANALYSIS

Patrol shifts

### 4. ELIGIBILITY CRITERIA

#### 4.1 Criteria Required (list all)

**4.1.1** Uniformed front-line police officers' shifts under Inspector Henstock' command (including new recruits in training)

**4.1.2** Within Birmingham South Police geographic jurisdiction

#### 4.2 Criteria for Exclusion (list all)

**4.2.1** Surreptitious interviews with victims or suspects (e.g., sex offenders and gang members), in which recording of the communication may be counter-productive<sup>1</sup>

**4.2.2** Lengthy or extensive interviews in police custody (e.g., child abuse reports, sexual battery or rape reports)

**4.2.3** Emergency situations where activating the device will present safety risks

**4.2.4** Special operations (e.g., football games, payback days, holidays), in which more than 50% of the LPU is involved in non-routine activities

### 5. PIPELINE: RECRUITMENT OR EXTRACTION OF CASES

#### 5.1 Where will cases come from?

Birmingham South Police

#### 5.2 Who will obtain them?

Data Analysis Team and Inspector Henstock (Co-Investigator).

#### 5.3 How will they be identified?

Experimental shifts will be identified by Inspector Henstock and assigned by Cambridge at random.

#### 5.4 How will each case be screened for eligibility?

All Birmingham South LPU patrol police officers under Inspect Henstock' command (two response teams; (n=46); eligibility of shifts (n=12 per week) pursuant to Section 4 above will screened weekly for routine patrols.

---

<sup>1</sup> Registry of these interviews is required

**5.5 Who will register the case identifiers prior to random assignment?**

Inspector Henstock.

**5.6 What social relationships must be maintained to keep cases coming?**

None.

**5.7 Has a Phase I (no-control, “dry-run”) test of the pipeline and treatment process been conducted?**

Yes

**5.7.1 how many cases were attempted to be treated?**

Two weeks of 100% assignment (“all shifts with cameras, all the time”)

**5.7.2 how many treatments were successfully delivered?**

**5.7.3 how many cases were lost during treatment delivery**

**6. TIMING: CASES COME INTO THE EXPERIMENT IN**

Repeated batch assignments (random assignment every week, for the next week of shift pattern for two Bham S. patrol teams)

**7. RANDOM ASSIGNMENT**

**7.1 How is random assignment sequence to be generated?**

Pseudo-random numbers case-treatment generator program in secure computer -  
**Cambridge Randomiser v 2.0 (as shown in Appendix F)**

**7.2 Who is entitled to issue random assignments of treatments?**

**7.2.1** Role: Co-Principle Investigator

**7.2.2** Organization: Birmingham South Police Inspector (Cambridge Randomiser v2.0)

**7.3 How will random assignments be recorded in relation to case registration?**

**7.3.1** Name of data base: Cambridge Randomiser WMP II.

**7.3.2** Location of data entry: WMP

**7.3.3** Persons performing data entry: Inspector Henstock.

**8. TREATMENT AND COMPARISON ELEMENTS**

**8.1 Experimental or Primary Treatment**

**8.1.1** What elements must happen, with dosage level (if measured) indicated.

- 8.1.1.1 Element A: wearable, personal cameras attached to each patrolling officer during experimental shifts, with capability of capturing and recording police interaction with the public (offenders, witnesses, victims), in both colour video and audio.
- 8.1.1.2 Element B: **each** ‘experimental shift’ of uniformed front-line police patrol unit consist of 23 officers ((1) 3 sergeants; (1)
- 8.1.1.3 Cameras must be turned on during every interaction with the public, until the situation is stabilized.
- 8.1.1.4 Members of the encounter must be notified through a script (i.e., “you are being recorded on tape”)
- 8.1.1.5 Cameras must be worn on the uniform and visible, during experimental shifts.

**8.1.2** What elements must **not** happen, with dosage level (if measured) indicated.

Element A: cross over

**8.2 Control or Secondary Comparison Treatment**

**8.2.1** What elements must happen, with dosage level (if measured) indicated.

Element A: no 8.1.1 above during control shifts

**8.2.2** What elements must not happen, with dosage level (if measured) indicated.

Element A: Cross over.

## **9. MEASURING AND MANAGING TREATMENTS**

### **9.1 Measuring**

#### **9.1.1 How will treatments be measured?**

9.1.1.1 Dichotomous measurement of treatment assignment (see [Appendix G](#))

9.1.1.2 Rich video-audio data from RS3-SX (see [Appendix A](#))

#### **9.1.2 Who will measure them?**

RS3-SX.

#### **9.1.3 How will data be collected?**

Computerised collection using RS3-SX.

#### **9.1.4 How will data be stored?**

Computer files.

#### **9.1.5 Will data be audited?**

Yes.

#### **9.1.6 If audited, who will do it?**

Inspector Henstock

#### **9.1.7 How will data collection reliability be estimated?**

Cambridge calculations.

#### **9.1.8 Will data collection vary by treatment type?**

No. treatment is identical in all cases.

### **9.2 Managing**

#### **9.2.1 Who will see the treatment measurement data?**

Principal investigators.

#### **9.2.2 How often will treatment measures be circulated to key leaders?**

Bi-monthly.

#### **9.2.3 If treatment integrity is challenged, whose responsibility is correction?**

Inspector Henstock.

## **10. MEASURING AND MONITORING OUTCOMES**

### **10.1 Measuring**

#### **10.1.1 How will outcomes be measured?**

All X and O in terms of:

- 10.1.1.1 Number of formal complaints lodged by a supervisor regarding officer misconduct or performance per patrol hour<sup>2</sup>.
- 10.1.1.2 Number of recorded incidents with the use of force per shift<sup>3</sup>.
- 10.1.1.3 Rich video-audio data from RS3-SX
- 10.1.1.4 Telephone survey with members of the public who came into contact with the police (see **Appendix B**)
- 10.1.1.5 Number of early guilty pleas in custody and at Court.
- 10.1.1.6 Self-legitimacy of police officers wearing cameras (see **Appendix C**);
- 10.1.1.7 PTSD measures in DV first-response jobs (see **Appendix D**),

#### **10.1.2 Who will measure them?**

OSD and Research Team from Birmingham City University.

#### **10.1.3 How will data be collected?**

- 10.1.3.1 Complaints, incidents of use of force – OSD
- 10.1.3.2 video-audio data – RS3-SX
- 10.1.3.3 Telephone surveys – BCU Research Team
- 10.1.3.4 Self-legitimacy of police officers – Dr Justice Tankebe, Cambridge University
- 10.1.3.5 PTSD measures – BCU Research Team

#### **10.1.4 How will data be stored?**

WMP secured systems.

#### **10.1.5 Will data be audited?**

Yes.

---

<sup>2</sup> Number of formal complaint is defined as a complaint where the reporting party either requests the alleged misconduct or performance related issues be investigated or the reporting party completes the department complaint form.

<sup>3</sup> physical force more than a basic control or compliance hold, OC spray, baton, Taser, canine bite

**10.1.6 If audited, who will do it?**

Principal investigators.

**10.1.7 How will data collection reliability be estimated?**

Reading of all incident reports during and after the experiment (both treatment and control), for measurement of accuracy and precision of data.

**10.1.8 Will data collection vary by treatment type?**

No.

**10.2 Monitoring**

**10.2.1 How often will outcome data be monitored?**

Biweekly.

**10.2.2 Who will see the outcome monitoring data?**

Cambridge.

**10.2.3 When will outcome measures be circulated to key leaders?**

Monthly.

**10.2.4 If experiment finds early significant differences, what procedure is to be followed?**

Discuss with leaders.

**11. ANALYSIS PLAN**

**11.1 Which outcome measure is considered to be the primary indicator of a difference between experimental treatment and comparison group?**

**11.1.1** Total number of complaints against patrolling officers per officer per patrol hour

**11.1.2** Total number of incidents in which police force was used per patrol hour

**11.2 Which outcome measure is considered to be the secondly indicator of a difference between experimental treatment and control group?**

**11.2.1** Satisfaction levels

**11.2.2** Number of incidents in hotspots of crime

**11.2.3 Self-legitimacy**

**11.2.4** Comparing all primary indicators listed above with three more response teams (n=69) in Birmingham South LPU

**What is the minimum sample size to be used to analyse outcomes?**

430 shifts (16 shifts per week x 26 weeks)

**11.3 Will all analyses employ an intention-to-treat framework?**

Yes.

**11.4 What is the threshold below which the percent Treatment-as-Delivered would be so low as to bar any analysis of outcomes?**

60%

**11.5 Who will do the data analysis?**

Cambridge.

**11.6 What statistic will be used to estimate effect size?**

OR

**11.7 What statistic will be used to calculate P values?**

GLM with Poisson distribution

**11.8 What is the magnitude of effect needed for a two-tailed,  $p = .05$  difference to have an 80% chance of detection with the projected sample size (optional but recommended calculation of power curve) for the primary outcome measure (at allocation ratio between the arms of 1:1)**

$d = 0.18$

**11.9 Any additional analyses will be conducted?**

**11.9.1** planned subgroup analyses listed above

**11.9.2** Legitimacy and procedural justice scores

**12. DISSEMINATION PLAN**

**12.1** What is the date by which the project agrees to file its first report on CCR-RCT? (report of delay, preliminary findings, or final result).

**Within 6 months.**

**12.2** Does the project agree to file an update every six months from date of first report until date of final report?

**Yes.**

**12.3** Will preliminary and final results be published, in a 250-word abstract, on CCR-RCT as soon as available?

**Yes.**

**12.4** Will CONSORT requirements be met in the final report for the project? (See <http://www.consort-statement.org/>)

**Yes.**

**12.5** What organizations will need to approve the final report? (Include any funders or sponsors).

**WMP.**

**12.6** Do all organizations involved agree that a final report shall be published after a maximum review period of six months from the principal investigator's certification of the report as final?

**Yes.**

**12.7** Does principal investigator agree to post any changes in agreements affecting items 12.1 to 12.6 above?

**Yes.**

**12.8** Does principal investigator agree to file a final report within two years of cessation of experimental operations, no matter what happened to the experiment? (e.g., "random assignment broke down after 3 weeks and the experiment was cancelled" or "only 15 cases were referred in the first 12 months and experiment was suspended").

**Yes.**



## Treatment Apparatus: Wearable Cameras

### Reveal Media RS3-SX



The Reveal Media RS3-SX is ruggedised DVR with articulated camera mounted on the top of the device and forward facing screen. The system allows users to review footage in the field and mark files as evidential if required to reduce the amount of time needed when administering the data. The device is designed to be worn with uniform and is supplied with an array of mounting options.

## Unit Specifications

The RS3-SX is a single piece BWV unit with no external cables or connections required in order to operate the system. The system has a forward facing screen that shows the video product being captured and is IP65 rated. The system connects to a PC for data download using a standard USB 2 connector. The system can be mounted on a Klickfast™ mount and also comes with a range of alternative mounting methods. The RS3-SX does not have GPS recording capability as standard, nor is this an optional accessory.

## Recording Functionality

The RS3-SX has a FOV of 120° and a fixed focus range of 25cm to infinity, which cannot be manually adjusted. The colour camera collects data at a frame rate of 30fps @ 1080p and 60fps @ 480p. The RS3-SX has a range of recording resolution up to a maximum of 1920 x 1080. The system has an internal microphone that is positioned at the front of the device in order to capture audio simultaneously with video product. Optimal device settings have been identified and evaluated by Reveal Media to ensure high quality recordings are captured, which cannot be modified by the user. Metadata is captured and embedded along with the unit ID within each recorded file.

## Operator Functions

The RS3-SX has a physical switch which requires a positive action to start/ stop recordings. An audible and visual confirmation is given to the user as to the current state of the system. Recordings cannot be modified on the device, however the data is stored on a removable SD card.

## Power Considerations

The RS3-SX has a removable battery that gives the system approximately 2.5 hours of continuous recording time. An external battery can also be connected to increase the battery life

to 8 hours. The battery can be charged whilst it is in the unit and when charging gives an indication to the user of the current charge state. The battery takes approximately 3.5 hours to fully charge from 0%.

#### Data Storage

The RS3-SX has an 8GB SD card as standard, however it can take a maximum 32GB card. This provides the ability to record approximately 3 hours recording time at 720p resolution. All data that is captured is protected using encryption of a section which prevents file playback on standard media players. Optional Full encryption via SD card will be available in early 2014. It takes approximately 7 mins / hour of recordings to download to a PC.