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Tracking investigative outcomes of sexual offences in British Transport Police by the medium of reporting

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Abstract

Police recording of sexual offences has increased in England and Wales by 29% for the year ending December 2015, compared with the previous year. British Transport Police have had a comparative rise, but have also seen an 11% reduction in the detection of these offences. This has coincided with successful media campaigns encouraging victims to report unwanted sexual behaviour by text and Twitter. This study aims to review all crimes and determine whether the reporting medium and reporting source, meaning how it was reported and by whom, is related to the onward co-operation of the victim; and ultimately whether these variables have an influence on the detections.

This thesis used all crimes for BTP between 1st April 2010 and 31st March 2016 where medium and source data were available, which amounts to 5842 cases. A large set of variables for both are then refined and each one tested for a significant relationship with detections using chi-squared tests, t-tests and effect size analysis. Victim contact and attempted contact data has been collected from 361 cases, randomly sampled from the population. These were also subject of statistical analysis in combination with the key variables. Those found to have strong relationships are further tested using multivariate analysis and binary logistic regression.

The consistent finding was that the reporting mediums were strongly related to whether a case was detected or not and the successful mediums were those where the victim reported whilst still within the railway environment, whether to staff or police. The less successful mediums were telephone and text, where contact is either delayed or reduced in quality. However, the source of the report and the particular offence type did not have a significant relationship. Where contact data was available, it was found that contacts were not significantly related to detections, although attempted contacts were. Furthermore, continued contact attempts led to a victim contact, although did not equate to a positive outcome. For the majority of mediums, making more than three attempts reduced the odds of detection.

These results show that consideration to reporting medium should be made when designing contact policy, whether this is developing advertising for victims or training police, contact staff and rail staff. A different approach may increase detections for those high volume low severity cases.

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Introduction

British Transport Police (BTP) is a national specialist police service for the railway; with a duty and commitment to protect and serve the railway environment and its community, keeping levels of disruption, crime and the fear of crime as low as possible. However, in line with the wider police service in England and Wales, notifiable crime on the railways has seen a recent rise and sex crimes as a proportion of this has increased year-on-year to 2016 (1.7%, 2.2%, 3.0% and 4.0%); with the greatest concentration of offending in London (70%).

Sexual assault is recognised as amongst the most challenging problems facing criminal jurisdictions, with lack of confidence in police and the criminal justice system seen as a main contributor to under-reporting (Taylor et al., 2010). These issues have been widely researched with similar findings detailing the contribution of reporting barriers and negative public perceptions of sexual assault; referred to as a 'hidden prevalence' (Neame et al., 2003). This was confirmed as an issue by Transport for London in (2013) when results of their survey found that 9% of respondents had been subject of unwanted sexual behaviour. Also of concern, was that 96% of these informed that they had not reported the incident.

Various explanations for an impact on crime reporting exist and it is the reporting rather than the offences themselves which are considered to be on the increase. External influences which may have contributed to this include: Home Office guidance issued around crime recording; continued high levels of media coverage, part fueled by high profile cases and large scale operations into sex crime and sexual abuse; multi-force initiatives to encourage victims to come forward; and increased scrutiny of sexual offence recording methods. The main drivers from within BTP centre on the campaigns to encourage reporting of sexual offences and create an environment that does not tolerate sexual harassment and intimidation.

In April 2013, BTP launched 'Project Guardian', a joint approach between TfL and the police in London to coordinate a response to the problem of under-reporting. This was successful in raising awareness to the issue of sexual assaults on the transport network and was implemented

as ‘business as usual’ with further advertising under the headline ‘Report it to Stop it’. Both campaigns have been attributed to the marked increases in sexual offence reporting, of over 30% (TfL, 2016). This initiative was driven with a successful media strategy, heavily centred on methods by which victims can report offences quickly and discreetly using the BTP text or Twitter service.

The natural consequence of an increase in crime reporting is an increase in crime recording, arrests and detections. A strong inference can be drawn that ‘Report it to Stop it’ was associated with a rise in reports between April and December 2015, and a decline of BTP detections by 11%, within the same period. It has been suggested that the reduction in detections is due to lack of co-operation from the victim, encouraged by the use of text as a medium to report. No in depth study has been conducted on police data to truly understand the complexities of the medium used to report these offences and the subsequent impact on the investigation. BTP have highlighted the need for further research on this issue, to provide a more detailed analysis so that they, the wider police service, and the public can understand whether the medium of reporting effects the rates of victim co-operation.

Therefore, it can only be inferred at this time that the rises in victim non responsiveness can be attributed to the medium used to report sexual offences, although it is clear that victim non-engagement is increasing as these new types of medium, in particular text message, also increase. Another inference is that using a text message to report is only detrimental if the intention is not to engage at the outset, as successful follow ups from a text have equal chance of detection as other reported crimes. To partition detection rates into cases where there is co-operation and where there isn’t, would provide a different perspective of measuring police performance, especially if contact and attempted contact data was captured. This would also provide information for targeting those situations where victims may wish to inform rather than report.

This thesis reviews the surrounding literature in relation to sexual offending, reporting and measurement of crime. The methodology provides information on the study of 5842 sexual

offences and the initial analysis of reporting mediums against detected cases using chi-square tests. It then lays out how multivariate tests are completed with those variables showing strong significance, leading into a binary logistic regression model; to test for variance amongst the independent variables, with detections as the dichotomous dependent variable. The results are then discussed and conclusions drawn.

Literature Review

This literature review commences with a description of the issues faced by BTP and partner agencies in tackling sexual assaults on the transport network, particularly in London. It examines work that has been undertaken to address the known concerns and also reviews the research literature surrounding these issues, of both sexual offending and the under-reporting of it. Beyond this, further inspection of how crime is measured and reported is completed. This includes a review of those influences that effect the decisions and processes from crime occurrence to crime recording, with a focus on the medium of reporting used. However, direct research on the reporting mediums specifically is limited and this research goes towards filling the gap in this area.

Sexual Offences and Transport Systems

The TfL survey (2013) examined 1036 Londoners' opinions and experiences of safety and security matters on and around public transport; which found that 9% of respondents had received unwanted sexual behaviour, with the largest proportion (36%) being sexual assaults of a minor nature (groping, touching, rubbing). Of those respondents 96% stated that they had not reported the incident and gave the following reasons: not necessary / was minor incident (46%); ignored it / wasn't bothered / moved away (22%); not worth the hassle / ask too many questions at police station (17%); and no staff or police around at the time (9%).

Sexual offending and harassment is prevalent on the transport network, not just in London, but throughout the world. Paris for example, has increasing problems of sexual harassment and intimidation, as reported by Osez le Feminisme (2014) who conducted a survey which highlighted that 90% of women respondents had received unwanted sexual attention; which had led to three out of four women adapting their way of dress when using the Metro.

This issue is not restricted to Europe however. A survey with similar intentions was conducted on the New York Subway and it was also found that 10% of respondents had been a victim of sexual assault and 96% of those victims had not reported it to the police (Stringer, 2007). The

same message can be heard about Mexico City (Dunckel-Graglia, 2013) and even Baku in Azerbaijan (Jafarova et al., 2014); where 80% and 90% of respondents respectively, stated they had been victims of sexual harassment or assault.

Under-reporting of Sexual Offences

The issues faced with under-reporting of crime has been constant for decades. Early research into the reasons for reporting showed that it was the seriousness of the crime which was key to the reporting. (Bennett et al., 1994). More recent research and events suggest that even where serious sexual offences occur, reporting can sometimes be limited.

As police look for new ways to approach community issues, sharing problems and ideas with wider agencies and academics alike; research and discussion into crime causes on the transport network is developing policy for the police and their partners. Newton (2014) articulates the unique settings that the transport network creates for crime and disorder to occur, and the difficulties which it presents for identifying the true levels of crime. Under-reporting in this environment is a more complex issue than crime recording in general; and Newton (2014) also highlights the paucity of evidence available for identifying and analysing this issue.

Although based on the more serious offence of rape, Koss (1985) also found that under-reporting was common amongst students due to the belief that they were in fact not victims. Other studies (Fitzgerald et al., 1988; Brooks et.al., 1991) found that women were not inclined to report sexual harassment unless they viewed it as serious or offensive. Such barriers can be victim or agency centred (Taylor et al., 2010) with the former including: age; gender; sexual orientation; context of the crime; feelings of shame, guilt, or self-blame; and embarrassment. The latter can include a lack of trust in the police and the legal system.

Whilst Kelly et al., (2005) also comments that sexual violence is the most un-reported crime and makes similar findings as to reasons for this, they also note the limited studies that deal with why victims *do* report offences, and share the reasons as: acting automatically / it seeming the 'right' thing to do; wanting to prevent attacks on others; wanting protection for oneself; and a desire for

justice / redress. Williams (1984) and Skogan (1994) also raised this question and found that women were more likely to report the offence if the perpetrator was a stranger, although this reduced if the victim took the view that they had little information to offer and there was only a slim chance of capturing the assailant.

However, it is also true that much of this research on reporting and non-reporting contends with serious sexual assaults and rape, offences which are rare on BTP jurisdiction. However, a comprehensive study which reviewed various surveys came to similar conclusions for less serious sexual offences. Lievore (2003) found that the reasons provided for non-reporting of these crimes included 'personal barriers' of: too trivial or inappropriate to report to police; not a 'real' crime; not clear that harm was intended; and dealt with it themselves.

As BTP and partner agencies have started to break down those barriers discussed here, questions are raised as to why criminal justice outcomes are declining. Reasons provided in this paper suggest that non-reporting may be linked to that question, in as much as where knowledge and understanding from the public has improved through awareness campaigns; the reasons that one may have harbored for not reporting the crime, simply moves past the reporting stage and into the investigation stage, i.e., a person reports the crime via a particular medium, for example text message and then declines to assist the police with the investigation from that moment. This unfortunate position creates the situation where the police know a crime has occurred but can do little to detect it, thus raising the crime rate without reducing the outcomes. It is important to address this issue as not only does this leave the offender free to commit crime with a risk of victimisation, but high crime rates and low detections can lead to insecurity from the public and low morale for law enforcement personnel and agencies (Ousey et al., 2010).

Reporting mediums and Sexual Offences

As mentioned, to the authors' knowledge there is no research into reporting mediums specifically for sexual offences, or any other crime type. Tarling et al., (2010) completed a study of how crime reporting has changed over time between 1994 and 2008. Using data from the British Crime Survey and international research on all types of crime reporting throughout this period,

they concluded that it was the level of perceived seriousness that was the greatest influence to whether a victim reported the crime to police. They also found that the reporting of property crime had declined whilst the reporting of violent crime had increased. Despite this comprehensive piece of work into how the nature of crime reporting has changed over time, there was not one reference or comment to how the crime was reported.

Similarly, a recent review (Mayhew, 2014) of police crime-recording literature for Her Majesty's Inspectorate of Constabulary (HMIC) did not elicit any comment on the specifics of differing medium types. This is perhaps in light of the relative rapid change in availability of reporting methods now being offered by the police, combined with the limited availability of recent research into police crime-recording after 2000, with the most authoritative dating from 1980. The HMIC report (HMIC, 2004) was concerned with evaluating the crime reports received into the Force and not the medium used to provide it. However, there was comment that 7% of the crimes were recorded by other routes, which were loosely categorised as: reports to officers on patrol, at police stations or direct to specialist departments. Further to this, electronic reports, e.g., e-mail were dealt with as crime reports received by the bureau for which a call back was made. There was no inspection into the quality or impact these types of reports may have had on the subsequent investigation.

Therefore, there is a clear gap in the literature as to how the mechanics of particular mediums of reporting may contribute to the service provided. There is a wide body of research on police call handling, and more recently a limited number of studies into the specifics of the first account provided by telephone to police call handlers. Ambler et al., (2006) found leading questions were prevalent and that information received was different to that recorded and passed on; and Leeney et.al., (2011) found the interview was driven by the call handler. These studies highlight the numerous influences that can alter the quality of the information provided and distort the memory of those providing it, thus affecting the subsequent investigation. This study will review those mediums that rely on call handling interaction and provide suggestion as to the effectiveness in respect of detections.

Measuring crime and Sexual Offences

Crime recording has been present in England and Wales for over 150 years and up until 2002 the concept and practical methods of recording remained constant. Each police force compiled crime counts of particular offences and these were submitted to government departments for comparison and statistical analysis on crime volume and trends. As Putwain et al., (2002) explains, although interesting for comparison across time; often a wide range of social and political issues, along with government policy change, have meant that these singular crime counts in isolation are an unrealistic measure of national crime rates. It is known, for example that crime rates increased due to changing crime reporting habits amongst the general population; and better understanding of crime meant police were considerably more likely to record non-stranger rapes and domestic assaults in 1996, than they would have been in 1971 (Tonry, 1998). Another fluctuation included that between the mid 1950s and early 1990s, which saw sustained increases in recorded crime, partly caused by the advent of land line telephones across general populations.

Other crime fluctuations in England and Wales, especially in more recent times, are likely to have been affected by government led initiatives for better crime recording. These include changes in the National Crime Recording Standards (NCRS), which moved to a system of crime recording based on the victim's perception of whether a crime had occurred, rather than a police decision based on their procurement of sufficient evidence (Simmons et. al., 2003). Although this raised the crime count for some offence types, it provided a much more consistent approach between police forces.

Today, when considering the levels of crime year on year, two primary sources of data provide the focus for public service agencies and the general public. One such source is the Crime Survey of England and Wales (CSEW) which records crime from the perspective of residents in households by way of questionnaires, administered by an independent agency. This survey aims to reflect the Home Office Counting Rules (HOCR) that provide standards for police on when they should record crime. However, homicide, sexual and various other offences are excluded from the interviews that obtain the information and like any survey, can be subject to error from

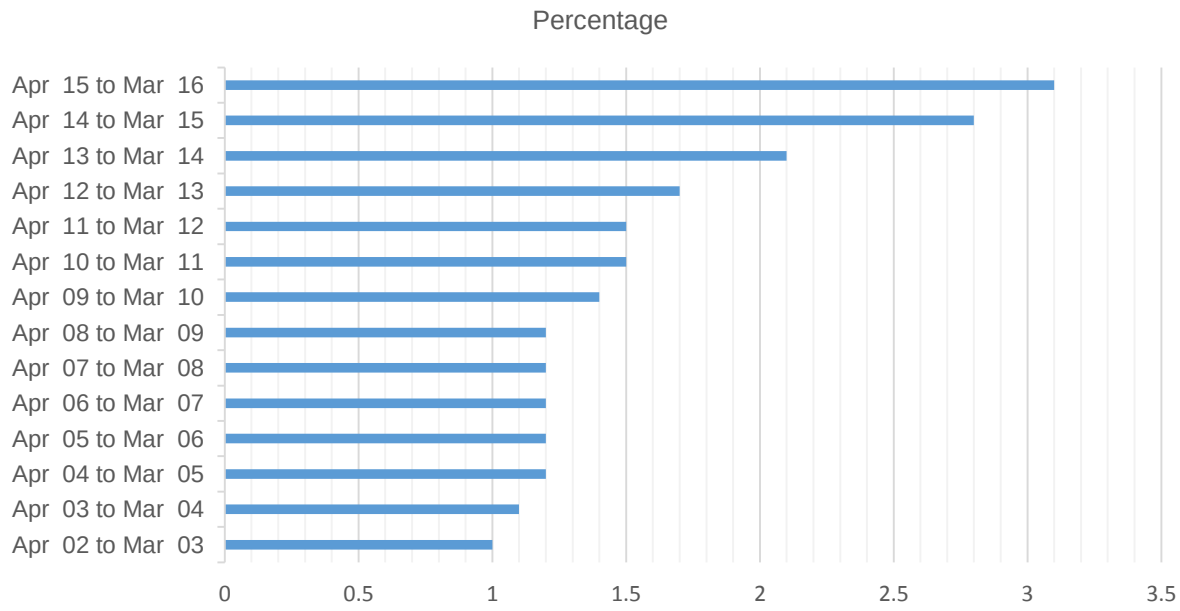
sampling and respondents ability to accurately recall past events (Office for National Statistics, 2016).

The other primary source of crime data is that received directly from the 43 Home Office Police Forces, plus the British Transport Police (BTP), and is recorded against the Notifiable Offence List (NOL). This list includes and codes separately all serious sexual offences, and groups lesser offences such as voyeurism, exposure, and other miscellaneous crimes. Counting in this way has the benefit of covering a wider offence range and population than the CSEW, and is a decent measure of those crimes which are well reported and includes all crimes as opposed to a sample. However, like the CSEW there are limitations which can effect the data. For example: the crime count only records those crimes reported to police; reporting can be effected by police activity; and what is reported can be handled inconsistently across different police boundaries (Office for National Statistics, 2016). Across both data sources there is a spread of crime reporting that allows for most offence types which are reported or otherwise to the police. However, this study is concerned not only with a crime count, but also with: the method by which a sexual offence is reported to the police; who makes that report; and the outcome of the subsequent investigation. Therefore, the police recorded crime and the problems associated with it, has more relevance to this discussion.

In 2012 a change to the categories of crimes on the notifiable offence list (NOL) was implemented. This allowed for statistics to be presented in a more coherent way and provide a clearer understanding of the types of crimes being recorded (ONS, 2013). This did not alter the actual data gathered, but changed the grouping of certain offences. Sexual offences were re-grouped to show ‘rape’ as a sub-category, thus reflecting public interest and the offences of ‘Soliciting’ and ‘Exploitation of Prostitution’ were moved into ‘Crimes against Society’. A group of three higher level categories was created to include ‘victim-based crime’. This was to differentiate between those crimes that were police generated and to highlight harm, whilst at the same time bringing this category in line with the CSEW, which primarily deals with victims.

The Office for National Statistics (ONS) is independent of government and report through the UK Statistics Authority. They collate and disseminate official statistics on matters of UK economy, society and population. This remit includes reporting on Crime in England and Wales utilising data from the CSEW and police recorded crime. ONS reported (2016) that in the year ending March 2016 the CSEW showed that there was no significant change from the previous year, in the number of victims of sexual offences. However, police recorded data for the same period showed a 21% rise, including a 22% increase in rape and 20% increase in other sexual offences; and this is the highest volume recorded since the introduction of NCRS in 2002. Figure 1. below illustrates this increase by displaying sexual offences as a proportion of all police recorded victim-based crime, from March 2003 to March 2016 (ONS, 2016). Of notifiable crime within BTP jurisdiction between April 2013 and March 2016, 3% were sexual offences.

Figure 1: Sexual offences as a proportion of all police recorded victim-based crime



ONS further reports that the CSEW signifies a more realistic measure of crime levels over time and that the police generated data is effected by improvements in police methods for recording sexual offences and also an increase in the willingness for victims to come forward. Therefore, this crime count increase cannot provide indications of reliable trends in sexual offences. (ONS, 2016).

Influences on Crime Reporting and Recording

The measurement of crime is continually evolving as the method of reporting becomes more varied; and access to those reporting mediums reaches a greater population and touches all social classes. It would be amiss for police and other agencies to neglect the opportunities afforded to crime reporting through advancing technologies. Enabling and encouraging a wider spread of crime recording can only benefit criminal justice in the long term.

There are various studies which have researched the effects that crime reporting has on the ability for the police to respond, although not on the actual medium used to report the crime. This is likely due to the recent advent of new technologies, whereas before there were only two options, call the police from a landline telephone or tell the police direct. Early studies in this regard even commented on the issues presented with the medium itself, in particular with communication, access to telephones or lack of knowledge of phone numbers (Spelman et.al, 1981). Where these issues no longer prevail, the constant findings from these studies are the reasons why people do not report the crimes, as opposed to how they report them.

Influences on whether a crime is reported and recorded can be caused by internal or external factors. Internal being centred on the victim and emanating from various concerns about perceived consequences of reporting the crime. External factors can be through barriers caused by lack of assistance from other agencies including the police. The former has been well documented and in respect of sexual offences there are numerous reports that detail the reasons why victims may choose not to report a crime.

The issue of reliability for this police generated data has been well documented beyond the ONS and the culture of target setting to measure performance has been widely considered a contributory cause. Curtis (2015) conducted a review for the Home Office into the use of targets in policing and commented that despite a high level of commitment to ethical crime recording; where published data was used for a direct measure on police performance, pressure from within resulted in less accurate data being recorded.

This issue does not just effect the crime count, but can just as easily effect the crime detections. Detectives have long since been measured for effectiveness by the clearances they achieve, and are judged not only by their peers but by the public who can gain trust, and the police legitimacy, by demonstrating high detection rates (Tankebe, 2008).

Further influences include: a more focused re-categorisation of sexual offence crimes; new ways of reporting through varied technological means; and a greater understanding and willingness to report sexual offences, including historical sexual offences. This may be due to the wide media coverage of police action such as Operation Yewtree, which dealt with the investigation into offences committed by Jimmy Saville; and the independent inquiry set up in 2013 into child exploitation in Rotherham between 1997 and 2013 (Travis, 2015).

Methods

Although studies on sexual offences are common and literature exists to augment understanding in many associated subject matters, to the knowledge of the author there are no studies specifically directed at the way those crimes are reported, and how they may influence detection rates. Therefore, a method design is explored that refers to statistical significance and effect size, with an aim to ensure maximum accuracy and reliability. A large secondary dataset has been obtained to achieve this (Weisburd et al.,1993), which includes the merger of two distinct data sets captured from systems used for the crime reporting and also crime recording.

Sexual offences data was collected for a population of 5842 cases that occurred on railway property policed by BTP between April 2010 and March 2016. A random sample of 361 cases was drawn from this to collect data on contact and attempted contact with the victim. This could not be downloaded, and required manual review of descriptive data within the crime action fields to ensure accurate data was accrued.

This method chapter sets about describing the quantity and quality of this data; and how the different analysis methods used assisted in addressing the research questions. It goes on to explain: how the outcomes and key variables are defined; how the data was selected and refined into relevant groups; why data was excluded; and the tests used to provide meaningful conclusions.

Aims and Objectives

The aim of this study is to review the trends in reporting of sexual offences to widen the understanding of how a particular medium used to make that report influences the onward relationship with the victim and subsequently the ability of the police to investigate and therefore detect the crime. These findings will be used to assist strategic decision making surrounding crime reporting and the intelligence and detection of offences on a national level. It will also provide assistance to more local level strategies on crime prevention and enforcement.

The primary objective will be to analyse the reporting medium used by victims of sexual offences and then to track each report to its final outcome. Although not in the context of an experiment (Sherman, 2013), a thorough inspection of each stage of the process with each medium type will provide data for further comparison and analysis, allowing an exploration of whether the journey from report to closure has been influenced by how that report was initially provided or whether other causes are wholly, or in part responsible. To further this analysis, the contacts with the victim and attempted contacts made by the police will be analysed. This will provide assessment on whether the time taken to make contact, and whether in fact contact was even made, has an association with the reporting source and medium and ultimately the detection rate.

Research Question

The intended outcome of this research is to improve our understanding of whether the reporting medium and reporting source are contributing factors in whether sexual offence cases are detected; and if police agencies should consider any such relationship when developing policy around victim contact and the way it is managed. In doing so this study asks the principle question: what are the relationships between the reporting medium and sources, victim co-operation and the detection of sexual offences? To break this down further the following questions are answered:

1. What are the relationships between key reporting variables (reporting medium, reporting source) and the positive outcomes?
2. What are the relationships between reporting mediums and the reporting source?
3. What are the relationships between key crime variables (offence type, offence location, geographic location, occurrence time) and the positive outcomes?
4. What are the relationships between the reporting mediums and positive outcomes, controlling for key crime variables?
5. What relationship do victim contact and attempted contact have with positive outcomes and reporting medium?

Defining Key Categories and Variables

To answer these questions, it is necessary to define the meaning of a positive outcome, reporting source and reporting medium.

Positive Outcome:

BTP refer to case disposals which 'detect' or 'clear' a crime as positive outcomes, which is in accordance with the Home Office from April 2014. This study does not inspect each disposal per crime, as to do so would be outside the scope of the thesis question. Therefore, where positive outcomes are discussed, they are simply referred to in the positive or negative i.e. the offence was detected or it was not. However, it is of interest to note that they can be defined as: charged; summonsed; caution (adult / youth); taken into consideration (TIC); offender deceased; PND; cannabis warning; community resolution; and not in the public interest (CPS). Excluded from this study are: PND, as this would not be appropriate as custody or a sentence more serious than a fine would be expected if the case were to be tried at court (Ministry of Justice, 2014); and cannabis warning as this is not relevant to sexual offences.

Of those that are included within the data set, charged and caution are the more prevalent and the former will be decided by the CPS based on an evidential and public interest test unless the offence is of a minor nature. For all positive outcomes the result is a cleared crime by either a sanction placed on an offender; or a non-sanction, where there is evidence of an offence but no sanction is administered, e.g. TIC. The latter has been found to advance unethical practices to improve police performance figures (Bloch & Bell, 1976; Greenwood, 1970) and recent scandals (Peachey, 2014) involving suspects admitting high numbers of crimes through police offering inducements, has altered policy (Home Office, 2011).

Reporting Source:

The reporting source deals with who exactly made the report to the BTP force control room. This is captured by one of 13 different system category names. Due to similar characteristics these can be placed into one of three overarching groups: 'police', 'public', and 'railway' and reduced into 7 variable groups for use in this study. It is important to have an understanding of how the

source may have received the information, as this will assist with the interpretation of the data and subsequent discussions. However, this analysis does not capture how or by whom the report was initially received, if in fact it was not a direct report from the victim.

The category of *police* is split into one of two sources, either a police officer / staff member from BTP or any other police force and form the variables used in this study (BTP-2, Police exc BTP-4). For both, the source will either have witnessed the offence or had it reported to them and therefore may or may not be the person with direct evidence of the offence. The same principle exists for the *public* category as the source can be the victim or witness with direct evidence, or a third party informant not present at the scene, such as friends or family. These form the variables used in this study (victim-1, witness-6, informant other-5). The third category *railway* is for staff on the trains and stations or in railway control rooms. Given the nature and locations of offending, rail staff rarely witness the offence, but are the source of the report to the BTP control room through information they have received; and this is often from an approach made by the victim, either in person or through a reporting mechanism such as a help station on a platform. These form the variable used in this study (rail staff-3). The last source variable used in this study makes up all other sources, although this has very low numbers (other-7). Each variable is described further within the results chapter.

Reporting Medium:

The reporting medium is the conduit used for the reporting of the crime. The focus here is not who made the report as in the source above, but how it was made. There are various reporting mediums available and each is captured by BTP and categorised by the call handler and or captured by the call handling system, along with details of the source. There are 21 different system category fields, and as with reporting source, can be placed into one of three overarching groups: ‘police’, ‘public’, and ‘railway’. For the purpose of this study, these are then reduced into 12 variables due to duplicity or similar characteristics.

Essentially, the decision on which reporting medium to use is often led by circumstances and environment that the source of the report finds themselves. For example, when a crime occurs

and the victim decides to report it, they have to make a choice on how they report it and to whom. If they were to leave the railway environment, go home and then report it direct to the BTP control room using a non-emergency telephone line; they would be the reporting source (victim) using a reporting medium (public non-emergency). If they were to report it direct to the BTP control room using a text service, then they would be the reporting source (victim) using a reporting medium (text). However, if the victim decided to approach a police officer on the station concourse immediately after the offence occurred and that officer took details and reported the crime to the BTP control room via their radio; the police officer would be the reporting source (BTP) and the radio would be the reporting medium (BTP officer – radio).

Therefore, when considering the results, reference to this process is important. As described, the choice made by the victim on when they report the crime and who to; will have a bearing on the source and medium of reporting. It is the objective of this study to analyse the links between these variables to understand if their particular associations are significant. It will then review whether there is evidence to suggest that a particular combination may dictate the level of service that a victim receives, including the detection of that offence.

Data Selection

A preliminary examination of BTP data relating to sexual offences was conducted. In addition to each crime, every available first account recorded on the BTP command and control system (NSPIS) was also captured, and relevant fields identified for further analysis of that report and to enable a primary cross comparison of crime field data with how the crime was reported (the medium used), and who reported it (the source of the report).

Bringing together the data from these two BTP systems into a master data sheet provided an opportunity to test feasibility of the proposed study, both to test data recovery and content comparison. 2172 lines of data were recovered, each one containing 34 fields of material. This provided all details of the crime and how and by whom it was reported. This was a successful test of the data which showed initial findings of interest to support a wider inspection on the thesis topic. This included a simple link of data by volume, to source and medium and then to

detections. Both data comparisons showed a wide range of percentages across the key variables.

Following this the dataset was expanded to include all sexual offences, thus providing a greater opportunity for empirical evidence on offence type and its relationship to the key variables. This captured 7187 sexual offence crimes (6946 England & Wales / 241 Scotland) between 1st April 2010 and 31st March 2016, that reported whether the case was detected or not. The data included all variables pertaining to the crime descriptors, although did not include any fields related to the persons involved in the case. Table 1 shows the categories of variables selected for analysis based on their interest to the central question. All other categories were rejected.

Table 1: Key Categories Selected for Analysis

Key Categories
Positive Outcomes
Reporting source
Reporting medium
Financial Year
Division
Sub-division
Location description
Offence type
Crime occurrence per hour (24hr)
Victim Contact
Victim Contact Attempts

Difficulties and Limitations of Data

Missing 'reporting medium' and 'reporting source' fields:

The analysis of this master data sheet following merger of the systems CRIME and NSPIS highlighted two separate issues. The first related to data present in the NSPIS system not populating into the master data sheet. For example, a completed field on the NSPIS report for the 'call origin description' (reporting medium) showed as 'text' yet this field was blank on the master data sheet. The second problem identified was that not all crime reports had been generated through the NSPIS system in the control room where the reporting medium and

reporting source are captured. These were instead created on the CRIME system directly by the staff in the Crime Management Unit (CMU) due to being received direct from a third party, usually a historic report from another force. This meant that the reporting mediums and reporting source fields were not present on the master data sheet for these crimes, which numbered 1345.

Consideration was made to research each crime and manually add the data or create a further field to account for the un-recorded reporting medium and reporting source. Having sampled a small number of cases neither method was found to be a practical or a reliable solution. It was then decided to remove the 1345 crimes from the population to ensure reliability was maintained. A comparison of the two data sets was made to test whether the 1345 crimes without medium and source fields, were randomised across the six years. This was important to know as certain mediums of reporting were introduced at different stages throughout the 6 years of crime data. Any system bias towards a particular year for example, could make any reported associations unreliable.

Figure 2 shows crime volume and percentage of positive outcomes from 2010 to 2016 for both data sets. The graph on the left displays the crimes with a complete dataset, where the merger has populated all crimes with a reporting medium and reporting source (5842); and the graph on the right displays all the crimes including the 1345 without reporting medium or source (7187). The comparison demonstrates that the missing data is randomised across time, as the graphs correspond to volume and percentage of positive outcomes. The total detection rate for both sets of data is exactly the same at 31.3%. Therefore, this study uses the data set of 5842 as a reliable population.

Figure 2: Comparisons of master datasets

Contact data not electronically captured:

Further issues relate to question 5 in the study – the data required for contact and attempted contact, neither of which is captured within the master dataset. This is because the data is only reliable on review of each crime record action field, where the information is manually entered in a descriptive form by the officer in charge of the case (OIC). Therefore, to obtain this data for all 5842 was considered too large to test. However, given the size of the complete dataset a 'sample size determination' test was applied (Lachin, 1981) and sample size was determined using the standard statistical formula, applied by a statistician (Olphin, 2016). The sample size was calculated at 361 crimes. These cases were then randomly drawn from the 5842 cases with an intention to draw inferences from the known characteristics of the sample to the unknown full population.

To ensure that each case in the population of 5842 had an equal probability of being chosen from the sample, every case was provided a unique case reference number from 1 through to

5842. The numbers were then entered in an online random sampler (randomizer.org) to provide a set of 361 unique numbers. These numbers were then placed against the case reference numbers and the matching cases drawn from the sample. Each crime was then manually reviewed and a separate database of contact data compiled. This data provided: number of contacts; number of attempted contacts; contact achieved (Y/N); and contact or attempted contact dates. The contact data was only noted between crime record date/time and point of disposal decision. This was to ensure reliable results analysis on tests between contact data and positive outcomes. The data was then merged with the master dataset.

Analytical Procedures

Descriptive statistics have been used for the main analysis. All research questions were examined with the use of the statistical software package: Statistical Package for the Social Sciences (SPSS), version 22. Where appropriate a chi-square test for independence was conducted for each key variable in the population, to determine if there was a significant association between the two. The significance level was set equal to 0.05. with a null hypothesis of H_0: *key category variables* and positive outcomes are independent. Further analysis was conducted with the results of chi-square test between reporting source and reporting medium and submitted with the strongest relationship pairing to test with positive outcomes; the null hypothesis as H_0: strongest reporting medium/reporting source relationships and positive outcomes are independent. Reporting medium and offence type were also tested for a relationship.

The key variables considered central to this thesis and with strong significance (location, reporting source and offence type) were then tested as controls against reporting mediums and positive outcomes with three-way chi-square tests; to examine for their importance. Reporting medium was then reversed and used as the control to confirm any significance suggested.

Following chi-square test between reporting mediums and positive outcomes, the variables that make up reporting medium were reviewed and three selected for inspection; due to their relationship with positive outcomes and crime volume (BTP internal, public non-emergency, text).

These were then individually compared with the highest crime volume attributed to each variable within the key categories. This provided a matrix of variables for each category to display a combination effect related to detection. The aim of this analysis was to provide focus on the factors of sexual offence crimes which provide the most common of circumstance, but have the least detections.

Further analysis was then conducted on contact categories to provide more understanding and discussion on how contact data may relate to reporting medium and detections. Three-way ANOVA tests were conducted for average victim contacts and victim attempted contacts for cleared and non-cleared crimes by reporting medium. This was to provide direct comparison of whether certain reporting mediums created more contact work for officers and whether this had an effect on detections. Analysis then continued using further ANOVA and t-tests to provide conclusions on: contact delay; contact speed related to detections; and contact number for offence types.

Logistic regression is well suited for describing and testing hypothesis about relationships (Hosmer et al., 2000; Peng et. al, 2002; Burrows, 2005). To conclude the analysis, binary logistic regression was applied to the key categories that were considered of importance to the overall understanding and provided information not available from the other variables; or were significant at the <0.05 level in the tests described earlier. Using Pearson tests of correlation, the variables were then assessed for inter-variable correlation. Whether cases were cleared or not cleared was used as the dichotomous dependent variable.

Results

The primary objectives of this study are to examine the variables of key categories that refer to this thesis question: the medium used to report the crime; the source who reported it; and the contacts made with the victim. This inspection will focus on the relationship between all three, and also how they relate individually to detection rates. This will be completed with the use of descriptive statistics such as standard deviation, mean, percent and frequency. Inferential statistics will also be used in respect of contact and attempted contacts to the victims.

Further categories which surround this question are also tested against detections, to provide context and overall understanding. These include: financial year between 2010 and 2016; type of offence; geographic and crime specific location of offence; and times offences occurred. Having exhaustively sorted through all the variables surrounding the main areas of interest, using bivariate and multivariate analysis; this section will then provide further review of the relationship between the response to reports of sexual offences and explanatory variables. This delivers greater understanding of their statistical significance and provides a wider perspective on the overall question of; whether investigative outcomes of sexual crimes are influenced in any way by the medium used to report them.

The data is explained from a wide perspective initially, to provide understanding of the scope of the analysis and context as to the overall theme. Tables and charts are used to analyse and present the individual variables as both an explanation of meaning and also in relation to positive outcomes. Where key variables have been sorted into more manageable groups for analysis, this is explained and presented in tables, to provide understanding of the reduction of categories but retention of scale.

To narrow the analysis and investigate whether distributions of categorical variables differ from one another, independent samples chi-square tests and sample t-tests are used along with the analysis of variance (ANOVA) between and within the variable groups. The results of binary logistic regression analysis are then produced to provide a final representation of the relative importance significance, variance and odds of detection for those variables included. This in turn

provides an indication of how many detections can be predicted, even without a comprehensive subset of solvability characteristics.

Positive Outcomes

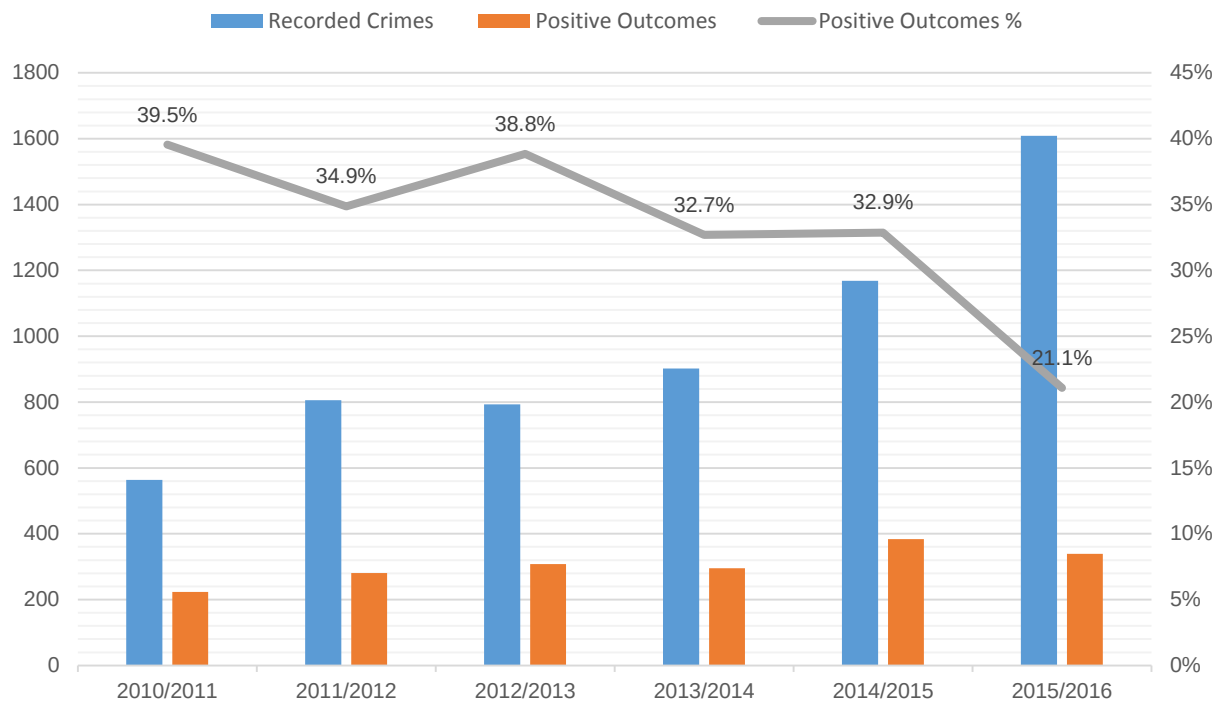
This section provides a presentation of each key category variable against the percentage of positive outcomes. Under each category heading a figure, table and description of results is provided. Where further analysis is required for that particular category or variable, this is continued under this section heading.

BTP record 'clear rate' as a 'positive outcome'. For the sexual offences recorded these may include the case disposals: charged; summonsed; caution (adult / youth); taken into consideration (TIC); offender deceased; community resolution; and not in the public interest (CPS). This study did not obtain the data as to which disposal method was used for each crime detected, as this is not directly linked to the research question.

Financial Year

Figure 3 shows the detections by year since April 2010. Each year set is from 1st April to 31st March. This provides a general context to the issues of rising crime recording for sexual offences and reduced clearance rates (chi-square = 123.976, df = 5, n = 5842, p<.001, cramer's v = .146).

Figure 3: Positive Outcomes by Financial Year



This graph shows that the volume of cases cleared has remained relatively constant and in fact has increased slightly year on year, except for a slight decline to the previous year in 2013/2014 and 2015/2016. However, from 2013/2014 there has been a rising crime count which has caused a gradual decline in the percentage of positive outcomes, in particular in 2015/2016. This has had the effect of almost halving the percentage of positive outcomes over the six years of data analysed. An explanation for this may be a boost in less easily detectable crimes or offences where victims are less co-operative. The percentage of positive outcomes for all crimes across the whole 6 years is 32.3%. The average is 32.9%.

Division

BTP is split into four divisions; A, B, C, and D. A-Division refers to Force Headquarters (FHQ) estate and staff; and does not have any crimes attributed to it. B-Division includes the East, South and also TfL, which includes London Underground and the Docklands Light Railway. C-

Division is the remainder of England and Wales and D-Division is Scotland. The following figures 4 and 5 display crime volume for each Division and Sub-Division.

Figure 4: Positive Outcomes by BTP Division

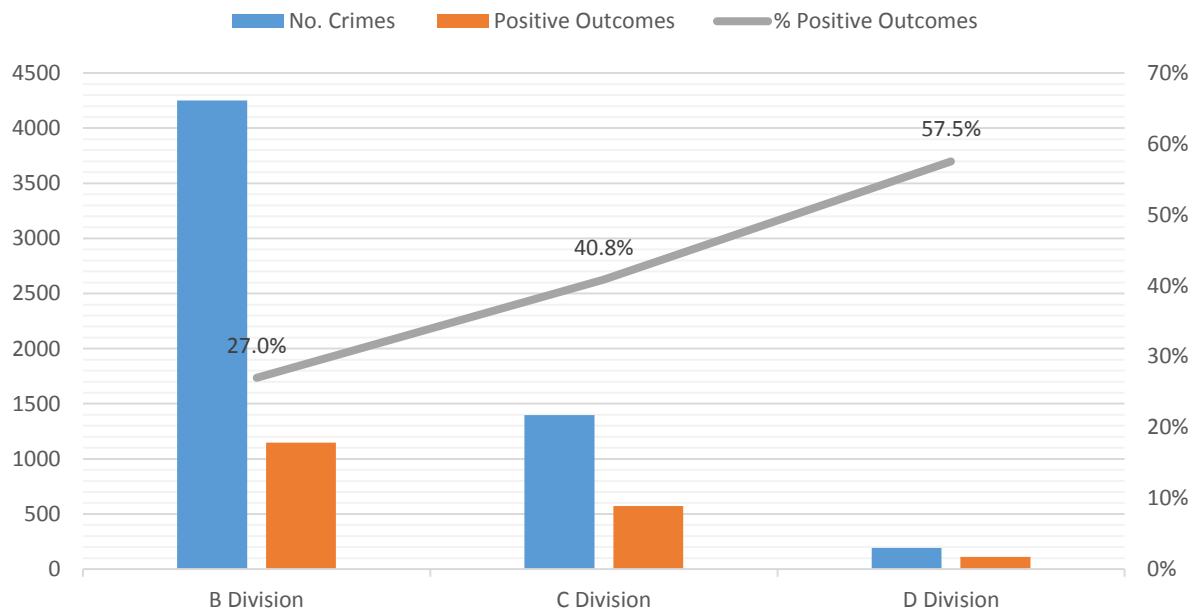
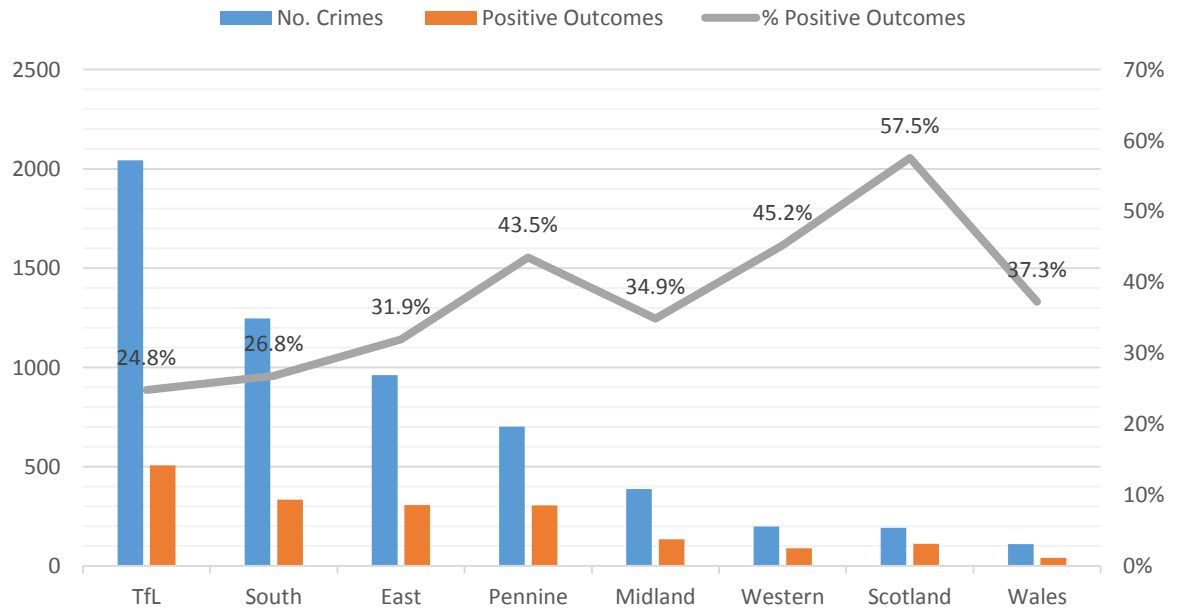


Figure 5: Positive Outcomes by BTP Sub-division



There are very large differences in sexual offences and positive outcomes between divisions and sub-divisions. B-Division has the greatest volume of crimes, equating to 73% of all the recorded sexual offences, but the lowest percentage of positive outcomes (chi-square = 157.284, df = 2, p<.001, cramer's v = .164) and just under half (48%) are committed on TfL Sub-Division. This area also has the lowest percentage of positive outcomes, although has the highest volume of detected cases (507). D-Division / Scotland has the highest percentage of positive outcomes, although the second lowest crime count (193). Therefore, clearance does vary for sex crimes by the Division in which they occur. This could be a resourcing outcome related to volume of crime and available officers to investigate, although resourcing data is not available for further analysis.

Offence Type

Of the 5842 crimes within the population, 24 offences are present and form sexual offences within the law of England and Wales (5648); and 21 are from Scottish Law (194). Due to the similarities in both wording and meaning, the offences from both countries were combined into seven main categories. Table 2 shows each of the variables and their volume relating to the data as a whole.

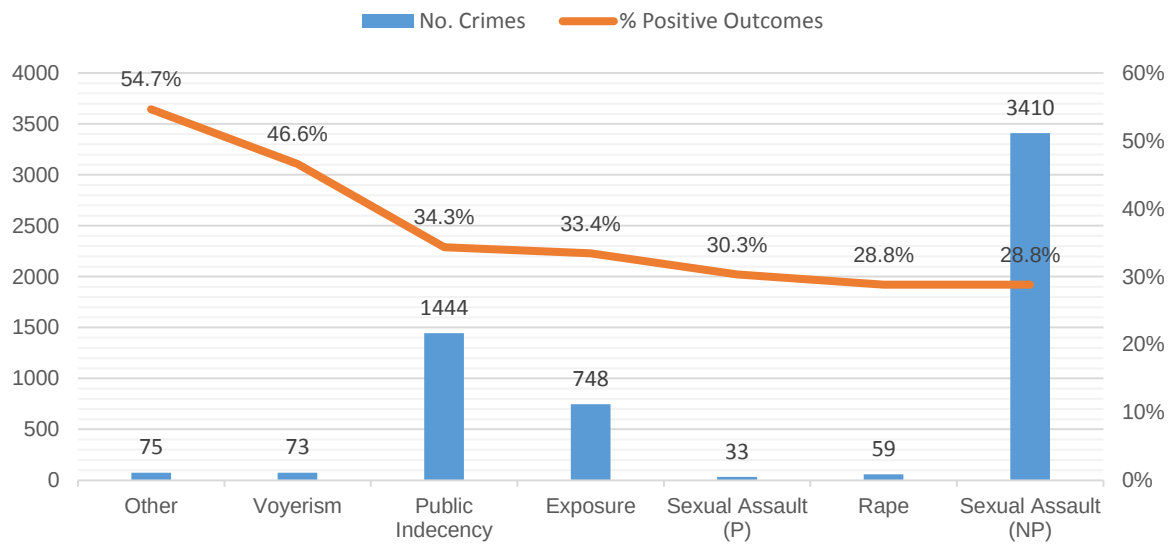
Table 2: Offence Type - Group Variables by Volume

Analysis Offence Type (Group Variable)	Group Variable No.	Volume
Sexual Assault (NP)	1	58.3%
Public Indecency	2	24.7%
Exposure	3	12.8%
Rape	4	1%
Voyeurism	5	1.2%
Sexual Assault (P)	6	0.56%
Other	7	1.2%

Figure 6 shows these variables and their relationship with positive outcomes, which is statistically significant, although with a low effect size (chi-Square = 44.87, df = 6, p<.001, cramer's v = .088). The majority of crimes are the least serious, with non-penetration (NP) - sexual assault offences providing 58.3% of all crimes. This category has the lowest detection rate at 28.8%. Rape has the same rate of detection, although only 59 offences were recorded. Public indecency

and exposure offences make up a further 37.5% of the offences, and have a higher rate of detection of 34.3%.

Figure 6: Positive Outcomes by Offence Type



Offence Location

BTP record offence location in a very detailed way and each has a classification of crime location description. Of the 5842 crimes analysed, 64 separate locations are recorded. Of these, 68.5% (n =4006) are committed on a train (n=3967) or tram (n=39). The remaining 62 represent variables made up of specific locations throughout the BTP jurisdiction and range from: line side locations, station buildings and platforms; and those retail and entertainment venues which are within the station complexes. These include nightclubs, bars and restaurants. Of these 62, the top five variables with the greatest volume of crimes are: station platforms (576); stairs and escalators (303); station concourse (159); station exit/entrance (112); and male toilets (94). The remaining 592 crimes are spread across all the other 57 variable locations. For the purposes of this thesis, the locations have been grouped into one of eight categories according to the

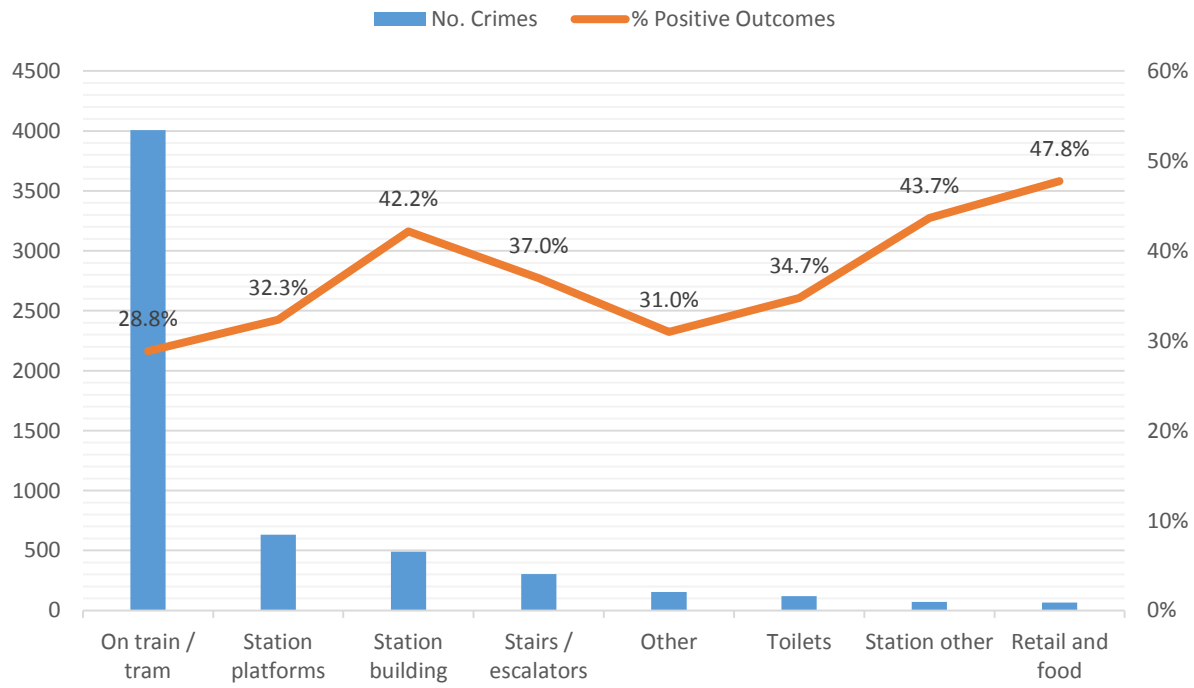
characteristic of that particular location. These eight group descriptions are listed at table 3 and display each grouped variable against their volume of overall crime.

Table 3: Crime Location – Group Variable by Volume

Analysis Crime Location (Group Variable)	Group Variable No.	Volume
On train / tram	1	68.5%
Station platforms	2	10.8%
Stairs / escalators	3	5.1%
Station building	4	8.4%
Toilets	5	2%
Station other	6	1.2%
Retail and food	7	1.1%
Other	8	1.2%

Figure 7 displays the detections by grouped location. The graph displays the variable, the volume of crime, and the percentage of positive outcomes attributed to each (chi-square = 57.227, df = 57, n = 5842, p <.001, cramer's v = .099); which is statistically significant, although with a low effect size.

Figure 7: Positive Outcomes by Crime Locations

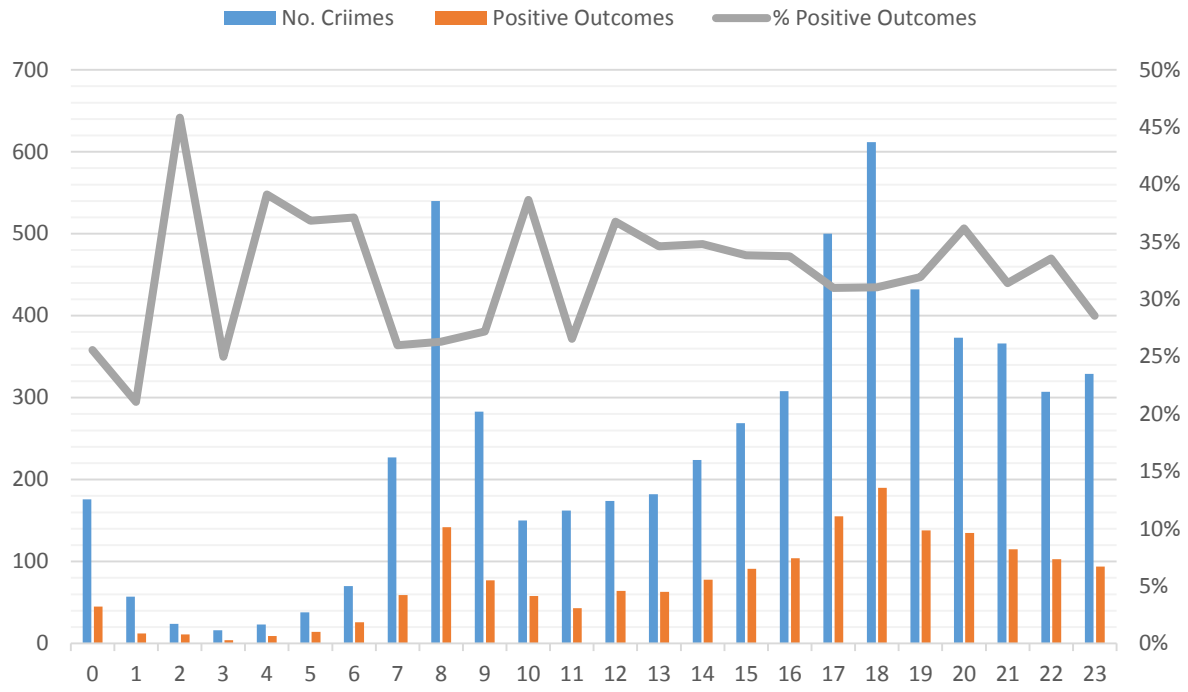


This graph indicates that the greatest proportion of sexual offences occur on train / tram and this location accounts for 69% of all offences. This group also has the lowest detection rate at 28.8%. The highest percentage is achieved when the offences occur in retail and food establishments, although this is the lowest recorded crime count. The third highest percentage and crime count is when crimes occur in station buildings.

Offence Occurrence Time

As seen in this chapter, 35% of all sexual offences are committed on the London Underground; and they mainly occur on a train. The majority of these are low severity non penetration offences and involve sexual touching over clothing. All these variables are related to the detection of the offences, which are at their lowest percentage within these categories. Figure 8 displays the hours of the day at which the offences occur and their relationship with detections (chi-square = 39.838, df = 23, p<.001, cramer's v = .083). Although a strong significance, there is a low effect size.

Figure 8: Positive Outcomes by time (per 24hr)



This graph clearly shows the relationship between the detections achieved and the volume of crime. The peak travel time for volume of passengers correlates with the volume of offences. This occurs in the morning and evening. Offences remain relatively high throughout the evening but continue to decline from 18:00 hours to 22:00 hours. Percentage of positive outcomes dips in the morning rush hours and late morning, but there is a less marked dip in the evening rush hour.

Reporting Source

Regardless of which medium is used to report a sexual offence to the police, there may be several different people that have knowledge of the crime, who may choose to report it. This can be for a multitude of reasons based on circumstance of the incident or wishes of the victim. If a reporting source is not a victim then this is a third party report and BTP will contact the victim, usually when the crime is allocated, although sooner if the crime requires expediency. Within the

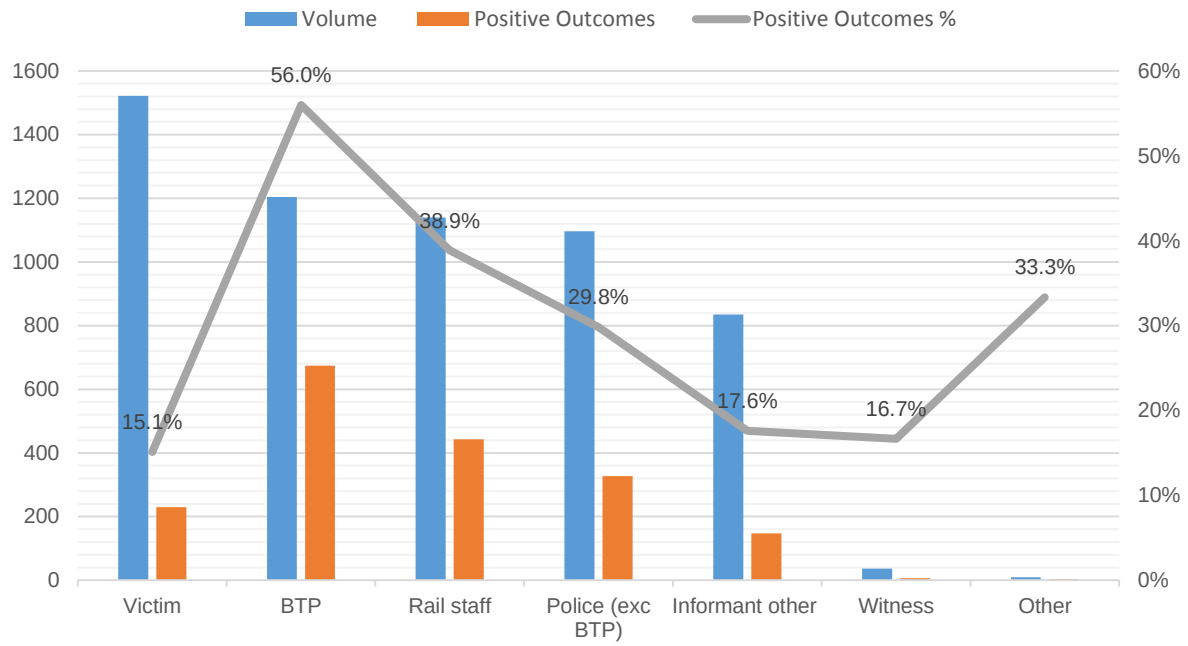
data set of crimes there are 13 different sources from which the report originated. All are self-explanatory, except for 'informant', which is used when the source is not clear to the operator. It is beyond the scope of this study to identify why this particular source was selected over any of the others. This may have been because the actual source did not exist as a pre-determined system variable; or it was chosen over the specific source, for whatever reason the operator had at the time. In some instances, the sources have similar characteristics and for the purposes of this study they are grouped into 7 categories which best represents their type. Table 4 displays each grouped variable against their volume of overall crime.

Table 4: Reporting Source – Group Variable by Volume

Analysis Reporting Source (Group Variable)	Group Variable No.	Volume
Victim	1	26%
BTP	2	20.6%
Rail staff	3	19.5%
Police (exc BTP)	4	18.7%
Informant other	5	14.2%
Witness	6	0.6%
Other	7	0.1%

Figure 9 displays the detections by grouped reporting source. The graph displays the variable, the volume of crime, and the percentage of positive outcomes attributed to each. This is statistically significant, with one of the larger effect sizes within this analysis. (chi-square = 634.087, df = 6, $p<.001$, cramer's v = .329). Victim reports are the most prevalent and also have the lowest percentage of positive outcomes. The second and third highest volume are 'BTP' and 'Rail staff' and they also have the first and second highest clearance rates, both in percentage and volume.

Figure 9: Positive Outcomes by Reporting Source



Medium of Reporting

BTP do not operate a traditional '999' emergency telephone service. Where calls of this nature are made from the public they are initially received by the police force for that geographical area. Where a crime is identified as falling within BTP's jurisdiction, it is transferred immediately for allocation. However, an emergency line does exist for railway staff and non-emergency lines exist for both the public and railway staff.

There are 21 different system variables within BTP, which represent the mediums of incident reporting, and all are present in the data (5842 crimes). In some instances, the mediums have similar characteristics or are duplicated due to being superseded or not required. Therefore, for the purposes of this study the 21 mediums are grouped into 12 categories which best represents their type. Table 5 displays each grouped variable against their volume of overall crime.

Table 5: Reporting Medium – Group Variable by Volume

Analysis Reporting Medium (Group Variable)	Group Variable No.	Volume
Public non-emergency	1	31.8%
Rail staff non-emergency	2	16.6%
BTP officer - radio	3	12.3%
Metropolitan Police (MPS)	4	11.1%
Home Office police (exc MPS)	5	9.5%
BTP internal	6	7.9%
Text	7	5.1%
Rail staff emergency	8	2.8%
Non Home Office police	9	1.1%
E-mail	10	0.8%
Social media	11	0.2%
Other	12	0.2%

Table 6: Reporting Medium and Offence Type

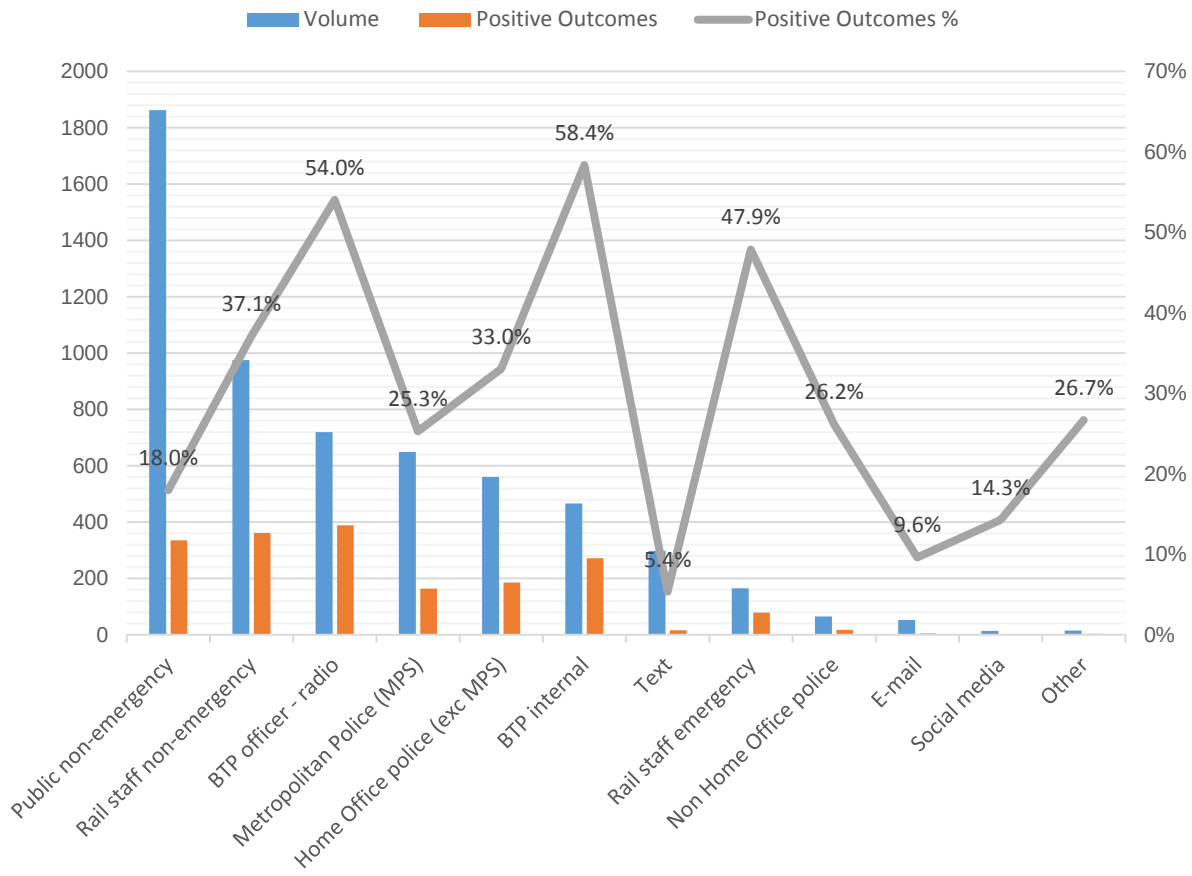
	Sexual Assault (NP)	Public Indecency	Exposure	Other	Voyeurism	Rape	Sexual Assault (P)
Public non-emergency	1131 60.7%	493 26.5%	205 11.%	10 0.5%	15 0.8%	3 0.2%	6 0.3%
Rail staff non-emergency	490 50.3%	279 28.6%	178 18.3%	9 0.9%	14 1.4%	1 0.1%	4 0.4%
BTP officer - radio	420 58.3%	165 22.9%	85 11.8%	20 2.8%	23 3.2%	3 0.4%	4 0.6%
Metropolitan Police (MPS)	398 61.3%	156 24.%	74 11.4%	6 0.9%	5 0.8%	5 0.8%	5 0.8%
Home Office police (exc MPS)	309 55.2%	100 17.9%	95 17.%	14 2.5%	5 0.9%	27 4.8%	10 1.8%
BTP internal	282 60.5%	99 21.2%	49 10.5%	11 2.4%	10 2.1%	14 3.0%	1 0.2%
Text	210 70.5%	68 22.8%	19 6.4%	1 0.3%	0 0%	0 0%	0 0%
Rail staff emergency	93 56.4%	47 28.5%	21 12.7%	1 0.6%	1 0.6%	1 0.6%	1 0.6%
Non Home Office police	31 47.7%	15 23.1%	13 20.%	3 4.6%	0 0%	1 1.5%	2 3.1%
E-mail	31 59.6%	11 21.2%	6 11.5%	0 0%	0 0%	4 7.7%	0 0%
Other	12 80%	2 13.3%	1 6.7%	0 0%	0 0%	0 0%	0 0%
Social Media	3 21.4%	9 64.3%	2 14.3%	0 0%	0 0%	0 0%	0 0%

Table 6 shows the relationship between the reporting mediums and the offence types (chi-square = 369.159, df = 66, n = 5842, p<.001, cramer's v = .103). For every medium the number of crimes attributed to each offence type are displayed along with their percentage of all crimes within that particular medium. The crime type with the greatest volume (sexual assault-NP) has the highest percentage of crimes within every medium except social media, although the numbers for this are relatively low and cannot be relied upon in isolation. Text has the highest proportion of its offences in this group also, and is not used for any serious offences. Rape and sexual assault with penetration have the highest volume of reporting for home office police forces (MPS & Home Office exc MPS).

Figure 10 presents the results from a chi-squared test for prevalence of the grouped variables for reporting mediums (chi-square = 640.795, df = 11, n = 5842, p<.001, cramer's v = .331) for all crimes and their usage in cases that had positive outcomes and those which did not. The graph

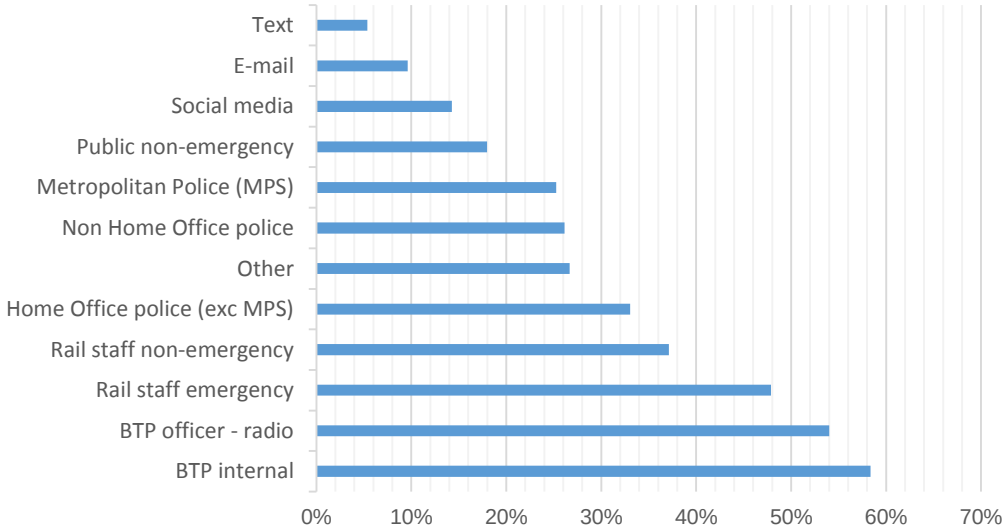
displays the variable, the volume of crime, and the percentage of positive outcomes attributed to each. There is a medium range effect size and a substantial association with outcome, confirmed by a large chi-square.

Figure 10: Positive Outcomes by Reporting Mediums



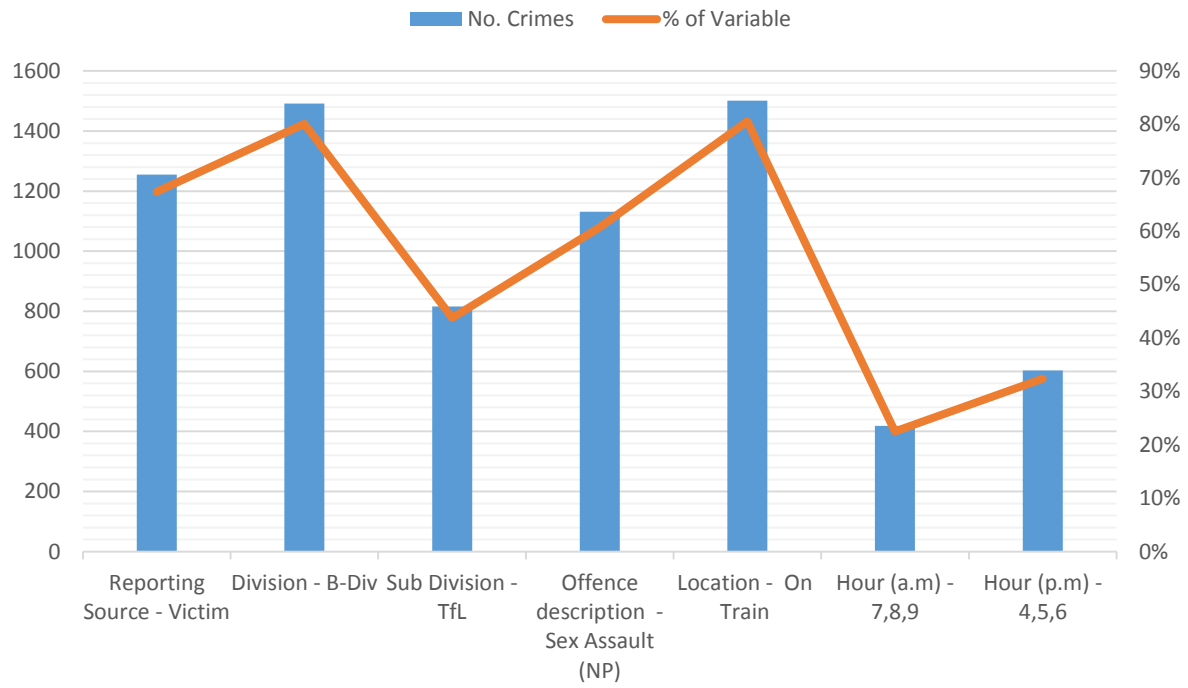
'Public non-emergency' can be seen as the medium used in the most cases, which represents any person, excluding police and rail staff, making a call to service. Despite the relative high volume there is a relatively low percentage of positive outcomes, at 17.98%. The lowest percentage of positive outcomes is 'text' at 5.37%. Figure 11 displays the positive outcomes attributed to each medium of reporting.

Figure 11: Reporting Mediums by Percentage of Positive Outcomes



Although this does not represent the full picture, it does suggest a requirement for further inspection. The four highest groups for positive outcomes, with an average of almost 50%, are those centred on mediums used by the police and rail staff that are present in the railway environment; and all represent an incident that is reported and later recorded as a crime. Of the 12 groups, three have been selected for further analysis: Public non-emergency, as this group represents the highest volume of crime, yet with the 4th lowest percentage of positive outcomes; BTP Internal and Text, as these represent the highest and lowest percentage of positive outcomes. This will also assist with the overall question of reporting medium as an influence to detections; and whether there should be further inspection of policy around advising victims in certain circumstances, of which reporting medium to use. This focus does provide inspection on the less serious offences, which is justifiable in the context of a study that lends itself to volume crime, directed by the interest in reporting mediums.

Figure 12: Public Non-emergency by Variable



The medium variable 'Public non-emergency' for which there are 1863 crimes recorded, has been extrapolated to display each variable within it, that has the highest number of crimes, in isolation; and therefore the percentage represents the share that that variable has of all types (figure 12). For example, there are seven 'Reporting Source' groups and the 'Victim' is the type of source that reports the most. The remaining six being: BTP; rail staff; police (ex BTP); informant other; witness; and other. Therefore, this is represented in the graph by 'Reporting Source – Victim'. The next variable in the graph is 'Division', which has three groups; and 'B-Div' is the one that has the highest volume of crime. This continues for each variable.

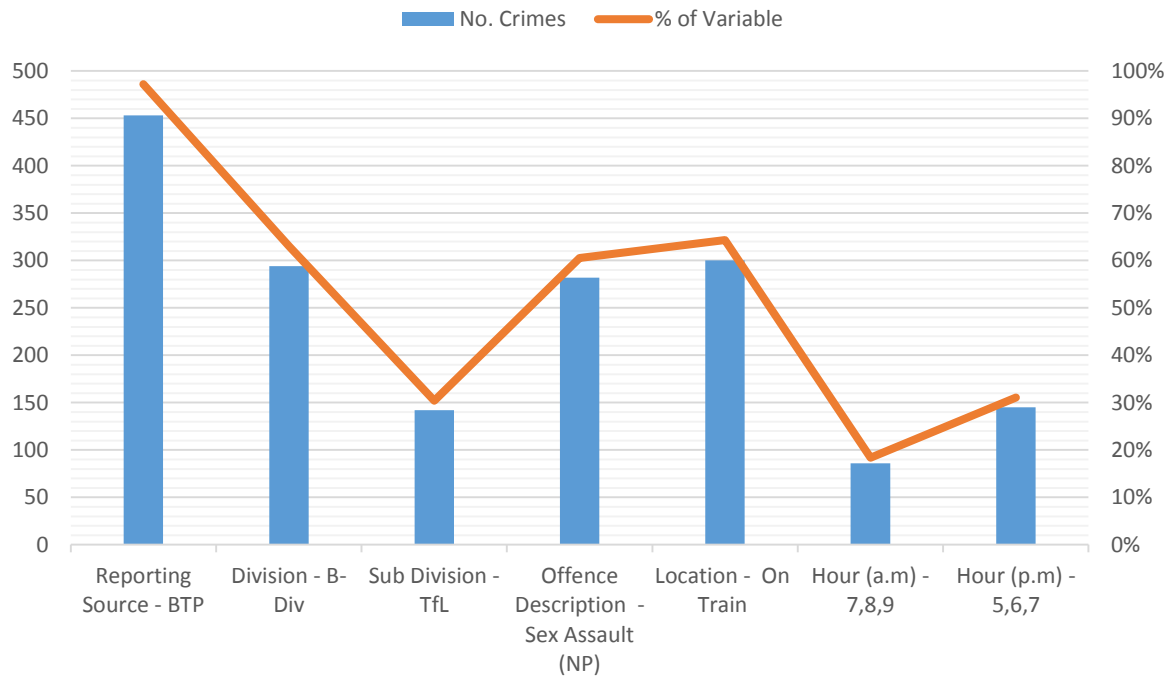
So, of the 1863 crimes reported by the public via the non-emergency telephone line: 1255 (67.4%) were from the victim of that crime; 1492 (80.1%) were committed on B-Division; 816 (43.8%) were committed within TfL; 1131 (60.7%) were non-penetrative sexual assaults; 1501 (80.6%) were committed on a train; and the morning and evening peaks saw 419 (22.5%) / 603 (32.4%) respectively.

Table 7 shows each of the above variables in association, and with positive outcomes. It can be seen that where each is selected there is a very low percentage of positive outcomes (1.4%) against the percentage across the six years of data (31.3%). This would indicate a requirement to focus resources where each of these variables combine, to provide greater opportunity for detections.

Table 7: Association between Public Non-emergency, key variables with highest volume, and detections

Variables	Public non-emergency	Victim	B-Div	TfL	Sex assault (NP)	On train	7,8,9 / 4,5,6	Yes
Public non emergency	1863							
Reporting source		1255						
Division			1064					
Sub-division				603				
Offence description					469			
Location						363		
Hour (a.m. / p.m.)							268	
Positive Outcomes								26 / 1.4%

Figure 13: BTP Internal by Variable



The medium variable 'BTP Internal' for which there are 466 crimes recorded, has been extrapolated to display each variable within it, that has the highest number of crimes, in isolation; and therefore the percentage represents the share that variable has of all types (figure 13). For example, there are seven 'Reporting Source' groups and 'BTP' is the type of source that reports the most. The remaining six being: victim; rail staff; police (ex BTP); informant other; witness; and other. Therefore, this is represented in the graph by 'Reporting Source – BTP'. The next variable in the graph is 'Division', which has three groups; and 'B-Div' is the one that has the highest volume of crime. This continues for each variable.

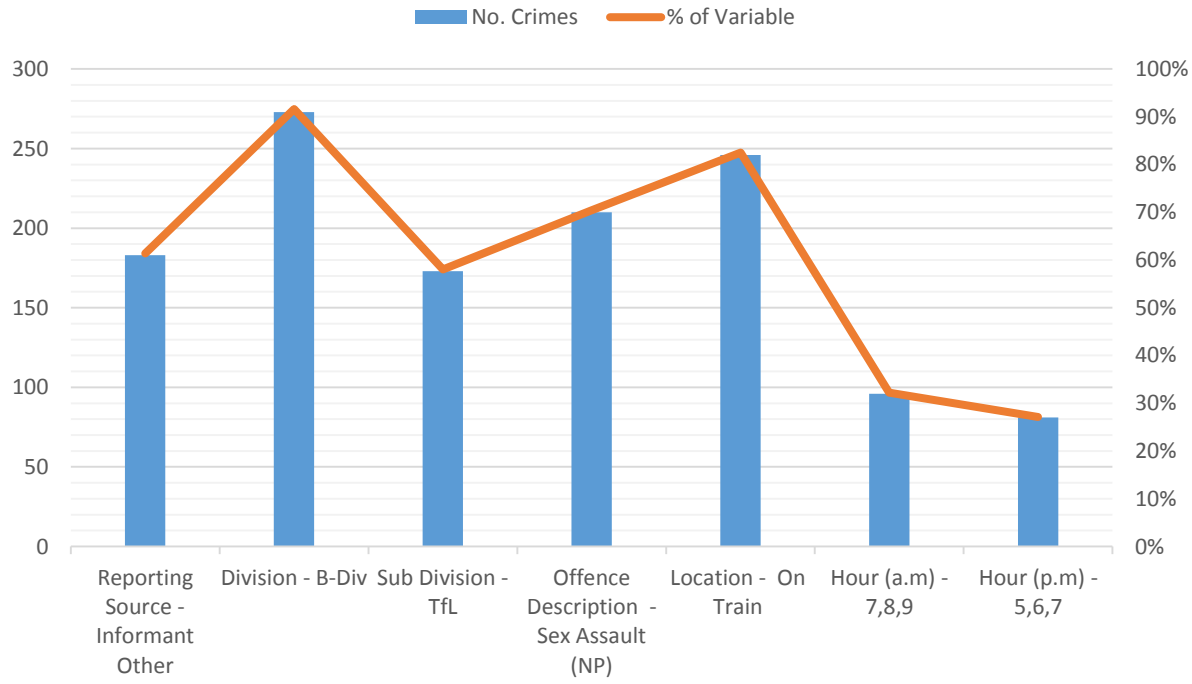
So, of the 466 crimes reported internally within BTP: 453 (97.2%) were reported internally by BTP officers; 294 (63%) were committed on B-Division; 142 (30.4%) were committed within TfL; 282 (60.5%) were non-penetrative sexual assaults; 300 (64.3%) were committed on a train; and the morning and evening peaks saw 86 (18.4%) / 145 (31.1%) respectively.

Table 8 shows each of the above variables in association with positive outcomes. It can be seen that where each is selected there is a low percentage of positive outcomes (12%) against the percentage across the six years of data (31.3%). This would indicate a requirement to focus resources where each of these variables combine, to provide greater opportunity for detections.

Table 8: Association between BTP Internal, key variables with highest volume, and detections

Variables	BTP Internal	BTP	B-Div	TfL	Sex assault (NP)	On train	7,8,9 / 5,6,7	Yes
BTP Internal	466							
Reporting source		453						
Division			294					
Sub-division				142				
Offence description					282			
Location						300		
Hour (a.m. / p.m.)							231	
Positive Outcomes								56 / 12%

Figure 14: Text by Variable



The medium variable 'text' for which there are 298 crimes recorded, has been extrapolated to display each variable within it, that has the highest number of crimes, in isolation; and therefore the percentage represents the share that variable has of all types (figure 14). For example, there are seven 'reporting source' groups and 'informant other' is the type of source that reports the most. The remaining six being: victim; BTP; rail staff; police (ex BTP); witness; and other. Therefore, this is represented in the graph by 'reporting source – informant other'. The next variable in the graph is 'division', which has three groups; and 'B-div' is the one that has the highest volume of crime. This continues for each variable.

So, of the 298 crimes reported by text: 183 (61.4%) were by informants (other); 273 (91.6%) were committed on B-division; 173 (58%) were committed within TfL; 210 (70.4%) were non-penetrative sexual assaults; 246 (82.5%) were committed on a train; and the morning and evening peaks saw 96 (32.2%) / 81 (27.1%) respectively.

Table 9 shows each of the above variables in association with positive outcomes. It can be seen that where each is selected there is a very low percentage of positive outcomes (0.33%) against the percentage across the six years of data (31.3%). This would indicate a requirement to focus resources where each of these variables combine, to provide greater opportunity for detections.

Table 9: Association between Text, key variables with highest volume, and detections

Variables	Text	Informant Other	B-Div	TfL	Sex assault (NP)	On train	7,8,9 / 5,6,7	Yes
Text	298							
Reporting source		273						
Division			173					
Sub-division				142				
Offence description					210			
Location						246		
Hour (a.m. / p.m.)							177	
Positive Outcomes								1 / 0.33%

Figure 15: Reporting Source and Reporting Medium Relationships with Positive Outcomes

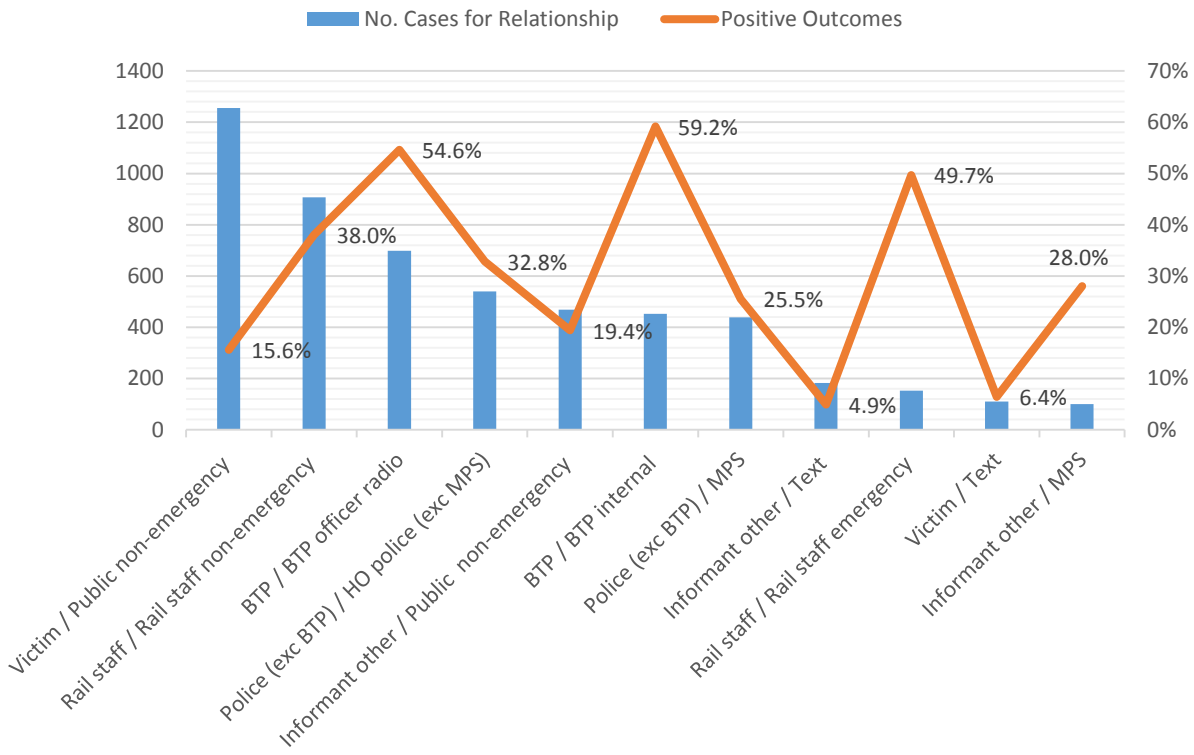


Figure 15 shows the strongest relationships between the reporting medium and reporting source. These are the relationships with the highest number of cases (chi-square = 14798.86, df = 360, p<.001, cramer's v = .650). The relationships with the highest percentage of positive outcomes are those related to BTP and rail staff. The highest volume and lowest detection rate is when the source is the victim and the reporting medium the non-emergency telephone line.

Three-Way Chi Square Tests

Further results analysis was conducted using three-way chi-square tests controlling for three variables: location description; reporting source and offence type. Given the significant relationships between many of the variables that are linked to positive outcomes examined above; it is useful to select the important ones of these and carry out a three-way analysis in order to understand which of them is important or otherwise.

Location Description:

Reporting medium and offence location were both related to whether or not cases were cleared (chi-square = 640.795, df = 11, n = 5842, p<.001, cramer's v = .331; chi-square = 57.227, df = 57, n = 5842, p <.001, cramer's v = .099), and reporting medium was related to offence location (chi-square = 589.69, df = 77, n = 5842, p <.001, cramer's v = .318). Further, the relationship between reporting medium and clearance shows significance, when controlling for location. Although not a universal effect the majority of the data shows all category variables are significantly inter-related. This is a particularly convincing finding as it is only in retail and food establishments that significance disappears, with it very strong for all the large reporting locations such as when on train, station platforms, station building, stairs and escalators etc. Therefore, when controlling for location, the reporting medium persists in having a strong impact and is associated with whether a case is cleared or not (table 10). This means that the reporting medium is the important factor as opposed to the location of the offence. The relationship between location and detection controlling for medium is only weekly significant in a limited number of cases. This confirms that when reversing the control, the location is not important and reaffirms the significance of reporting medium.

Table 10: Results of Chi-Square Tests – Detections and Reporting Medium controlling for Location Description

Location Description	Value	df	n	Significance (2-sided)	Cramer's V
On train / tram	411.477b	11	4006	.000	.320
Station Platforms	76.848c	10	631	.000	.349
Station Building	56.549d	10	491	.000	.339
Stairs / Escalators	70.314e	9	303	.000	.482
Other	12.345f	9	155	.195	.282
Toilets	16.862	9	118	.051	.378
Station Other	22.569	8	71	.004	.564
Retail and Food	5.020	6	67	.541	.274
Total	640.795	11	5842	.000	.331

Reporting Source:

Reporting medium and reporting source were both related to whether or not cases were cleared (chi-square = 640.795, df = 11, n = 5842, p<.001, cramer's v = .331; chi-square = 634.087, df =

6, p<.001, cramer's v = .329), and reporting medium was related to reporting source (chi-square = 14798.861, df = 66, n = 5842, p <.001, cramer's v = .650). Further, the relationship between reporting medium and clearance shows significance when controlling for reporting source, but not in all cases (table 11). Only three category variables are significantly inter-related and when the reporting source are police officers, there is no significance. Therefore, when controlling for reporting source, the reporting medium has selective importance as to whether a case is cleared or not. This is also the case when the control was reversed.

Table 11: Results of Chi-Square Tests – Detections and Reporting Medium controlling for Reporting Source

Reporting Source	Value	df	n	Significance (2-sided)	Cramer's V
Victim	25.939b	11	1522	.007	.131
BTP	13.277c	10	1204	.209	.105
Rail staff	18.078d	9	1140	.034	.126
Police (exc BTP)	12.671e	10	1096	.243	.108
Informant other	54.023f	11	835	.000	.254
Witness	.655g	3	36	.884	.135
Other	2.250h	3	9	.522	.500
Total	640.795a	11	5842	.000	.331

Offence Type:

Reporting medium and offence type were both related to whether or not cases were cleared (chi-square = 640.795, df = 11, n = 5842, p<.001, cramer's v = .331; chi-square = 44.87, df = 6, p<.001, cramer's v = .088), and reporting medium was related to offence type (chi-square = 369.159, df = 66, n = 5842, p <.001. Cramer's v = .103). Further, the relationship between reporting medium and clearance shows significance, when controlling for offence type. Although not a universal effect the majority of the data shows all category variables are significantly inter-related, except for 'Other', 'Rape' and 'Sexual Assault (P)'. Therefore, when controlled for offence type, the reporting medium persists in having a strong impact and is associated with whether a case is cleared or not (table 12). Further, when controlling for reporting medium, significant association between offence type and clearance disappears. This means that the reporting medium is the important factor as opposed to the offence type.

Table 12: Results of Chi-Square Tests – Detections and Reporting Medium controlling for Offence Type

Offence Type	Value	df	n	Significance (2-sided)	Cramer's V
Sexual Assault (NP)	409.426b	11	3410	.000	.347
Public Indecency	174.462c	11	1444	.000	.348
Exposure	64.708d	11	748	.000	.294
Other	8.252e	8	75	.409	.332
Voyeurism	13.184f	6	73	.040	.425
Rape	5.888g	8	59	.660	.316
Sexual Assault (P)	6.091h	7	33	.529	.430
Total	640.795a	11	5842	.000	.331

Victim Contact

This bivariate analysis reports on the number of contacts that an investigator makes with a victim during the case; and also, where a crime has been reported and the victim not yet contacted, the number of attempts made to contact that victim. The number of both these categories include zero through to twelve, which represent the minimum and maximum number. All counts are pre-disposal only and up to the point a decision is made; so as to capture any relationship between the contacts and the detections.

As figure 16 shows, when number of contacts are placed against positive outcomes the findings are not statistically significant (chi-square = 16.23, df = 12, p = .181, cramer's v = .212). Where there are zero contacts with positive outcomes (28 offences / 41.2%), this represents offences for which a victim was not required in law (public indecency / exposure - 25) or offences where CPS charged without the victim statement or contact was not recorded.

As figure 17 shows, when contact attempts are tested against positive outcomes the findings are also not statistically significant (chi-square = 19.472, df = 11, p = .053, cramer's v = .232). However, there is a positive indication towards significance and a trend of a reduction in detections as the contact attempts increase from zero to six. It should be noted that the increase

to 100% between 8 and 9 contact attempts are statistical outliers with low numbers, which give a misleading read.

Figure 16: Positive Outcomes by Number of Contacts

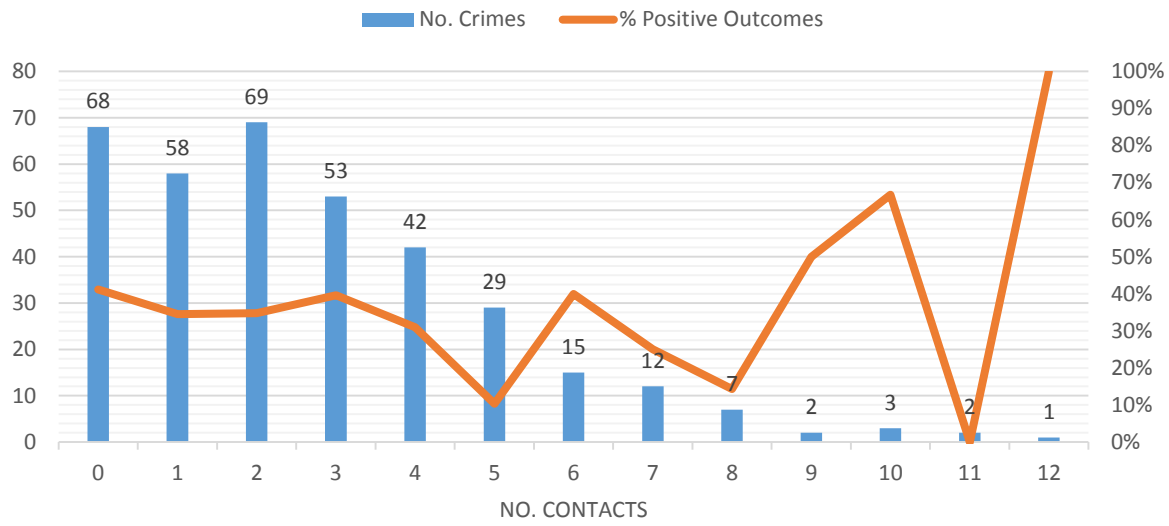
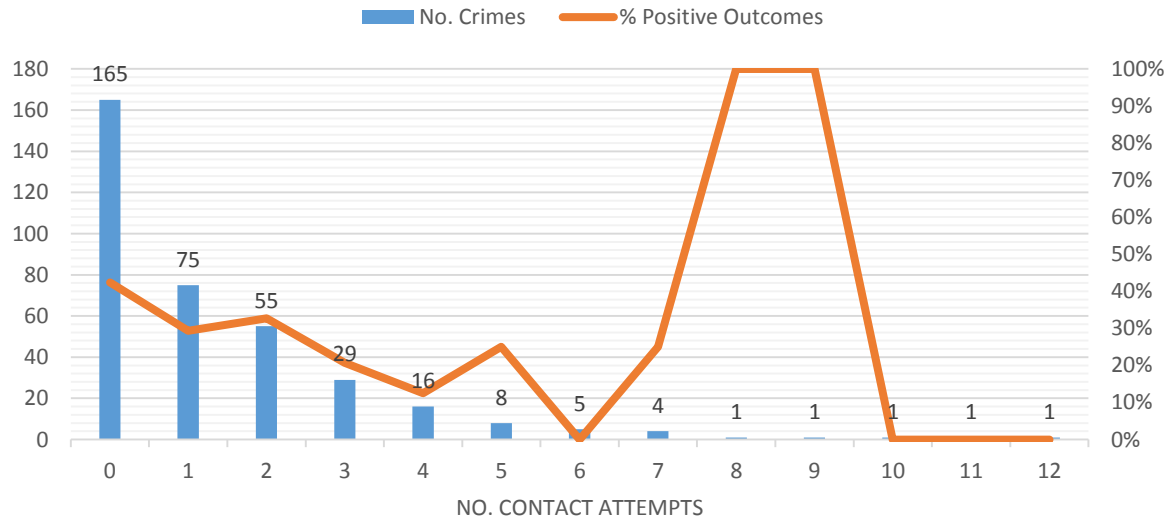


Figure 17: Positive Outcomes by Number of Contact Attempts



In respect of relating contact to other independent variables, similar issues exist. When tested against reporting source, again the results are not significant (chi-square = 62.134, df = 72, n = 361, p=.790, cramer's v = .415). Whether the report is provided by the victim or a third party has

no bearing on the contact thereafter. This is the same result for contact attempts (chi-square = 80.511, df = 66, n = 361, p=.108, cramer's v = .472).

Figure 18 and 19 show the results of three-way ANOVA tests. For each reporting medium, the average number of contacts and contact attempts for crimes that are cleared and not cleared are shown. This result is not significant (F = .786, p = .642 n = 361, df = 10, 350) for contacts, but is significant for contact attempts (F = 2.174, *p* = .019 n = 361, df = 10, 350). The graph indicates a trend towards more contact attempts for cases that were not detected than were detected; and this is for all reporting mediums except for public non-emergency and text.

However, figure 20 explains that there is a significant relationship (chi-square = 30.634, df = 11, n = 361, p=.001, cramer's v = .291) when contact attempts are cross related with whether contact was actually made (victim contact Y/N). Therefore, repeated contact attempts *do* increase the rate of contact, although this *does not* translate to co-operation and case detection.

Figure 18: Average victim ***contacts*** for cleared & non cleared crimes by reporting medium

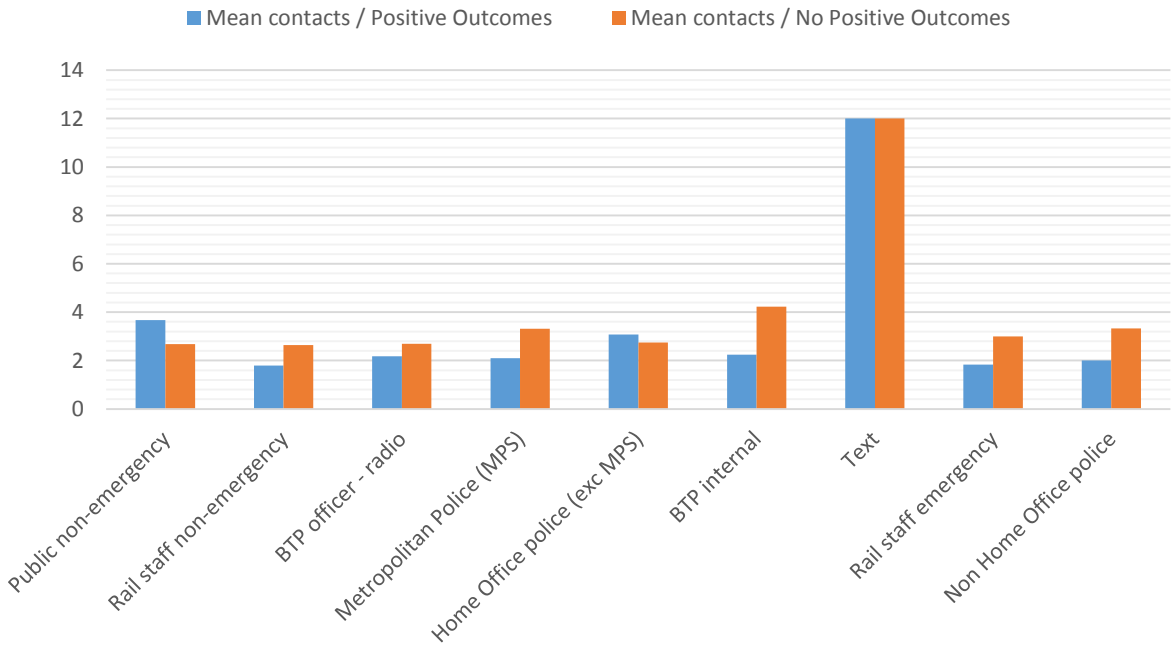
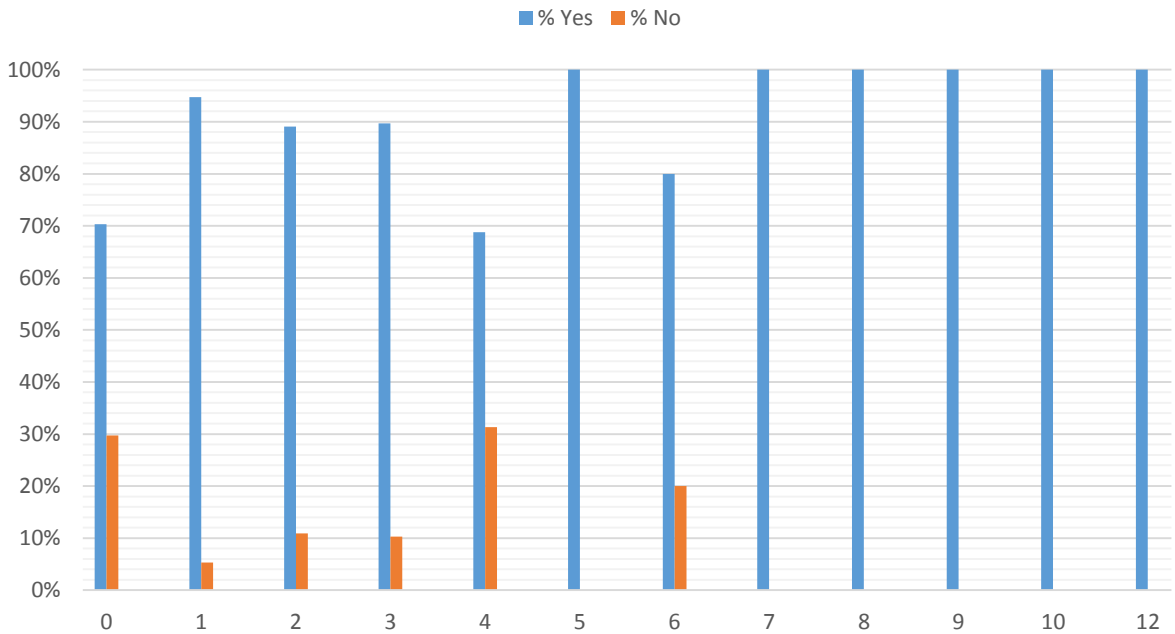


Figure 19: Average victim attempted contact for cleared & non cleared crimes by reporting medium

Figure 20: Number of Contact Attempts by Contact Achieved



Additional findings for Contact Variable

There is no significant difference between whether contact was achieved or not for each reporting medium, with contact being made between 76% and 88% of all cases across all the mediums. An analysis of variance was conducted to explore the impact of contact delay on detections. Where cases are cleared, first contact with the victim occurs more quickly ($t = 3.02$, $p = .003$): 3 days cleared compared with 6.2 days not cleared. However, speed of contact is not significantly related to the reporting source. ($F = 1.2$, $p = .31$). Further, the number of contacts does not significantly differ for cleared and non-cleared cases for each of the reporting source variables ($F = .89$, $p = .504$); and fewer contacts were made in cleared cases than not cleared ($t = 2.1$, $p = .036$): 5.5 compared with 8.7 (mean). Finally, the number of contacts is fewer for more serious offences ($F = 4.2$, $p = .016$): 5.8 compared with 10.8 (mean).

Binary Logistic Regression Model

Logistic Regression was performed to establish the impact of the variables shown in table 13. The key variables were selected and refined to provide the most reliable representation within the model. This is because the more variables that are taken into account, the more they compete with the reporting medium and reporting source; and those which are interrelated capture some of the explanation. The dependent variable in this model is dichotomous (detected or non-detected) and therefore this model is binary as opposed to multinomial (Pallant, 2001). Contact variables were not included due to their relative insignificance to the overall detections.

Table 14 provides the results in respect of their statistical effect on the variation between detected and non-detected sexual offences. The full model containing all predictors was statistically significant ($\chi^2(10)=67.770$, $p<.001$); which demonstrates that the model was able to distinguish between the cases that were detected and were not. The model explained 24.8% of the clearance (Nagelkerke R^2) and correctly classified 73.4% of cases. Positive predictive value was 49.6% and negative predictive value 86.1%.

The variable ‘source rail’ is close to significant and for purposes of illustration means that reporting via this source reduces the odds of clearance by 2:1 compared with reporting via a BTP

officer. 'Contact Att' (0,1,2,3+)' is the attempt to contact once, twice or three times and greater. This is due to the fact that there were very few cases with more than three attempts to contact. To show each number of contacts up to the 12, would not have provided a reliable variable. This has a negative relationship with clearance and each additional attempt to contact a victim is associated with reduced odds of 1.27:1. The key variable is 'on train' as the odds of detection are boosted by 1.75:1 when the victim is not on a train and this is statistically significant. If the offence is committed outside of B-Division, the odds of clearance are boosted by 2:1 and this is statistically significant. Finally, if reported to a BTP officer or rail staff, the odds of clearance are elevated by 4.2:1 and this is also statistically significant.

Table 13: Logistic Regression Variables

Variable	Description
Source Public	Reporting Source - Victim, Informant Other, Witness
Source Rail	Reporting Source - Rail Staff
Source Pol Other	Reporting Source - Police (exc BTP)
Source BTP	Reporting Source - BTP Officer
Contact Att' (0,1,2,3+)	Contact attempts from 0 to 3+
On Train	Location Description – On Train vs Off Train
B-Div	Division – B-Division vs C and D-Division
Offence low severity	Public Indecency, Exposure, Voyeurism,
Offence med/high sev'	Sex Assault (NP) / Rape, Sex assault (P)
Reporting Medium non BTP/Rail	Public non emergency/MPS/HO police/non HO/E-mail vs all other mediums that are BTP and Rail related

Table 14: Logistic Regression Results with Positive Outcome as the Dependent Variable

Independent Variable	B	S.E	Wald	df	p	Odds Ratio
Reporting Source			8.267	3	.041	
Source Public	-.720	.720	.999	1	.318	.487
Source Rail	-.695	.368	3.568	1	.059	.499
Source BTP	.068	.756	.008	1	.928	1.071
Contact Att' (0,1,2,3+)	-.240	.117	4.220	1	.040	.787
On Train	.559	.283	3.921	1	.048	1.750
B-Div	.742	.275	7.278	1	.007	2.100
Offence Type			.780	2	.677	
Offence low severity	-.908	1.034	.772	1	.380	.403
Offence med/high severity	.004	.269	.000	1	.989	1.004
Medium non BTP/Rail	1.429	.678	4.436	1	.035	4.174

Discussion

The primary focus of this research was to investigate how sexual offences were reported and whether the medium used to do so was having an influence on the detections of those crimes; with an aim to fill a gap in the current research literature. This has been achieved through analysis of a large set of BTP secondary data, pertaining to all types of sexual offences occurring between 1st April 2010 and 31st March 2016, with a total of 5842 cases in the population. There has not been another study directed at this issue to compare methods of analysis, however the author has had reference to studies comprising of solvability factors which have related theory in respect of statistical significance for individual factors (Paine, 2012), effect sizes for variables within a railway environment (Robb et al., 2014) and binary logistic regression (Alderden and Lavery, 2007; Jarvis and Ragoeczi, 2009). Although not based on predatory crime, for which there is very little work examining investigated cases (Bouffard, 2000); all of these statistical methods have been used. This has been completed with bivariate and multivariate analysis to explain the relationships; and with logistic regression to provide context and understanding as to how; when the variables are interrelated, the variance in detections is effected.

Before looking specifically at the questions asked by this thesis; for context on the issue under discussion, it is worth remembering why those questions were posed. BTP has seen a steady decline in detections for sexual offences against a rise in reported crime (27% in data population). Both are consistent with national trends and year ending March 2015 saw a 37% rise on the previous year of recorded sexual offences; the highest since the introduction of the National Crime Recording Standards in 2002 (Office for National Statistics, 2016). The data in this study demonstrates a clear reduction in detections to 21% from 32.9% the previous year in 2014/15. From 2011/12 to 2014/15 there was only a 2% reduction in detection rates despite a much higher rate of crime recorded in the same period. Therefore, an inspection into the data that underpins these statistics is of interest; and in particular why the detection rate decline has been so sharp; and whether the reporting medium is a contributing factor in this regard.

It has been beyond this study to analyse levels of resource applied to the investigation of sexual offences, although it is accurate to comment that the staffing levels have not increased in line

with the crime recording (BTP, 2016). Every crime that is recorded will be allocated for investigation where appropriate, so given that the number of cases has increased it is worthy to note that the BTP detections achieved for 2015/16 have only marginally reduced against the previous year and actually increased on 2013/14. This analysis has inspected the medium of reporting and surrounding factors to understand if they are related to the reduction in positive outcomes. The results suggest that although the crime location has persistent significance in this regard, there are strong relationships with the reporting medium and detections.

Reporting Mediums and Positive Outcomes

The first question asked by this thesis was; what are the relationships between key reporting variables (reporting medium, reporting source) and the positive outcomes? To answer this question all crimes within the dataset were applied to these variables to assess their relationship with detections. Dealing with reporting medium first; the 12 mediums showed a significant relationship. Text was the medium with the lowest percentage (5.3%) along with other technology driven reporting; e-mail (9.6%) and social media (14.2%). However, it is not enough to say that the cause of low detections is texts alone, as the relative number of reports is low. It is clear from the results that this is not a suitable way to enable detections and that if this method was to increase then it may add further issues to an already complex picture. The text service is used to report other crimes such as anti-social behaviour and this volume is far greater than text message reporting for sexual offences. This is an area of study which could enhance the understanding of texting as a reporting medium per se.

The highest rates of detection were for those mediums used by BTP officers (BTP internal, 58.4%; BTP officer radio, 54%) and then those used by railway staff (rail staff emergency, 47.9%; rail staff non-emergency, 37.1%). Therefore, it is the mediums that provide capture of report within the railway environment, which provide greatest opportunity for detection. It is important to note that this includes those cases where an officer has made an arrest due to being present at the scene; or was in a position to deal with an allegation immediately, such as on patrol close by. However, this fact should not discount these mediums as irrelevant, as it is the

presence of the officer and their positive actions that have allowed for a direct medium of reporting; and reduced the possibility of a less favourable method being used later.

These mediums suggest successful outcomes are more likely where immediate personal interaction is provided to receive the report; and when this is within the railway environment there are further increases. A study to understand the attrition process in volume crime investigations (Burrows et al., 2005) found that the strongest possibility of detection in cases (80%) was when the victim or witness was present at the scene, and their quick actions allowed for an effective police response. As all sexual assaults involve the presence of the victim, encouraging reporting that allows timely action by police, will provide an opportunity to gather the evidence required. This is supported by the lower detection rates when other police forces are the reporting medium (MPS, 25.3%; Home Office police exc MPS, 33%).

It is likely that that these reports are not made within the railway environment, although it is not possible to say in this study how the reports were actually received. The victim may have attended their local police station and reported it immediately on exiting the transport network. However, they could have reported the offence some days later via telephone; or approached an officer on the street. Although this information is not known, the one constant which is apparent from this research, is that those offences would not have been reported as soon as possible to a BTP officer or a member of rail staff. It is strongly suggested here that to do so would improve the odds of detection.

Further Analysis on Reporting Mediums

Combination tables of highest volume variables with reporting mediums:

The reporting mediums ‘public non-emergency’, ‘BTP internal’ and ‘text’ were further analysed to understand the relationship with all the other category variables that provide the highest crime count; and to inspect the type of circumstances that lend themselves to these mediums of reporting. These were selected due to their variance in volume and detection rates:

- Public non-emergency is the medium with the highest usage for sexual offence reports (31.8%) and also has a low detection rate (18%). In 67.4% of these cases, it was the victim (reporting source) who used a telephone to call BTP and report the crime.
- The medium BTP internal has a relatively low usage in reporting sexual offences (7.9%), although has the highest rate of detections associated with it (58.4%). In 97.2% of these cases it was a BTP officer (reporting source) who contacted the control room to report the crime.
- The medium Text has a relatively low usage in reporting sexual offences (5.1%), and also has the lowest rate of detections associated with it (5.4%). In 61.4% of these cases it was an informant (reporting source) who reported the crime via text.

It is of interest to note that the poor detection rates are constant even where very strong reporting mediums are used. When combined with all factors the detection rate is much lower than the 31.3% seen across the 6 years of data; and much lower than their detection rate in isolation, whilst maintaining their relative levels against each other (1.4%; 12%; 0.33% respectively). This would suggest that reporting source has little influence on the detections when combined with other factors, and that it is the other variables which provide a challenge to detection with the three reporting mediums.

As described above, each reporting medium has a different reporting source that utilises that method the most. All other category variables in the combination with the highest volume of offences were the same: sexual assault-non penetration; location of offence was on a London Underground train, and within the peak rush hours in the morning and afternoon (except for a one-hour movement in the afternoon for text). This suggests a focus on these volume crime locations at these times would be of benefit, along with a greater priority and focus when crimes are reported in this way. A conventional patrol strategy may assist in the short term; although a further examination of the overarching strategy for crime reporting may be required; and how this strategy evolves could have a bearing on detections in the future.

Reporting medium and offence type:

There are seven crime type variables grouped from 24 offences. The less severe offences make up 97% of the crime in the population, with sexual assault non-penetration the highest volume at 58.3% and the lowest detection rate at 28.8%. This is also the highest crime type across all mediums except for social media which has a very low count. Serious sexual offences (sexual assault-penetration and rape) are very low in volume and have a detection rate of 30.3% and 28.8% respectively.

Of interest here is that the reporting medium used the most to report rape is 'Home Office police (exc MPS)'. This suggests that the initial crime report is received by a force other than BTP. When paired with the associated reporting source (police exc BTP) the detection rate remains relatively high at 32.8%. Further, reporting medium of text has no serious offences attributed to it and is mainly used for sexual touching offences that occur on the London Underground. These findings are consistent with other research (Jansson, 2005) that evidences rape as an offence type that is often reported by a third party, with a third reporting more than a week after the offence took place; and Feist et al. (2007) which found that 26% of rapes were reported by phone, 7% were reported at a police station and the reminder of known reports were to agencies or police whilst being spoken to about other offences.

Therefore, text as a reporting method for serious sexual offences would likely not be considered an appropriate means of reporting, and that it hasn't been used in the population data is encouraging. As Jansson's review (2005) explains, the initial contact is vital for police to respond promptly and that although scene assessment and police actions are important, it is the information obtained from the victim that is critical to the investigation.

Reporting Sources and Positive Outcomes

Positive outcomes by reporting source follow the same theme as reporting mediums in that the variables which show the highest detections include BTP and rail staff; 56% and 38.9% respectively. Again, these variables are those which provide early contact for the victim within the railway environment where the offences have occurred. Greenwood et. al., (1975) conducted a

solvability study and advocate that the information collated by the initial attending patrolman provides the best opportunity for collation of the most important factors. This is supported by other more recent studies (Brandl et. al., 1994; Coupe et. al., 1996); and as Milne and Bull (2003) proclaim, it is the reliable witness account which is fundamental to the successful investigation of a crime.

The highest volume reporting source is for victims, although when a victim is the direct source of the report only 15.1% of the offences are detected. This supports the evidence above and may be due to a level of control and capture of evidence in a timely manner when BTP or rail staff are the source, as opposed to the victim. Further, this evidence capture will often be at the scene especially in respect of rail staff; and thus provides opportunity for initial questioning as to where and when the alleged incident took place and who was involved (Ministry of Justice, 2011). When the victim is the source there has been no immediate attempt at evidence capture in this regard; with the first opportunity presenting itself when the victim contacts the control room having left the railway environment, and this may be some time later.

There are many solvability studies that refer to reporting as a significant factor in crime detection when related to methods that allow for timely reporting. Coupe (2014) provides detail on the significance of this and suggests these methods should be encouraged. Spelman and Brown (1981) go so far as to suggest that, as long as the crime is not 'in action' it is the victim response and not the police response that provides the greatest chance of arrest; and that this should be within five minutes of the offence. Blake and Coupe (2001) also confirm that police response is a solvability factor when the offence is reported immediately. Therefore, how that initial interaction takes place and what reporting medium the victim uses, will have an influence on the ability of police to investigate the offence reported.

Reporting Sources / Reporting Mediums and Positive Outcomes

As indicated, the reporting medium and reporting source are significantly related. How they are related is a question set by this thesis. Given that the evidence here for both categories is that

they are strongly related to positive outcomes with a similar medium effect size (.331 / .329), it is perhaps not surprising that there are strong relationships with a larger effect size (.650). The medium and source are linked by convenience in most cases which explains their close association. For example, where the rail staff is the reporting source, they use the staff telephone line to the BTP control room as the medium of reporting. Likewise, where BTP is the source then they either use their radio or report internally when back at police post. The exceptions to this are where the victim or witness is the reporting source and their options of medium choice may be influenced by a variety of reasons.

The largest associations for victims are with the mediums public non-emergency and text. This is replicated by 'informant other/public non-emergency' and 'informant other/text'. 14.2% of all crime reporting is from the source 'informant other' and this is defined by the original reporting source system fields as 'informant' or 'anonymous' and are split 2% and 12.2% respectively. Given the similar relationship to the source 'victim' and that this category is not defined as police or staff personnel, it is assumed for the purposes of this study that they are a member of public and likely a victim. Investigation of all crimes relating to this variable would be required to establish an exact source.

The strong relationships between reporting source and medium and their association with positive outcomes, are in line with the variables own isolated association. For example, victim/public non-emergency has a detection rate of 15.6%, whereas 'victim' has 15.1% and 'public non-emergency' has 18%. Strong detection rates are shown for the pairings in the same railway environment settings as described earlier, with the four BTP and railway pairings providing the highest detection rates (38%, 49.7%, 54.6%, 59.2%); and where there is no such control and intervention by police or rail staff, there are very low detection rates (4.9%, 6.4%, 15.6%, 19.4%). The remaining three pairings with average percentages all involve either; other police force pairings or other police/public pairings. Therefore, this supports the evidence that victims should report crimes at the earliest opportunity, preferably before leaving the railway environment and to a BTP officer or rail staff.

Key Variables and Positive Outcomes

The key variables for: offence type; offence location; geographic location; and crime occurrence time, were analysed against detections. For geographic location, B-Division had the lowest detections but the highest volume. C-Division performed the best relative to crime volume. When B-Division is further analysed it can be seen that Sub-Divisions TfL and South (B-Division) have lower detections (24.8%; 26.8%) whilst East performs better at 31.9%. Neither South nor East contains any London Underground lines and further analysis would be required against all the variables to understand if crime volume is the main cause and whether this is linked to resourcing and crime location.

As previously described, offences committed on train have the highest volume and lowest detection rate. This offending is concentrated in the rush hour with lowest detection rates for offences between 7 a.m. and 9 a.m.; and the offences are mainly low severity non-penetration offences. Focus for policy makers should therefore be in this area; strategically, operationally and from the perspective of call handling.

Controlling for Key Variables

The relationships between the independent variables, reporting medium and positive outcomes were tested with the introduction of three different control variables: location description; reporting source; and offence type. When controlled for location the results were very strong especially at large reporting places such as when on a train, station platforms, station building; and significance only disappeared for ‘retail and food’. The strength of reporting medium is therefore demonstrated by the significance when controlling for location. However, when controlling for reporting source and offence type there is limited significance. This means that when controlling for these variables the medium does not have a large impact on detections. For reporting source there is only persistence for victims and rail staff, whereas not for BTP officers. For offence type the significant association between clearance disappears for the more serious sexual offences of rape and sexual assault, however it persists in the higher volume, less serious offences. Both these variables have a medium effect in the binary logistic regression model

(BLRM). This suggests that the serious offences are dealt with exhaustively whatever the reporting medium.

Binary Logistic Regression Model

As mentioned earlier in the discussion the reporting medium and reporting source are significantly related to detections with a similar effect size; and are strongly associated with each other. Therefore, it is important to distinguish their relative effect by controlling. This is carried into the BLRM which explains which are the important and unimportant variables. Neither offence type nor severity of offence had an independent significant association with whether offences were cleared, when all other variables in the equation were accounted for. However, it does show that a quarter of the detections can be predicted with just the significant variables alone (reporting source, reporting medium, number of attempts at contacting, and two locational factors - which division it is in and whether it is on a train or not).

So the BLRM explains nearly 25% of the variation in whether a case is detected or not. This demonstrates that it is not applicable just to focus on case characteristics such as CCTV. Although this evidence is important, the way a case is reported should also be considered; and has a large part to play in the detection of offences. This breakdown confirms that where the crime reporting is kept within the railway family there are far better odds of detection (4:1). Therefore, the use of reporting mediums should be encouraged, where their significance persists.

Further BLRMs controlling for each Division would be of interest, given the strong role that the geographic location plays in the detections. This would assist to distinguish if different factors are operating in different places, and in different ways.

Victim Contact

Various tests were performed on the contact and attempt contact data. Results show that contact is not a significant factor. It is likely that police attention to ensuring that victim contact is made, regardless of the initial circumstances, plays a significant part in the findings. The Codes of

Practice for Victims of Crime (Ministry of Justice, 2015) defines when police should contact the victim, what service should be provided to whom, and for what purpose. Therefore, it is not possible to relate the number of contacts to detections; except to say that where contact is non existent or cursory the case is unlikely to have been cleared, as very few cases are positively disposed of without evidence from the victim.

The key finding here is that continuing to try and contact the victim, especially past three attempts will not increase the odds of clearance in most cases, and moreover will waste resource in doing so. As discussed, public non-emergency and text are identified as weak mediums of reporting so it is of interest that for these, the result is reversed. This may be because a greater requirement is put on those cases due to higher rates of non-co-operation in the first instance. However, it is also of note that where contact attempts result in an actual contact, this does not guarantee co-operation. This maybe because the victim acknowledges contact and then confirms they do not wish to proceed.

Strengths and Limitations of this Research

The data in this study covers 6 years and has enough population to provide a powerful analysis. However, for the category of reporting source there is a one-dimensional data field, captured on receipt of the report. For some of the less self-explanatory variables in this category a further understanding of how this source came by the crime would be beneficial and allow for an assessment of the data accuracy and whether there are further factors to consider. For example, the strong relationship between the source ‘victim’ and the reporting medium ‘text’ is clear, without further review required – the victim of an offence has sent a text to BTP and reported the offence. Alternatively, the relationship between the source ‘BTP’ and the reporting medium ‘BTP officer radio’ could benefit from further inspection. This is due to the fact, that although BTP is the source of the report it is not known how it was obtained before the radio was used to convey it. Some circumstances may have the effect of strengthening this result against positive outcomes or in fact weakening it. For example, the officer may have arrested the suspect or simply be informed of the offence by a witness, both of which may influence the likelihood of detecting the offence. This reduces the internal validity of this study.

An area of interest for this study was text messaging, due to its relative recent introduction as a reporting medium. On analysis, the size of the data for texts was found to be relatively low (5.1% of the volume) when compared with the more conventional methods. The results do indicate that text reporting is related to low detections, although further analysis is required with a larger data set of cases that can be compared with the surrounding variables.

Conclusions

Any means that provide victims of crime an outlet to report sexual offences, especially if they would not have done so otherwise, is of course a positive step. If police and other agencies don't understand the true picture of offending they cannot respond appropriately; whether that is at a strategic or operational level. Others (Carcach, 1997; Rennison, 2007) explain that if the police don't receive the report in the first instance, there will be no chance of apprehending the offender and reducing the risk of further victimisations; and communities who don't report will be deprived crime prevention tactics and expenditure.

Text messaging and other new technological mediums are providing ways for crime reporting, where for some there may not be space to do so otherwise. This could be because of time pressures or reluctance to report. This study does not suggest these methods should cease; the police service, like any other organisation that provides a critical public service should evolve and provide technological solutions as accessibility and usage increases. As stated by the Home Secretary (May, 2016), "technology has the power to transform policing immeasurably".

However, it is important to understand the impact that certain mediums of reporting can have on the quality of service that can be provided. Although text messages have been shown to be the least productive reporting medium in terms of detections, it is also important to note that the volume of sexual crimes reported in this way is also very low at only 5%. This would suggest that if this method of reporting was to increase and be used for the levels of crime reporting seen by other mediums, there would likely be a further decline in positive outcomes. Further research is required into the effects of texting as a medium of reporting and as this method increases there will be opportunity to do so. Research should be widened to include other public services, law enforcement, and government agencies; and policy makers should have reference to research in this regard when deciding on any expansion of a text messaging service for this purpose.

This is not to say that all other reporting mediums are linked to high detection rates. As discussed, public non-emergency is the medium with the highest usage for sexual offence reports (31.8%) and also has a low detection rate of 18%. In 67.4% of these reported cases it is

the victim using a telephone to call BTP and report the crime. This presents further questions for analysis - are there issues with the reporting mechanism and the way the call is processed? Are there issues with the way the victim is handled at first contact? Or is it simply that these volume crime cases, by their very nature lack the necessary solvability factors? This research goes some way to answer the latter, in as much as the characteristics of the crimes studied allow. When public-non emergency is the reporting medium the highest volume of crimes are for those offences that are committed on the train and in the peak passenger times. These offences rarely have a witness or CCTV, both highlighted as essential solvability factors in volume crime (Donnellan, 2011; Paine, 2012; Robb, 2012).

To understand the effect that call handling may have on the detections of offences reported by this medium would require extensive research into each call made. An inspection of the literature in this regard may provide answers as to possible improvements for call handling procedures. BTP, like many other forces, approach the call handling as a process by which to obtain information to make subsequent police decisions; and focus less on the forensic capture required through the interview of the subject (Leeney et al., 2011; Waddington, 1993). Adoption of a process which allows for greater active listening to enhance the call quality (Milne et al., 1999) may subsequently improve detections. The THRIVE model (HMIC, 2015) has been adopted by many forces and focuses on: threat, harm and risk analysis; the investigative opportunities that present themselves in a call; and the vulnerabilities of the victim. This may be a preferable model to address the needs of the large majority of sexual offences which are reported to the BTP control centres by the victim.

This study has shown that where investment is to be made in promoting and encouraging reporting, consideration to marketing strategies, and advertising material needs close inspection also. Educating the travelling public on the need to report sexual offences, regardless of the nature of it has already had attention through video campaigns such as ‘Report it to Stop it’, which as well as highlighting the importance of reporting unwanted sexual behaviour; also depicts reporting by text message as the solution (TfL, 2015). This has been a successful campaign with over 10 million views on YouTube alone and provides an emotional connection

with the victim, something which Skogan (1994) found as a reason that victims of sexual offending report the crime.

Although there is every attempt by the police to make contact with the source of the report, any initial contact opportunities to preserve evidence may have been lost. In contrast, the mediums that appear to perform the best in respect of detections are those which can be considered face to face reports, where the initial account can be absorbed and relevant actions immediately applied. These mediums include where BTP officers have dealt with the victim directly due to a request for service or a pro-active arrest; BTP Internal (58%) and BTP officer radio (54%). Similarly, the next two best performers are those mediums where the victim speaks with a rail staff member, again providing information that enhances the opportunity to capture solvability factors; rail staff emergency (48%) and rail staff non-emergency. It is safe to assume that these reports are made to the staff, given that the nature of offences would not have been known without direct reporting from the victim.

It is fair to comment that factors perhaps not available when these studies commenced are available today, and forensic science now has a big part to play in detecting offences (Bradbury and Feist, 2005). However, it is also recognised that malleability of memory has an effect on the evidence that a victim or witness can provide (Wells, 1995; Wells et. al., 2006). Although forensic interviewing has improved and techniques developed to enhance the quality of memory retrieval (Clarke and Milne, 2001) it is shown that where a victim or witness are present, timely and effective questioning at the scene provides a far greater opportunity to obtain reliable and accurate evidence (Milne & Powell, 2010).

Ultimately, the broad conclusion of this study is that to provide the best service possible to victims of sexual offending, there needs to be cognisance not just to crime prevention and crime investigation, but also the crime reporting. However, the author recognises that the subject of sexual offending on the transport network is a multifaceted and complex issue; and although there are general recommendations within this thesis, this is not to simplify or overestimate the

usefulness of the work (Lum, 2012). Rather, this thesis is provided to inform those who are in pursuit of a constant improvement in this arena. As Weiss (1988) remarked;

> Decision makers indicate a strong belief that they are influenced by ideas and arguments that have their origins in research and evaluation. Case studies of evaluations and decisions tend to show that the generalisations and ideas that come from research and evaluation help to shape the development of policy. The phenomenon has come to be known as "enlightenment".

Appendices

Appendix 1: Table 15 displays each offence and their grouped variable. Rape (variable group 4) is not shown in Scotland as this offence did not occur within the data capture.

Table 15: Offence type and Variable Group

Offences in England and Wales	Group Variable No.
Sexual assault on a female aged 13 and over - no penetration	1
Sexual assault on a male aged 13 and over - no penetration	1
Sexual assault on a male child under 13 - no penetration	1
Sexual assault on a female child under 13 - no penetration	1
Committing an act of outraging public decency	2
Exposure	3
Rape of a female aged 16 and over	4
Rape of a female child under 16	4
Rape of a male aged 16 And over	4
Voyeurism	5
Assault on a female aged over 13 by penetration	6
Sexual assault on a male aged 13 and over by penetration	6
Sexual grooming – female	7
Causing or inciting a child under 13 to engage in sexual activity	7
Exploitation of prostitution (cause or incite activities of a prostitute for gain)	7
Causing a female person to engage in sexual activity - no penetration	7
Commit an offence with intent to commit a sexual offence	7
Sexual activity with a person with a mental disorder	7
Abuse of children through prostitution & pornography	7
Trafficking into the UK for sexual exploitation	7
Administering a substance with intent to commit a sexual offence	7
Persistently soliciting a person for prostitution from a motor vehicle	7
Causing a female person to engage in sexual activity- no penetration	7
Causing or inciting a child under 16 to engage in sexual activity	7
Offences in Scotland	
Sex assault on a female 16 and over	1
Public indecency	2
Sexual exposure	3
Coerce into being present during sexual activity	7
Communicating indecently	7
Indecent assault	1
Sex assault on male aged 16 and over	1
Sex assault on female aged 13-15	1
Voyeurism - operate equipment	5
Coerce into being present during 3rd party sex act	7
Voyeurism - record another	5
Voyeurism - equipment under clothing	5
Sex assault by penetration on female aged 16 and over	6
Coerce into looking at sexual image	7
Sexual assault on young child - male under 13	1
Communicate indecently to older child aged 13-15	7

Voyeurism - record image under clothing	5
Voyeurism - observe another	5
Intercourse with older child female aged 13-15 (consensual)	7
Cause to see or hear indecent communication	7
Penetrate another older child - male both 13-15 (consensual)	7

Appendix 2: The 64 crime locations are listed in table 16 below, in descending order of crime count. Also shown is the group number for each location.

Table 16: Location of Crime and Variable Group

Crime Location Description	Number of crimes	Group Variable No.
On train	3967	1
Station platforms	576	2
Stairs escalators	303	3
Station concourse	159	4
Station exit / entrance	112	4
Male toilets	94	5
Other	71	8
Car parks	49	6
Booking office	43	4
Station forecourt	40	4
On tram	39	1
Subway/ corridor	35	4
Ticket barrier way in	28	4
Lift	27	4
Ticket barrier way out	26	4
Female toilets	24	5
Road rail footbridge	24	8
Tramway / metro stops	23	2
Waiting and ladies room	20	4
Roads in station approach	18	6
Kiosks shops	18	7
Burger bar/fast food	16	7
Line side location	14	8
Platform unknown	12	2
Waiting shelter	12	2
Coffee shop	10	7
Public house	9	7
Underpass	7	8
Admin offices	5	8
Night clubs	5	8
Platform 6	3	2
Taxi rank	3	6
Off licence	3	7
Quickfare ticket machine	3	8
Street or customer premises	3	8
Tunnel	3	8
Undertaking hotels	3	8
BRSA/BAR/REST/Sports	2	7
Market stall	2	7
Shopping precinct	2	7
Stores	2	7

U/T refreshment rooms	2	7
Bus	2	8
Bus stop	2	8
Telephone kiosks	2	8
Tramway / line	2	8
Platform 1	1	2
Platform 10	1	2
Platform 3	1	2
Platform 7	1	2
Platform 8	1	2
Arrival lounge	1	4
Cycle sheds	1	6
Station newsagent	1	7
Freight depot	1	8
Left luggage office	1	8
Level crossing manned	1	8
Level crossing unmanned	1	8
Mess rooms	1	8
Photo booth	1	8
Roof	1	8
Screening barriers - Eurostar	1	8
Siding / marshalling yard	1	8
Tenants premises	1	8

Appendix 3: Table 17 lists all reporting sources in order of recorded crime volume.

Table 17: Reporting Source and Variable Group

Reporting Source	No. Crimes	Group Variable No.	Group Description
Victim	1522	1	Victim
BTP	1205	2	BTP
Police	1096	4	Police (exc BTP)
Rail staff	1017	3	Rail staff
Informant	713	5	Informant other
Anonymous	122	5	Informant other
Network rail controller	61	3	Rail staff
LU line controller	38	3	Rail staff
Witness	36	6	Witness
Railway switchboard	24	3	Rail staff
Railway tenant	5	7	Other
Ambulance	2	7	Other
Fire	2	7	Other

Appendix 4: Table 18 lists and describes each medium in order of the largest crime volume attributed to each method within the population.

Table 18: All Reporting Medium Descriptions and Crime Count

Reporting Medium	Medium Description	No. Crimes
Public non-emergency	Any call normally received by the Force Control Centre (FCC) by a member of the public.	1863
Rail non-emergency	Any call from railway staff via the non-emergency line. These include FCC lines and some within the Force Control Rooms (FCR's) in London (FCRL) and Birmingham (FCRB).	876
BTP radio	Any incident raised from a BTP officer over their radio.	720
CAD	Any incident raised from CAD (Metropolitan Police system) which is monitored by controllers in FCRL.	649
HO police	Any incident raised having been passed to BTP from a Home Office (HO) police force.	560
BTP	Any incident raised internally by BTP that has not been received via a radio channel.	449
Text	Any text received on the BTP dedicated text service.	298
Rail emergency	Any call that has been received on one of the railway emergency lines.	163
Rail controller	Any call from a railway controller, normally NWR, however this can also include the control rooms for the Train Operating Companies (TOCS).	87
Other police forces	Any call from a force that is not a HO force (i.e. Ministry of Defence Police, Civil Nuclear Constabulary).	65
E-mail	Any e-mail received from the public or railway staff.	52
BTP (BTP generated)	Previous version of BTP.	18
Social Media	Twitter.	14
Railway staff non-emergency	Previously used version of 'Rail non-emergency'.	11
Radio emergency	When an officer presses their emergency button.	5
E-mail & text	Previously used before separated into two mediums.	5
Ambulance	Any calls direct from the Ambulance Service.	3
Railway staff emergency	Previously used version of 'Rail emergency'.	2
Railway controller	Previously used version of 'Rail controller'	1
Fire	Any calls direct from the Fire Service.	1
Public emergency	Previously used for public emergency calls.	1

Appendix 5: 21 mediums are grouped into 12 categories which best represents their type, and are displayed in table 19.

Table 19: Medium of Reporting and Variable Group

System Reporting Medium	Analysis Reporting Medium (Group Variable)	Group Variable No.
Public non-emergency	Public non-emergency	1
Railway controller	Rail staff non-emergency	2
Railway staff non-emergency	Rail staff non-emergency	2
Rail controller	Rail staff non-emergency	2
Rail non-emergency	Rail staff non-emergency	2
BTP radio	BTP officer - radio	3
CAD	Metropolitan Police (MPS)	4
HO police	Home Office police (exc MPS)	5
BTP (BT Police Generated)	BTP internal	6
BTP	BTP internal	6
Text	Text	7
Railway staff emergency	Rail staff emergency	8
Rail emergency	Rail staff emergency	8
Other police forces	Non Home Office police	9
E-mail	E-mail	10
Social media	Social media	11
Fire	Other	12
Public emergency	Other	12
Ambulance	Other	12
Radio emergency	Other	12
E-mail & text	Other	12

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