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Routine Activities and Proactive Police Activity: A Macro-scale Analysis of Police Searches in London and New York City

Matthew P. J. Ashby *and Lisa Tompson*

This paper explored how city-level changes in routine activities were associated with changes in frequencies of police searches using six years of police records from the London Metropolitan Police Service and the New York City Police Department. Routine activities were operationalised through selecting events that potentially impacted on (a) the street population, (b) the frequency of crime or (c) the level of police activity. OLS regression results indicated that routine activity variables (e.g. day of the week, periods of high demand for police service) can explain a large proportion of the variance in search frequency throughout the year. A complex set of results emerged, revealing cross-national dissimilarities and the differential impact of certain activities (e.g. public holidays). Importantly, temporal frequencies in searches are not reducible to associations between searches and recorded street crime, nor changes in on-street population. Based on the routine activity approach, a theoretical police-action model is proposed.

Keywords stop and search; stop and frisk; routine activities; proactive policing

1. Introduction

Police work can be divided into two types, "reactive" and "proactive" (Black & Reiss, 1970, 66). Reactive policing activities are those that are initiated by

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Routledge
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members of the public, such as calls for service, reports of crimes in progress or having occurred, and other requests for action. Proactive activities are those that are initiated by the police themselves: the stopping of people who appear to be behaving suspiciously, patrols of crime hotspots and 'sting' operations against (for example) suspected drug dealers or street prostitutes. Although the categories overlap, reactive policing accounts for the majority of officers' time (Bayley, 1990; Black, 1971).

One important difference between reactive and proactive policing is that officers generally have little discretion over whether or not to undertake reactive activities, but can have considerable discretion in choosing whether or not undertake proactive work (Smith & Visher, 1981, 168). That is not to say that there is no discretion involved in reactive policing: in dealing with a citizen-initiated event, police must still decide *what* action to take. Officers have been shown to frequently resolve similar incidents in different ways according to circumstance (Lundman, 1974). Nevertheless, proactive activity is qualitatively different in that it is up to the officer whether or not the activity takes place at all.

Discretion is "the power to decide which rules apply to a given situation and whether or not to apply them" (Ericson, 1982, 11), exercised in "the twilight zone between law and morals" (Pound, 1960, 926). The provision of discretion to officers is an essential consequence of the almost limitless variety of situations with which the police may be called to deal (Bittner, 1974). However, the decisions resulting from police discretion seldom attract the same official review that would be attendant in more-formal action, such as summonsing a suspect to court (Goldstein, 1960, 552), which many scholars have argued means they are more likely to result in decision-making based on prejudice (Cole, 1999). As a result, the exercise of discretion by police officers has generated a large body of research.

Robinson and Chandek (2000) categorised potential influences on discretion as being either demographic, attitudinal or situational. Of these, demographic factors are by far the most studied, with disparities having been shown in how often—and how—police interact with people according to their sex (Visher, 1983), age (Chainey & Macdonald, 2012), ethnicity (Smith, Visher, & Davidson, 1984), style of dress (Lundman, 1979), socio-economic status (Hancock, 1978) and mental health (Teplin, 2000). Attitudinal factors shown to weigh on police discretion include whether or not the crime victim has a preferred course of police action (Black, 1971), whether the officer perceives the victim as uncooperative (Fenstermaker Berk & Loseke, 1981) and whether the suspect is antagonistic towards the officer (Smith & Visher, 1981).

In contrast situational factors that influence police discretion have received relatively scant attention in the research literature, ostensibly because they comprise a myriad of possible conditions that are difficult to operationalise into meaningful units of measurement. At a very broad level of abstraction, changes in the street population can be considered a situational influence on both proactive and reactive police activity.

Examining changes in the everyday movements of people lends itself to the routine activity approach (Cohen & Felson, 1979). This is a general theoretical perspective which advocates that human mobility patterns are the foundation for spatio-temporal patterns in crime. The simplicity of this approach belies the theory's considerable explanatory power for the concentrations of crime that are observed at multiple units of analysis, be they people, places or times.

Variations in everyday activities have been shown to explain patterns in the frequency of crime at both the micro (individual) and macro (community) level (Felson, 2008, 70). At the micro level, the routine activities of an individual—going to work, making a trip to the shops, visiting a cinema—influence that person's likelihood of being a victim of many types of crime. At the macro level, the aggregation of many individuals' routine activities can explain variations in aggregate crime rates. For example, when many individuals park their cars outside a supermarket while travelling home from work, that may lead to an increase in the frequency of thefts from motor vehicles in that area at that time.

The relationship between routine activities and crime depends upon the interactions between the activities of different actors in the crime event. Cohen and Felson (1979) identified three types of actors: motivated offenders, suitable targets and capable guardians. What they referred to as "direct contact" crimes (Cohen & Felson, 1979, 589) require the convergence in space and time of at least one motivated offender and at least one suitable target (be it a person who is assaulted or an object that is stolen), in the absence of a capable guardian. Such a convergence is referred to as a crime opportunity. Subsequently, the list of potential actors in the crime event has been expanded. Felson (1986) introduced the offender handler, a person—often a close relative or role model — who can exert influence over an offender's behaviour. Eck (1994) added the place manager, who has responsibility for a place at which crimes can occur, and has the power to regulate the use of that place to prevent crimes occurring if they wish to do so (Eck, 1995). These two categories of actor became known—along with guardians, who protect targets—as "controllers" (Eck & Weisburd, 1995, 5). More recently, Sampson, Eck, & Dunham (2010) identified a group of "super controllers" who regulate controllers' ability and motivation to prevent crime.

The definition of guardianship has narrowed during its development (for a review, see Hollis, Felson, & Welsh, 2013), with Felson and Boba (2010, 20) arguing that police officers should usually not be thought of as guardians because they are so rarely present when a crime occurs. However, the criminal-justice process is not simply an attempt to prevent future crime by guarding potential targets, it also involves elements of retribution, general deterrence and potential rehabilitation. In order to consider the impact of routine activities on police work, it is necessary to introduce a police officer as a separate actor in the crime event.

Whether or not a police officer will be able to discharge their investigatory duty in a case will depend on circumstances that can be thought of in similar terms to the offender–target–guardian triad of the routine activities approach. In simple terms, for a motivated *officer* to exercise their search powers requires them to converge in time and space with a suitable 'searchable' person in circumstances that allow the officer to identify the offender and take action. If these elements do not co-occur, no action will follow. For example, Robinson and Chandek (2000) found that officers responding to domestic-violence calls were less likely to make an arrest in the last hour of their working day, while Schafer and Mastrofski (2005) reported that officers were less likely to initiate a traffic stop if busy traffic made it potentially unsafe to do so and Phillips and Sobol (2012) found officers more likely to ignore minor offences in high-crime areas where there were multiple demands on their time.

Research on temporal variations in police activity suggests that such activities are partly driven by patterns of routine activities at the macro level. LeBeau and Corcoran (1990) found that the number of times police responded to calls for service varied systematically by day of the week, while Cohn (1996) found similar variations within each day. Cohn (1993) found that there were significantly fewer calls to incidents of domestic violence on days on which high schools were closed. Public holidays in a large American city were also found by Cohn and Rotton (2003) to be associated with more calls to violent crimes but fewer to offences against property. Since all of these studies relate to calls from citizens for police service, the results may simply be measuring the influence of aggregate routine activities on patterns of crime.

Despite there being numerous studies on the demand for reactive police action which employ aggregate calls for service data, research into the influence of situational factors on proactive police work appears to be rare. One exception (Tillyer, Klahm, & Engel, 2012) found that officers were more likely to choose to search drivers stopped on main roads than on back streets. There have been no previous studies—of which the authors are aware—on the influence of routine activities on stop and search. This is both puzzling and troubling, for police stops are often used as an indicator for proactive police activity; particularly in a performance-management regimes. This study thus addresses a gap in that evidence base.

Police officers in almost all countries are authorised to stop, question and—in certain circumstances—search members of the public (Weber & Bowling, 2011, 353). Large, urban police forces carry out many such stops and describe them as a key tool in the fight against crime (HMIC, 2013, 11), but they inevitably raise human-rights questions (Bowling & Weber, 2011, 480–481). Powers to stop and search citizens have been controversial for some time and so have been the subject of considerable scholarly research. However, this work has tended to have a specific focus, in particular examining disparities in how stop-and-search powers are applied to different groups in society (as described above).

We posit that the numbers of people present on the street, and what activities they are engaged in (lawful or otherwise) give rise to specific opportunities for police discretion. The present study explores this assertion through focusing on the relationship between macro-level changes in the street population and police searches. The motivation for doing so was purely pragmatic: we wished to explore the extent to which proactive police activity could be explained by macro-level human activity. In doing so, our intention was to produce findings that could be used to inform broad-level operational police policy. We recognise that studying police activity at an aggregate level overlooks the complex micro-level dynamics that are present in each individual police search, however as the first study on the topic, it still represents a contribution to knowledge generation that can be refined with further scholarly inquiry.

Temporal variation of social phenomena can be conceptualised at multiple scales (Taylor, 2015). Mirroring internal police-activity monitoring systems (Metropolitan Police Service, 2015), the present study focused on how citizen routine activities are associated with changes in stop and search throughout the year. The study used six years of stop-and-search records from the London London Metropolitan Police Service (MPS) and the New York City Police Department (NYPD) to identify patterns in two of the largest global cities for which reliable records are kept. These data are publicly released[1] and, as such, sensitive information regarding the officer, stopped person, circumstances and precise time were not made available. The use of data from both the United Kingdom (UK) and United States (US) allowed the identification of transnational commonalities and differences.

Police search powers in London and New York City (NYC) are broadly similar but with some differences stemming from their respective legal frameworks. In England and Wales, officers may search citizens if the officer has "reasonable grounds for suspecting" that the person is in possession of one or more of a list of prohibited items (Jason-Lloyd, 2005, 30–33). Such items include stolen goods, drugs, firearms, some fireworks and anything made, adapted or intended for use as an offensive weapon or for use in any theft, fraud or criminal damage (English and Card, 2007, 38).

In the US, police search powers stem largely from the decision of the US Supreme Court in the case of *Terry v. Ohio* (392 US 1 (1968), see Katz, 2004). This case distinguished between a 'search' of a person and a 'frisk', with the latter said to involve the officer touching only the outside of the suspect's clothing for the sole purpose of finding weapons that might be used to assault the officer or escape from custody (Saltzburg, 1998, 925). Police officers may carry out a frisk if they have stopped a person on "reasonable suspicion" (Saltzburg & Capra, 1996, 189) that their behaviour, appearance or

1. London data were released to the authors following a freedom-of-information request to the MPS.

circumstances suggest that "criminal activity may be afoot", and that the officer suspects there to be a "substantial possibility that the person is armed" (LaFave, Israel, & King, 2000, 220–224). In order to 'search' the person the officer must have "probable cause ... information indicating 'a substantial chance' or 'fair probability' of criminal activity" (Davies, 2002, 720). The probable cause standard requires more evidence that that for reasonable suspicion, but less than for a criminal conviction (LaFave et al., 2000, 149).[2]

In both the UK and US, stop-and-search laws were enacted to allow police officers to deal reactively with individual incidents that required an immediate response. In the UK, powers are provided to allow "officers to allay or confirm suspicions about individuals without exercising their power of arrest" (Home Office, 2013, 4). In the US, officers may search citizens "to insure that the suspect does not possess a dangerous weapon which would put the safety of of officer in peril" (Saltzburg, 1998, 916). Despite these intentions, large urban police departments have often used stop and search "systematically, deliberately and in large numbers" as a proactive tool for crime control (Meares, 2014a, 5). Both the MPS and NYPD have made extensive use of searches in this way. This has brought stop and search more firmly into the realm of being a proactive police activity. In turn, this may mean that stops and searches are more likely to be influenced by routine activities, since the officer must choose whether or not to implement this proactive tactic in any particular circumstance.

1.1. Hypotheses

Within the overall research question of how routine activities influence police use of stop and search, several hypotheses were devised. The first related to the relationship between searches and crime. The choice of crime types to use was determined by the need to identify those types:

(1) that were likely to be associated with the frequency of stop and search (for example because they are offences that the police may attempt to prevent using searches) and with the on-street population, but
(2) for which the number of recorded crimes was not likely to depend largely upon officers finding contraband during searches.

These requirements were chosen to prevent problems of dependence in regression models and to allow the crime count to be used as a proxy for on-street offender population. As such, drugs- and weapons-possession offences could

2. The distinction between a frisk and a search in US law means that the NYC data includes records of some people who have been frisked but not searched, and some who have been searched and not frisked. In the text below, for consistency with the UK data, searches and frisks are considered together and are referred to as searches.

not be used, and it was inappropriate to count thefts of items commonly stolen while unattended. This left two categories of crime: (a) violent crime resulting in injury or death, and (b) personal robbery and theft from the person, with models analysed for each category separately.

> The frequency of police stops will vary systematically with the frequency of number of recorded robberies, thefts from the person and violent crime causing injury or death (H1).

This first hypothesis is a necessary precursor to those that follow, since an association between the frequency of stops and crime could explain an association between stops and routine activities. There are at least three potential explanations for a relationship between street crime and police searches. The first might be called the deterrence explanation, in which the more stops there are, the more potential offenders are detected or dissuaded so fewer street crimes subsequently occur. Previous research has largely failed to find evidence of such a relationship (Meares, 2014b, 339–344), although some isolated examples of an effect have been found (Miller, Bland, & Quinton, 2000, 32–36). The second potential cause of a relationship might be called the intelligence-led policing explanation, in which officers may carry out more searches in response to short-term increases in crime in a particular area (Ratcliffe, 2008). Deployments of officers in response to crime patterns is explicit both in the National Intelligence Model (NIM) operated by the MPS (Flood & Gaspar, 2009) and the CompStat process used by the NYPD (Police Executive Research Forum, 2013).

The third potential explanation is that the frequency of street crime can be thought of as intimately related to the number of opportunities for offending on a particular day (referred to below as the street-population explanation). The types of street crime studied here can only take place if an opportunity exists, so the presence of fewer people on the street (for example on a public holiday) could be expected to lead to fewer offences occurring. As such, the frequency of street crime can be seen as a proxy measure for the on-street population. Although undoubtedly imperfect, using street crime as a population measure avoids the well-known problems with other denominators of crime (Andresen, 2011). Using residential or workplace population as a measure of on-street population would not provide information on the day-to-day variation in population required for this study. The same is true for the "ambient population" measure used by Andresen (2011). Given the limitations of alternative data, the frequency of street crime would appear to be suitable compromise measure for day-by-day variation in the on-street population.

Several hypotheses were developed to test relationships between routine activities and the frequency of police stops. Public holidays are likely to be associated with significant changes in the street population: there will be fewer people travelling to, from and for work, and this may lead to fewer journeys for other purposes, for example if shops or public transport are

closed. Many public holidays (such as Christmas Day) are also strongly associated with visiting family and spending time indoors. Public holidays may therefore be associated with fewer people being available to be searched on the street and so it was predicted that:

> Police will conduct fewer searches on public holidays (H2).

There are two potential explanations for an association between days on which schools are open and the frequency of stops. School days may act to "incapacitate" juvenile offenders by placing them under the supervision of teachers, but conversely may act to "concentrate" motivated offenders and vulnerable victims (Jacob & Lefgren, 2003). The criminogenic effect of concentration may be particularly pronounced on the journey to and from school, when older children especially are often unsupervised.

Jacob and Lefgren (2003) and Luallen (2006) found that in multiple US cities, school days were associated with increases in the number of violent crimes committed by juveniles but decreases in the frequency of their committing property crimes. In Chile, Berthelon and Kruger (2011) found that increasing the length of the school day led to fewer property and violent offences by school children.

Given that these results are offence-specific, and that police may initiate stops for either type of crime, it was not possible to predict the direction of any relationship between school days and crime. Therefore, the two-tailed hypothesis used was:

> The number of searches conducted by police will be associated with the days schools are open (H3).

Many public events are associated with an increase in the street population. The Notting Hill Carnival in London, for example, attracts over one million visitors each year. Having more people on the street increases the number of potential people that the police could stop. Large crowds may also attract offenders — particularly thieves (Poyner & Webb, 1997)—and so lead the police to conduct more searches. Therefore:

> Police will conduct more searches on the dates of major public events (H4).

Some events increase the demand for police services without necessarily leading to a substantial change in the street population. Many of these events relate to the police providing security to dignitaries or responding to disasters. As discussed above, the systematic use of searches for crime control makes it proactive, so it is likely that officers will conduct fewer searches when their attentions are directed elsewhere. Formally:

> Police will conduct fewer searches during events that cause a high demand for police service (H5).

2. Data

2.1. Stop Data

The present study used administrative records of police stops in London and NYC. These cities were chosen because their police make frequent use of powers to stop and search citizens, and because both have well-established systems for recording details of those encounters. For both cities, daily counts were available of the number of searches carried out by police.

In London, The MPS is a heavy user of stop-and-search powers, with its officers conducting 36% of all searches in England and Wales in 2012–13 (Home Office, 2014), despite only covering 14% of the population. Between 2008 and 2013, MPS officers recorded 2.61 million stop-and-search encounters under powers requiring reasonable suspicion for which the outcome of the stop was recorded (a mean count of 1,190 stops per day). Since the focus of the present study was on temporal variation, stops were considered for the whole of each city, rather than being disaggregated into small spatial units. This ensured there was a sufficient number of stops in each case to provide reasonable statistical power, particularly in relation to events that only occurred on one day per year.

Between 2006 and 2011, NYPD officers recorded 1.82 million stops in which the person was frisked or searched (a mean count of 830 per day).[3] The NYC data used in this study is for a slightly earlier period than the data for London because a substantial decrease in stops in NYC began in 2012 in response to litigation and local political pressure (New York Civil Liberties Union, 2013; Silverman, 2015). This was so sharp—a 90% decrease between early 2012 and late 2013 (Bostock and Fessenden, 2014)—that it would have been likely to obscure any annual patterns of stops, and so data were used for the period before the decrease occurred. The sample size was therefore 2,190 days for London and 2,191 days for NYC.

3. In both London and NYC, stops will have been conducted by police agencies other than the MPS/NYPD, such as specialist agencies policing public transport and national agencies carrying out operations within those cities. Although data are not available on the number of stops conducted by other agencies, the MPS and NYPD are by far the largest agencies in their respective cities. Another 643,000 searches were carried in London out under legislation that does not require the officer to have reasonable suspicion. In NYC, 1.57 million stops were recorded in which the person was neither frisked nor searched. In both cases, these events were excluded because this study focused on searches based on reasonable suspicion. There is the potential for some police searches to go unrecorded, and so not be reflected in the present data (Bland, Miller, & Quinton, 2000). In London, the MPS estimates that around five percent of searches may not be recorded (London Assembly, 2014, 15), but no comparable estimate exists for the NYPD. Although some searches will have been performed but not recorded, the present data are still the best-available macro-level dataset on police searches in both cities.

2.2. Operationalising Measures of Routine Activity

The selection of events that might influence the routine activities of citizens in a city was an inherently subjective process, since neither city keeps a list of past major events. Events were chosen based on their potential to cause a change in (a) the street population, (b) the frequency of crime or (c) the level of police activity. Table 1 shows the number of days during the study period on which each event occurred, with the dates of events (except for public holidays) shown at Appendix A.

All public holidays were included (with two exceptions) along with the day before and after Christmas Day.[4] Major disasters were included if declared by the Federal Emergency Management Agency for any county in the New York–Newark Combined Statistical Area.[5] This area was chosen because natural disasters in surrounding counties could lead to a change in the street population of NYC, for example if public transport was disrupted. The natural disasters recorded in this period included hurricanes, flooding, snowstorms and tornadoes.

Terrorist attacks were included because it is common for police commanders to deploy additional officers on patrol after an attack to provide public reassurance and potentially prevent further incidents. Attacks were included if they were recorded in the Global Terrorism Database (National Consortium for the Study of Terrorism and Responses to Terrorism, 2013) as occurring in either city. The resulting variable was then set to 'true' for the 14 days beginning with the date of the attack, to model the additional officers likely to be deployed during this period.

The day of the week was included as a predictor (with Sunday as the reference category) because routine activities vary systematically throughout the week. Two dummy variables were included to track change over time. The first was constructed by giving the first day of the period under study a value of 1, the second a value of 2 and so on. To aid interpretation, this index variable was then divided by 28, so that the resulting regression co-efficient could be interpreted as the expected change in the number of stops over a 28-day period. The second dummy variable was the day of the year, beginning with a value of 1 on New Year's Day and incrementing the value by one each day.

Table 1 shows that some events applied to very few days during the study period: at the extreme, the Superbowl was in NYC on only one day during the

4. The Late-summer Holiday in London was not included because it falls on the same day as the Notting Hill Carnival, another predictor in the model. Abraham Lincoln's Birthday is a New York State holiday, but was not included because is it is observed inconsistently, with different organisations closing on different days (and many not observing it at all).

5. Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Ulster and Westchester counties in New York; Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex and Union counties in New Jersey; Fairfield, Lichfield and New Haven counties in Connecticut; and Carbon, Lehigh, Monroe, Northampton, Pike and Warren counties in Pennsylvania.

Table 1. Events included in the regression models

Variable	Days	
	London	NYC
A: Basic variables		
28-day index	2,190	2,191
Day of the year	2,190	2,191
Days of the week (reference day: Sunday)	2,190	2,191
B: Public holidays and related days		
New Year's Eve/Day[1]	12	12
Martin Luther King Jr Day		6
Washington's Birthday		6
Good Friday	6	
Easter Monday	6	
Early May Holiday		
Memorial Day/Spring Holiday	6	6
Independence Day[1]		6
Labor Day		6
Veterans' Day[1]		6
Thanksgiving Day		6
Columbus Day		6
Christmas Eve	6	6
Christmas Day[1]	6	6
26th December (Boxing Day holiday in London*)	6	6
C: Public events		
school day	1,169	1,100
Superbowl[2]		1
Marathon	6	6
Gay Pride parade	6	6
Notting Hill Carnival	12	
World Series[2]		6
Halloween	6	6
Bonfire Night (5 November)	6	
election day	4	7
Olympic and Paralympic Games	29	
stadium events with $> 75,000$ people[3]	70	
D: Events causing high demand for police service		
federally declared 'major disasters'		181
terrorist attacks (14 days from date of attack)	89	42
incidents of major disorder	12	60
UN General Assembly general debate		46
DSEI arms fair (held every other year)	13	
State Opening of Parliament	5	

[1]Holiday will be moved to a weekday if it falls on a weekend. [2]Only included when a New York team is playing. [3]There are no stadia in NYC with a seating capacity over 75,000.

study period. As such, the statistical power of the analysis in relation to those variables may be low. These variables were nevertheless included in the analysis to prevent the possibility of the days on which they occurred being outliers, particularly with respect to day of the week. For example, the first day of the Notting Hill Carnival always falls on a Sunday: if the Carnival was associated with large increases in stop and search but the event was not included in the model, it could distort the co-efficient for Sundays.

3. Methods and Results

Analysis was completed in the R statistical language (R Core Team, 2013) using the packages `nlme` (Pinheiro et al., 2015) and `lawstat` (Gastwirth et al., 2015). The number of stops recorded on each day in each city was approximately normally distributed, so initially an ordinary least-squares (OLS) model was used. This produced residuals that were normally distributed with no substantial outliers, but for which the residuals appeared to be serially correlated. To correct for this, the following results were derived from first-order autoregressive generalised least-squares (GLS)—i.e. AR(1)—models, calculated using maximum likelihood.[6] Higher-order models were calculated, but produced results virtually identical to those reported below.

3.1. Hypothesis 1: Street Crime

Models were constructed to test for the relationships posited above. Each model regressed the daily count of stops against the 28-day index variable and day of the year (to account for temporal dependency in the model), as well as a measure of the number of street crimes occurring. Since crime data were only available for London for the period 2011—13, these models were constructed separately from those discussed in the following sections.

The street-population explanation was tested by regressing the number of stops against the number of crimes recorded on the day in question. The deterrence explanation was tested by regressing the number of stops against the number of crimes in the one, two and four weeks *after* the day on which the stops were carried out, while the intelligence-led policing explanation was tested by regressing the number of stops against the aggregate number of

6. To determine which model type had lower residual deviance, GLS models with no correlation structure specified (which are equivalent to OLS models) were compared to GLS models with first-order autoregressive structures. In each case the autoregressive model had lower residual deviance.

Table 2. Statistics for crime models. Based on data for London for 2011–13. Pseudo-R^2 calculated as suggested by Nagelkerke (1991). likelihood ratio (LR) tests compare each model to a model in which only the dummy index variables (for which pseudo-$R^2 = 0.564$)

Model	pseudo-R^2	LR test (d.f. = 1)		Crimes variable	
		χ^2	p	b	p
Personal robbery and theft from the person (232,794 offences)					
Same day	0.567	3.26	0.071		
Previous week	0.564	0.21	0.650		
Previous two weeks	0.564	0.59	0.443		
Previous four weeks	0.568	4.03	0.045	−0.12	0.045
Next week	0.564	0.01	0.924		
Next two weeks	0.564		0.965		
Next four weeks	0.564	0.01	0.906		
Violent crime causing injury or death (176,702 offences)					
Same day	0.612	54.26		−1.98	
Previous week	0.564	0.29	0.588		
Previous two weeks	0.564	0.49	0.486		
Previous four weeks	0.564	0.19	0.661		
Next week	0.569	4.93	0.026	−0.57	0.026
Next two weeks	0.570	6.05	0.014	−0.43	0.014
Next four weeks	0.566	2.68	0.101		

crimes in the one, two and four weeks *before* the day on which those stops were carried out.

Table 2 shows results for these models, including the results of LR tests comparing each model to one including only the 28-day index variable and day of the year as predictors of the count of stops on a day. These indicate that the number of street crimes was not a significant predictor of the number of stops but the number of violent crimes in the weeks after a stop was. However, where the number of crimes was a significant predictor, the co-efficient of determination (pseudo-R^2) was nearly identical to that for the baseline model, suggesting a small effect size. Overall, there is little relationship between the number of stops on a day and the number of recorded street crimes so H1 is not supported.

It should be emphasised that we do not present this result as a detailed test of the deterrence or intelligence-led policing hypotheses, since such a test would require a much smaller spatial unit of analysis to account for the heterogeneity of situational factors (Wyant, Taylor, Ratcliffe, & Wood, 2012, 526). This hypothesis was instead tested purely to identify whether or not variations in crime would be likely to confound tests of the remaining hypotheses. Given the weak relationship between searches and crime, it appears unlikely that variations in crime would act as a substantial confounding variable.

Table 3. Variables in London model

	b	S.E.	*p*	% change
intercept	1063.2	34.8	<0.001	
A: Basic variables				
28-day index	−6.4	0.6	<0.001	−0.6
day of the year	−0.0	0.1	0.811	
Monday	172.2	16.2	<0.001	16.2
Tuesday	362.0	17.9	<0.001	34.1
Wednesday	486.9	18.8	<0.001	45.8
Thursday	515.3	18.9	<0.001	48.5
Friday	544.9	18.0	<0.001	51.2
Saturday	351.9	10.3	<0.001	33.1
B: Public holidays and related days				
New Year's Eve/Day	−325.1	54.1	<0.001	−30.6
Good Friday	−470.3	57.8		−44.2
Easter Monday	−370.5	57.6	<0.001	−34.8
Early May Holiday	−271.6	58.7	<0.001	−25.5
Spring Holiday	−306.5	57.5	<0.001	−28.8
Christmas Eve	−304.1	67.2	<0.001	−28.6
Christmas Day	−563.0	76.6	<0.001	−52.9
26 December (Boxing Day)	−358.3	67.2	<0.001	−33.7
C: Public events				
school day	85.5	16.3	<0.001	8.0
marathon	−47.6	56.9	0.402	
Gay Pride parade	31.2	56.9	0.583	
Notting Hill Carnival	212.0	55.7	<0.001	19.9
Halloween	982.7	56.3	<0.001	92.4
Bonfire Night (5 November)	444.3	56.3	<0.001	41.8
election day	−8.7	69.4	0.9	
Olympic/Paralympic Games	45.8	78.3	0.559	
stadium event	−57.2	18.2	0.002	−5.4
D: Events causing high demand for police service				
terrorist attack	−89.5	47.7	0.061	
public disorder	−213.8	51.5	<0.001	−20.1
DSEI arms fair	−123.4	74.9	0.099	
State Opening of Parliament	−77.8	61.9	0.209	

3.2. Routine Activities

The remaining hypotheses were tested using the routine-activity variables in a combined model. LR tests showed this model to be a significantly better predictor of stops than a model with no predictors, both for London

($\chi^2(29) = 2036.5$, $p < 0.001$) and NYC ($\chi^2(31) = 2588.1$, $p < 0.001$).[7] In both cities, the model accounted for the majority of variation in stop and search across the year (pseudo-$R^2 = 0.80$ for London, pseudo-$R^2 = 0.81$ for NYC).

Model co-efficients are shown in Table 3 for London and Table 4 for NYC. Variance inflation factors were close to one for each variable, suggesting no substantial issue of multicollinearity. The final column of Tables 3 and 4 shows (for significant predictors) the estimated percentage change in the frequency of stops associated with a one-unit change in each predictor, compared to the reference day, if all the other predictors are held constant. This is an imperfect measure of variable importance, because it is dependent upon the units used to measure each variable, and so should be treated with caution.

3.3. Hypothesis 2: Public Holidays

The influence of public holidays in the model varied between the two cities. In London, all public holidays were associated with a significant decrease in the number of searches. The largest decrease was on Christmas Day, followed by Good Friday and Easter Monday. In NYC, only five holidays or related days were associated with an increase in stops. These differences may be due to the different activities pursued by residents on different holidays. The holidays associated with fewer expected stops (Christmas Day, Thanksgiving, Christmas Eve, 26 December and New Year's Eve/Day) are typically associated with people staying at home with family or friends, and with many shops and businesses being closed. The other holidays are more-often associated with activities in public places, and increasingly are days on which shops and some workplaces are open. Overall, then, it appears that there is some support for H2.

3.4. Hypothesis 3: School Days

School days were significantly associated with more stops in both cities. This suggests that the effect of schools concentrating potential actors in the stop-and-search process was larger than the effect of schools incapacitating such actors, perhaps because there is no incapacitation effect before and after school.

3.5. Hypothesis 4: Public Events

A minority of the public events included in the model were associated with large changes in stops—in different directions—but most events were not. The

7. Although these models were used to test multiple hypotheses, in both cases the p values were small enough that correcting for multiple comparisons would not change the decision to reject the null hypothesis that the models were not predictors of the dependent variable.

results suggest that the association between police searches and public events are both complicated and potentially important for explaining variations in searches over time.

A simple increase in the on-street population appears to be insufficient to lead to an increase in police searches: very-large events such as the Olympic Games, city marathons and gay-pride parades were not associated with any change in searches. Those events that were associated with an increase in stops were those for which there is a plausible link between the event and an increase in the number of offenders on the street. Halloween—long synonymous with "robbery, destruction [and] arson" (Rogers, 2002, 75)—was associated with a large increase in stops in both cities. Similarly, Bonfire Night—commonly associated with anti-social behaviour (Upson, 2006, 5), particularly involving fireworks (Edwin, Cubison, & Pape, 2008, 955)—was associated with a large increase in stops in London.

The decrease in expected searches on the days of stadium events, however, calls into question any association between an increase in the number of offenders on the street and the number of searches. The UK has a long-term problem with football violence (Frosdick & Newton, 2006), some of it linked to the possession of cocaine and knives (Ayres & Treadwell, 2011). Since officers have the power to search people for both drugs and weapons, it might be expected that match days would increase the availability of suitable people for the police to search. However, the results presented here suggest that this is not the case.

Research by Kurland, Johnson, & Tilley (2014) suggests a potential explanation for this finding. Their study found that the number of crimes around a football stadium increased on match days, but the rate of crime (calculated using the ambient population) decreased slightly. It may be that although the number of 'searchable' people increases on match days, the number of other people on the street increases even more. From a police perspective, on match days the number of the needles in the haystack goes up but the haystack itself becomes larger still, making it *more* difficult to identify a potential offender.

3.6. Hypothesis 5: Periods of High Demand for Police

The relationship between searches and periods of high demand was different between the two cities. In London, incidents of major public disorder were associated with fewer searches, while in NYC similar events were associated with more searches. This may be the result of differences in police responses in each city, or in the legal framework underpinning stops. Specifically, since search powers in the UK relate to searches for specific items, the diversion of resources to respond to an incident may lead to fewer officers stopping people on suspicion of, for example, possession of drugs—even if there is an increase in patrols overall. Meanwhile the general nature of US search powers—and the

Table 4. Variables in NYC model.

	b	S.E.	*p*	% change
intercept	465.4	16.3	<0.001	
A: Basic variables				
28-day index	6.8	0.3	<0.001	1.5
day of the year	−0.6	0.1	<0.001	−0.1
Monday	−117.1	10.9	<0.001	−25.2
Tuesday	201.2	12.2	<0.001	43.2
Wednesday	279.1	12.8	<0.001	60.0
Thursday	276.5	12.6	<0.001	59.4
Friday	342.1	12.1	<0.001	73.5
Saturday	299.5	8.0	<0.001	64.4
B: Public holidays and related days				
New Year's Eve/Day	−143.8	40.3	<0.001	−30.9
Martin Luther King Day	63.9	45.5	0.16	
Washington's Birthday	51.1	44.9	0.255	
Memorial Day	−23.8	45.4	0.6	
Independence Day	−78.2	44.2	0.077	
Labor Day	38.9	45.1	0.388	
Columbus Day	14.6	45.4	0.748	
Veterans' Day	57.9	45.2	0.2	
Thanksgiving	−474.4	45.6	<0.001	−101.9
Christmas Eve	−336.8	50.5	<0.001	−72.4
Christmas Day	−507.1	55.8	<0.001	−109.0
26 December	−145.2	50.3	0.004	−31.2
C: Public events				
school day	48.0	9.9	<0.001	10.3
Superbowl	−60.7	108.4	0.576	
marathon	26.4	44.8	0.556	
Gay Pride parade	0.4	44.6	0.993	
World Series	−111.8	59.1	0.059	
Halloween	261.5	44.8	<0.001	56.2
election day	−158.4	41.6	<0.001	−34.0
D: Events causing high demand for police service				
major disaster	−79.9	18.9	<0.001	−17.2
terrorist attack	44.0	37.1	0.237	
public disorder	99.9	37.6	0.008	21.5
UN General Assembly	−9.1	31.9	0.776	

wide availability of firearms making it common for officers to exercise those powers during any type of stop—may mean that an increase in patrols leads to an increase in searches, even if the patrols are directed towards a specific goal unrelated to stop and search.

One exception—which may demonstrate the limits of the pattern just described—is the finding that major disasters in NYC are associated with fewer

searches taking place. This may be because, although there may be more police on the streets during a disaster, they are unlikely to be patrolling. Instead, they will be busy assisting victims, securing dangerous structures and so on.

4. Discussion

Although demographic influences on the discretion exercised in police searches have been the subject of considerable academic research, studies of situational influences are conspicuously absent from the literature. This is the first study—of which the authors are aware—to consider whether macro-level routine activities can be used to explain variations in searches over time.

The results presented here suggest that the routine-activities approach can be usefully invoked to explain *some* macro temporal variations in stop and search. In both London and NYC, the models explained a large proportion of variation in searches throughout the year. Some variables (such as Halloween) were associated with very large increases in the number of searches, while others (such as Christmas Day) were associated with large decreases. The day of the week also appeared to be important in explaining the number of searches conducted.

It might be thought that these results are simply the product of day-to-day changes in the number of suitable 'searchable' people on the street who are available. However, the first set of results indicated that the causal process at work is not that straightforward. Any association between street crime and police searches appeared to be negligible, suggesting that the number of offenders on the street was not the primary driver of stop and search. Some events known to be associated with very large increases in street population were not associated with any change in the number of searches. Instead, it appears that the nature of the event causing the change in population is important, with those events (such as Halloween) likely to be associated with more crime resulting in more searches.

A framework for understanding the results presented here can be derived from the routine activity approach, with the actors in the original routine activity model of crime events replaced with actors relevant to the police search event. Consider a police-action model based of search opportunities through the lens of routine activities, in which a stop and search can only occur if a motivated police officer converges in time and space with a person suitable to be searched (known here as the search subject) in the absence of situational factors that prevent the officer from searching the person. In relation to the original routine-activities model of criminal opportunities, the officer has replaced the offender and the search subject has replaced the target.

The likelihood of the three elements—officer, subject and the lack of situational barriers—converging will depend partly upon the presence of controllers: the officer's immediate supervisor and colleagues (analogous to

handlers), the place manager, and other people present at the time (analogous to guardians). The controllers' behaviour will in turn be influenced by super controllers (those who have power over the controllers): police policy-makers, other officers who collectively maintain a particular police culture, politicians and so on. Whilst admittedly an oversimplified model, it has prospects for explaining patterns of searches at both the micro and macro levels. Further refinement of this model is clearly warranted to capture the complexity of the event-level dynamics.

Simple applications of this model may help to explain some of the variation observed in this study. For example, few officers are likely to relish a long shift on New Year's Eve (for a vivid description of why, see Moskos, 2008, 149–152), which may diminish their motivation to carry out searches and explain the observed decrease in searches on that day, even though New Year brings many people onto the streets. A large decrease in the number of suitable subjects may be expected to lead to a decrease in searches (all other things being equal), which may explain why Christmas Day—when businesses are closed and many people stay at home with their families—is associated with substantially fewer searches. In other circumstances, situational barriers may prevent searches: an officer responding to a disaster or guarding a dignitary may be unable to search someone, even if they are highly motivated and the subject highly suitable.

Of course these simple applications cannot reflect the complexity of each situation and the interaction between the elements. Officer motivation is likely to depend partly on the officer's perception of the likelihood of the subject being in possession of contraband (i.e. the officers perception of the subject's suitability for searching): where the officer is confident of finding something, they may be more likely to carry out a search than when their suspicion is less certain. At times when the streets are very busy with people—such as during the Notting Hill Carnival in London or the Gay Pride parade in NYC—officers may be so overwhelmed with potential subjects that they choose to search only the most suitable. This is likely to be particularly true given the other demands on officers' time during such mega-events. In some cases, the three elements will re-enforce each other. For example, on Christmas Day there will be few available subjects, officers may be demotivated because they have been separated from their families and denied the leisure time afforded to others, and because few situations may arise in which officers and subjects might meet. On other days the elements may drive search activity in different directions. For example during stadium events, officers may be demotivated by hours spent on foot at fixed points watching large groups of sports fans, but at the same time the availability of subjects increases and situational factors bring officers and subjects together.

The influence of guardian analogues can also potentially explain whether or not a police search can occur. In some circumstances passers by may act to facilitate a search, for example by pointing out a potential search subject behaving suspiciously. Conversely, citizens might make a search less likely. For

example, an officer may be observing a potential search subject when they are approached by a passer by with a routine question, allowing the potential subject to leave the area. The macro-level influence of guardian analogues is as yet unclear and will require further conceptual clarity to generate meaningful constructs which can be reliably measured.

While the data used in this study shed relatively little light on the influence of controllers and super controllers on police searches, they may be useful in explaining the observed increase in the number of searches on school days. Both the MPS and NYPD deploy officers inside and around schools, increasing opportunities for officers and subjects to converge on school days. It may be that the increase in searches is driven by the policy decisions of senior officers (super controllers) and the deployment practices of junior managers (officer handlers) influencing the likelihood of officers converging with subjects. However, such a link is speculative and further research would be required to confirm it.

4.1. Stop-and-Search Monitoring

The controversial nature of stop and search has attracted interest among both academics and policy makers. Both groups have attempted to elicit information about police practices from fluctuations in searches over time. For example, Miller (2010) tracked counts of police searches over time to estimate the impact of legislative changes designed to reduce racial disparity in search rates. Since the results presented here demonstrate that macro-level routine activities can explain a large proportion of variation in the frequency of searches throughout the year, taking these variations into account would appear to be important for future studies of this type.

This is likely to be even more true for practitioners and policy makers attempting to monitor the use of police search powers. Such monitoring often takes the form of tracking monthly or weekly changes in the frequency of searches (see, for example, Metropolitan Police Service, 2015). However, the present study showed that such monitoring is likely to be heavily influenced by variations in macro-level routine activities. This is particularly important because police performance monitoring often takes the form of binary comparisons between, for example, the current and previous month, or this month and the same month last year (for a discussion of other drawbacks of this approach, see Guilfoyle, 2015). To illustrate the magnitude of this problem, consider the model for London presented above. This model would predict a 10% decrease in the number of stops recorded between January and February 2015, followed by a 10% increase in March and a 6% decrease in April. These changes are of a similar magnitude as the actual 15% decrease, 8% increase and 14% decrease in stops in the first three months of 2014 (Metropolitan Police Service, 2015). This suggests that any mechanism for monitoring searches over time should incorporate the systematic changes in macro-level routine activities discussed here.

4.2. Limitations

We present the police-action model as a stimulus to thinking on the topic of police discretion. Akin to the antecedent routine-activities approach, we have initially applied it to explain and understand patterns of police activity at the macro level. Such aggregate patterns of searches are important because they represent the product of micro-level decisions and, importantly, because macro-level patterns can influence community perceptions of policing. This latter point is likely to be particularly true given the increased interest in community monitoring of stop and search discussed above, which often involves attempts to impute information on how police apply discretion at the micro level by monitoring temporal changes in the aggregate frequency of searches.

Although studying macro-level patterns has value, it does not expound the many causes of variation at the micro level. In particular, much like the routine activities approach to crime, our model describes only the conditions that lead to an *opportunity* for a search. Whether an opportunity to search a person (i.e. the convergence of an officer and subject in the absence of situational barriers) results in a person actually being searched will depend upon several factors. Research evidence to date attests that attitudinal and demographic influences on police discretion are non-trivial, and situational factors are likely to interact with these. Police decision-making is necessarily individualistic and multifaceted, making it likely that officers will behave differently in different places and at different times (Taylor, 2015, 10). For example, many police agencies direct their officers to particular places at times when offenders are known to be active (e.g. Groff et al., 2015), which may result in officers being more likely to convert an opportunity to search someone into an actual search. Officers may also be more likely to convert a search opportunity into a search if they have intelligence information or previous knowledge of the particular person they are interacting with.

Despite this limitation, the study of situational factors influencing police searches may be useful since a search opportunity is a necessary (although insufficient) precursor for a search to occur. In the study of crime, the analysis of opportunities has provided powerful insights into spatial and temporal clustering of offences despite not all opportunities being converted into offences. We hope that future studies will be able to test whether our police-action model is an example of "good-enough theory" (Cornish and Clarke, 2003, 49).

As this was a macro-level study of stop and search, we did not consider local variation within each city. That crime concentrates in space and time is a recurrent criminological fact, and police searches are conceivably similarly concentrated in space. To address this limitation, future research should compare temporal patterns of searches across smaller areas. However, such research would be likely to suffer from a lack of statistical power, so it would be important to be explicit about the minimum detectable effect for smaller units of analysis.

There were several potential sources of variance in stop and search that could not be modelled in the present study. Data were not available on the number of officers on duty at any particular time, but officer numbers might co-vary with stops and searches. This is particularly likely where there might be seasonal changes in the number of officers on duty, for example due to summer increases in annual leave or winter increases in sick leave. It is possible that local or city-wide police priorities might change throughout each year, either in response to crime patterns or political pressure. Different policing tactics may fall in and out of fashion over time, which may influence the number of searches conducted (Silverman, 2015, 82–95).

Although collecting data on officer availability may be difficult, new technologies—such as police radios that track an officer's location—offer prospects for this information to be incorporated into future studies. Local, qualitative analysis of stop and search would elicit information on influence of changes in policing practice, particularly those driven by changes in culture rather than policy.

4.3. Further Research

The routine-activities police-action model described here could fruitfully be extended in two ways. Firstly, it could be used to explain police decision making at the level of the individual event: the macro-level focus of the present study should not be taken as an indication that micro-level changes are less important. This would also allow the exploration of the influence of routine activities on search patterns at other temporal units of analysis, such as time of day. Suitable data for such work may be difficult to collect: while officer motivation and subject suitability can be determined from surveys, obtaining a comprehensive picture of situational factors in any one case may require detailed observations in the field.

Secondly, the model could be tested in relation to other police activities at the macro-level, which may be easier due to the availability of administrative data on police actions. In particular, many agencies keep detailed records of arrests and traffic stops by officers, which would be amenable to analysis similar to that conducted here. Such data could be used to test hypotheses generated using the model in order to assess its explanatory ability.

In sum, a macro-level theory such as the routine activity approach has important theoretical shortcomings and cannot be fully tested without micro-level data. Yet, to date it has been invoked to successfully model a wide range of phenomena related to crime event patterning and related behaviour, and offers a starting point for framing further theorising and empirical enquiry. Clearly, theories at different levels of abstraction are needed to answer different research questions. It is our contention that the routine activity approach holds promise for explaining aggregate temporal patterns of police searches, which is of interest to police managers, policy makers and communities.

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Appendix 1

Table A1. Dates for events included in the models

Event	City	Dates
Superbowl	NYC	3 Feb 2008
Marathon	London	13 Apr 2008, 26 Apr 2009, 25 Apr 2010, 17 Apr 2011, 22 Apr 2012, 21 Apr 2013
	NYC	First Sunday in November
Gay Pride	London	05 Jul 2008, 04 Jul 2009, 03 Jul 2010, 02 Jul 2011, 07 Jul 2012, 29 Jul 2013
	NYC	Last Sunday in June
Notting Hill	London	Last Monday in August and Sunday before
UN		GeneralAssembly
NYC		19 Sep–27 Sep 2006, 25 Sep–3 Oct 2007, 23 Sep–29 Sep 2008, 23 Sep–29 Sep 2009, 21 Sep–27 Sep 2010, 21 Sep–27 Sep 2011
DSEI arms fair	London	8–11 Sep 2009, 13–16 Sep 2011, 9–13 Sep 2013
World Series	NYC	28, 29, 31 Oct and 1, 2, 4 Nov 2009
Election Day	London	4 Jun 2009, 6 May 2010, 5 May 2011, 3 May 2012
	NYC	12 Sep 2006, 7 Nov 2006, 5 Feb 2008, 9 Sep 2008, 4 Nov 2008, 14 Sep 2010, 2 Nov 2010
State Openingof Parliament	London	3 Dec 2008, 18 Nov 2009, 25 May 2010, 9 May 2012, 8 May 2013
Major disasters	NYC	11–12 Feb 2006, 23 Jun–10 Jul 2006, 14–27 Apr 2007, 8 Aug 2007, 11–15 Nov 2009, 19–20 Dec 2009, 12 Mar–17 May 2010, 16 Sep 2010, 26–27 Dec 2010, 11–12 Jan 2011, 26 Apr–8 May 2011, 25 Aug–14 Sep 2011, 3 Sep–15 Oct 2011, 29–30 Oct 2011
Terrorist attacks	London	11 May 2008, 13 May 2008, 27 Sep 2008, 14 May 2010, 30 Sep 2012, 22 May 2013, 5 Jun 2013, 8 Jun 2013
	NYC	26 Oct 2007, 6 Mar 2008, 1 May 2010
Major disorder	London	1–2 Apr 2009, 10, 24, 30 Nov and 9 Dec 2010, 26 Mar 2011, 6–10 Aug 2011
	NYC	17 Sep–15 Nov 2011
Stadium events	London	24 Feb 2008, 5, 6, 17, 24, 25, 30 May 2008, 1 Mar 2009, 18–19 Apr 2009, 24, 25, 30 May 2009, 28 Feb 2010, 10–11 Apr 2010, 15, 22, 29 May 2010, 27 Feb 2011, 16–17 Apr 2011, 14, 28–30 May 2011, 26 Feb 2012, 14–15 Apr 2012, 5, 19, 26 May 2012, 24 Feb 2013, 13–14 Apr 2013, 11, 19, 25, 27 May 2013
Olympics/ Paralympics	London	27 Jul–12 Aug 2012, 29 Aug–9 Sep 2012