



Policing Directions: a Systematic Review on the Effectiveness of Police Presence

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Abstract

We systematically review the effectiveness of police presence. In doing so, we investigate concepts of police presence and differences between reported effects. Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and protocols, we systematically identify and review eligible studies on police presence. Further, quality assessment and findings synthesis are used to map limitations of current research as well as grounds for future avenues. The systematic search strategies yielded 49 studies focusing on testing the effects of police presence or evaluating its measurement. We find evidence that police presence has mostly crime reduction effects on crimes related to motor theft, property, violence and guns. Police presence also reduces calls for service and improves traffic behaviour. Police presence focused on specific areas, times and types of crime achieves maximum effectiveness. The reviewed studies show a high degree of heterogeneity in reporting which limits comparability of findings across studies. Research on police presence presents evidence for significant crime preventative effects of focused police actions and shows strongest effects when focused on certain areas, times, or types of crimes. We encourage future research to focus on police presence en route and its effects, including crime prevention, traffic regulation and fear of crime.

Keywords Police presence · Deterrence · Patrol · Crime prevention

Introduction

Throughout police research, scholars agree that police presence matters, especially in preventing crimes (see Andenæs, 1974; Kelling et al., 1974; Pfuhl, 1983; Esbensen & Taylor, 1984; Armour, 1986; Koper, 1995; Carrabine, 2009; Ming-Jen Lin, 2009). Criminological theory has placed police presence at its core. *Deterrence theory* suggests that criminal activity can be deterred through police presence (Durlauf & Nagin, 2011). By elevating either the risk (*general deterrence*) of being caught in the act or the severity (*specific deterrence*) of punitive action, offenders are deterred from committing a criminal act as expected

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costs outweigh expected benefits (see Durlauf & Nagin, 2011; Nagin, 2013; Nagin et al., 2015). Thus, police act as a symbol of general deterrence while they enforce the law (e.g. Ming-Jen Braga et al., 2019a; Lin, 2009). In contrast, incapacitation theory discusses how to improve crime prevention measures by increasing the percentage of solved crimes (e.g. clearance rates) and incapacitating offenders (e.g. Mastrobuoni, 2019; Blanes i Vidal & Kirchmaier, 2018). The two sets of theories tackle crime prevention and police from different perspectives. Deterrence theory understands police as a symbol of the criminal justice apparatus, while incapacitation theory tries to explain how successful this apparatus operates. Cohen and Felson (1979) argued that criminal opportunities arise through routine activities of offenders, victims and guardians. Crimes can only take place when an offender, a victim and the absence of a ‘capable’ guardian (e.g. police officers) come together (Cohen & Felson, 1979; Felson, 1986). Therefore, police officers need to be at the right place at the right moment to prevent criminal acts. Although different strategies on how to optimally deploy police forces exist, such as *community policing*, *broken window policing*, *pulling-levers policing* or *hot spots policing* (e.g. Ariel et al., 2016; Braga et al., 2019a; Weisburd & Braga, 2019; Weisburd et al., 2011), all strategies share the assumption that police presence affects social realities. Two questions remain, however: What social realities can be affected, and how much police presence is needed to do so?

Concepts of police presence have lacked clarity and neglected the meaning of *presence*, in terms of physical presence of police forces (e.g. Levine, 1975; Levitt, 2002; McPheters & Stronge, 1974). Neither police expenditures nor number of officers constitute a measure of physical police presence in the field. We present an incipient definition of police presence:

Police Presence at core is less concerned with performative aspects of policing and patrols (i.e., how they police), but rather focused on the structural characteristics of it (i.e., where and when they police, how many officers are present, how long they are present). It describes social, spatial, and temporal aspects of police work, which can be measured as definite quantities.

This systematic review investigates the state of the art in research on the effectiveness of police presence. Thus, we want to know: *what are quantitative and qualitative effects of police presence?*

Methods

We conducted a systematic review in accordance to PRISMA guidelines (see, Moher et al., 2010). To be eligible for this review, studies had to focus on:

1. Measurable police presence. Suitable studies reported police presence in quantifiable measures, e.g. time of police presence, number of visits, hours of officers per police beat or length of patrol shifts (e.g. Ariel et al., 2019; Bowers & Hirsch, 1987; Collazos et al., 2020; Kaplan et al., 2000; McGarrell et al., 2001; Novak et al., 2016; Ratcliffe et al., 2011; Stephensen, 2017; Taylor et al., 2011; Zech et al., 2005). This excluded studies that either focused on police expenditures (McPheters & Stronge, 1974), police personnel (Levine, 1975; Levitt, 2002) or tried to infer a level of police presence from law enforcement actions such as arrests rates (Weisburd et al., 2016). These excluded measures do not allow for a precise measurement in specific spatial units, as they cannot

- distinguish between the proportion of time spent outside or inside police stations. In order to be visible and present, police forces need to be in 'the field', thus, officer-citizen ratios do not properly represent physical police presence.
2. Physical police presence defined as a police officer or a (marked) police vehicle, in contrast to alternative ways of police presence such as a picture or cut-out of a police officer (e.g. Simpson et al., 2020)
 3. Measures of qualitative (i.e. fear of crime, perception of security, police legitimacy) or quantitative (i.e. reported crime rates, calls for service) effects of police presence or methodological considerations on measuring police presence (Davies & Bowers, 2019; Wain & Ariel, 2014).
 4. And, due to the authors' language proficiencies, eligible studies were limited to proceedings published in English, Dutch, and German.

Search Strategies and Databases

Discrete search strategies were deployed to extensively search for relevant literature. First, a keyword search was conducted on eleven literature databases,¹ with text and abstract screening. The used keywords are 'Police Presence', 'Police Patrol' AND 'Presence', 'Police Deployment', 'Police Visibility', 'Hot spots Policing', 'Community policing' AND 'Presence', 'Broken windows policing', 'Problem-orientated Policing', 'Focused Deterrence', 'Patrol'. The scientific databases were selected as they cover the majority of journals that are recommended by the American Society of Criminology (ASC). Second, references from well-cited reviews that focused on police programs, police practices, and patrol strategies were consulted (Bradford, 2011; Braga & Welsh, 2016; Braga et al., 2014, 2015, 2019a, 2019b, 2019c; Carriaga & Worrall, 2015; Chalfin & McCrary, 2017; Famega, 2005; Kounadi et al., 2020; Lee et al., 2013, 2016). Third, a cross-reference search was conducted on the preliminary selection to identify relevant publications, which were not yielded during the initial search (e.g. Blattman et al., 2017; Draca et al., 2007; Hinkle & Weisburd, 2008; Mitchell, 2017; Richards et al., 1985; Rosenfeld et al., 2014; Thaler, 1977). Fourth, studies were included or excluded by assessing the title, abstract and full-text. Ultimately, three of the co-authors critically judged the final selection and one of the co-authors validated the deployed search strategies.

The search was conducted in September 2020. Hence, the review includes studies that were published or available before the end of September 2020. The list of variables was derived from examining other research on police and policing (e.g. Braga & Weisburd, 2014, 2015; Depraetere et al., 2020; Dewinter et al., 2020; Pullin & Stewart, 2006; Sacks, 2000; Smith et al., 2005; Staples & Niazi, 2007).

In contrast to systematic reviews on policing at large (see Braga et al., 2014, 2019a, 2019b; Carriaga & Worrall, 2015), we have included non-experimental research designs. Randomized controlled trials (RCT) represent the highest standard to evaluate programs and interventions (Kaptchuk, 2001). As this systematic review aims at identifying all research directions and conceptualizations of police presence, excluding all studies other than RCT appeared overly restrictive. The main criteria for inclusion, in regard to the

¹ These databases were: Elsevier (*Science Direct*), Emerald Publishing, JSTOR, National Criminal Justice Reference Service (NCJRS), ProQuest (*Criminology Collection*), Sabinet, Sage, Springer, Taylor & Francis, Web of Science, and Wiley.

research design, are that the studies (a) provide a quantifiable measure of physical police presence and (b) report a quantitative or qualitative effect that was investigated in relation to police presence. Thus, non-experimental and observational study design was eligible for inclusion.

Results

Characteristics of Selected Studies

The systematic database search yielded 118 eligible studies for full-text assessment. We identified 49 eligible studies for this review (see, Fig. 1, for complete list see, Table 1). The majority of identified studies were published after 2013 (53%), with the oldest study dating back to the early 1970s (Kelling et al., 1974). Since 2011, the number of studies on police presence grew substantially (see Fig. 2).

Most studies analysed police presence in the USA ($n=33$), the UK ($n=7$), Australia ($n=2$) and Canada ($n=2$) (see Table 2). A predominant number of studies was published as journal articles ($n=42$). All eligible studies implemented quantitative research designs. About three quarters of the selected studies implemented experimental research designs ($n=36$), of which 13 conducted randomized controlled trials (e.g. Barnes et al., 2020; Ratcliffe et al., 2011; Rosenfeld et al., 2014; Sherman et al., 1995a, 1995b; Taylor et al., 2011). On average, police presence was monitored for approximately 350 days ($SD \sim 483$ days). Sample size here refers to the number of spatial units under analysis to measure police presence. This measure of sample size is chosen as an equivalent to ‘cases’ in comparable studies. The reviewed studies document a mean sample size of 282 spatial units under analysis with a standard deviation of 975 spatial samples. Analyses were conducted on the micro ($n=30$, e.g. street segments), meso ($n=13$, e.g. neighbourhood) and macro ($n=5$, e.g. state) level (see Table 3 in appendix).

The selected body of research comprises different types of policing such as *hot spots policing* ($n=20$), *general patrol* ($n=10$) or *traffic patrol* ($n=8$). Regardless of deployed strategies, motor patrol ($n=23$) (e.g. Davies & Bowers, 2019; Kaplan et al., 2000; Medina et al., 2009) and foot patrol ($n=20$) (e.g. Kelling et al., 1981; Ratcliffe et al., 2011; Sorg et al., 2013) were most commonly evaluated. This comes as no surprise as motor patrol is wide spread (Ariel et al., 2019) and foot patrol manifests the most traditional way of policing (see Kelling et al., 1974; Carrabine, 2009). While crime still constitutes the general focus of analysis ($n=33$), around one quarter of studies concentrated on calls for service ($n=14$) and almost a fifth on traffic violations ($n=9$). A great number of studies found significantly positive effects of police presence, such as crime reduction or increased public trust in the police ($n=30$).

The number of officers per shift ($n=13$) and the dosage (Ariel et al., 2019; Davies & Bowers, 2019; Lum et al., 2020) of police presence ($n=13$), for example, in minutes per spatial unit were used as the independent variable. Another approach is to determine physical police presence with the number of visits ($n=4$) officers paid to a certain area or through designated length of police officer shifts ($n=9$). Around a third of the studies measured police presence through information extracted from police staffing and deployment data ($n=15$), followed by GPS (Global Positioning System) ($n=8$), officer radio log and call data ($n=6$) and computer-aided dispatch ($n=3$). Approximately half of the selected studies used low ($n=17$) or very low precision ($n=9$), while a third documented high ($n=15$)

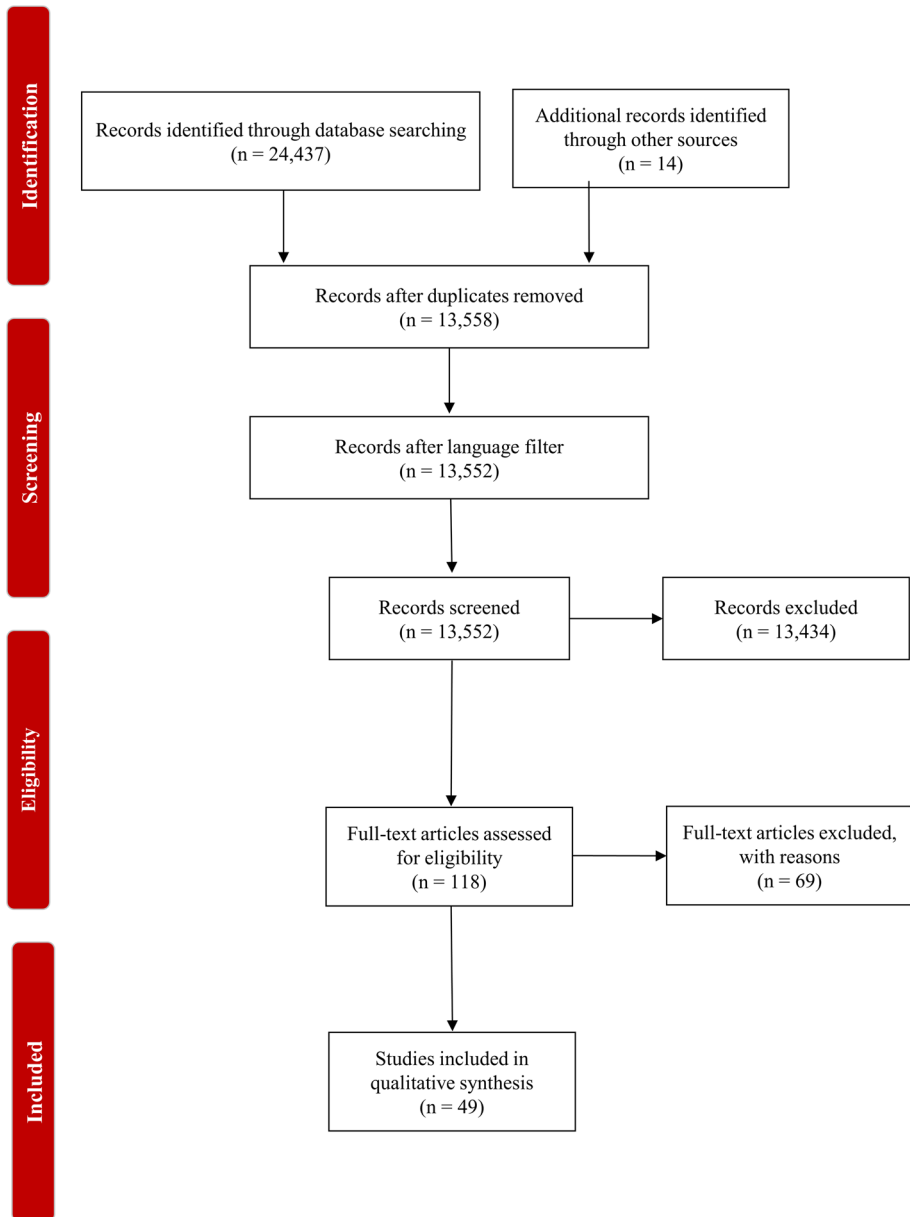


Fig. 1 Selection of studies according to PRISMA Guidelines (see, Mother et al. 2010)

precision measurement.² Research on police presence primarily focused on specific destinations within a jurisdiction ($n = 33$) and to a lesser extent on the entire jurisdiction ($n = 16$).

² The introduced categorization goes as follows:

Very low: no mention of measurement, unclear basis for calculations.

Low: Staffing schedules, observations, hand written patrol logs.

Medium: Deployment data, Radio log and call data.

High: GPS tracking, experimental placement.

Table 1 Overview of all reviewed studies ($n=49$)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/policing strategy	Population
Andresen and Lau (2014) ($n=1$), Days: 155, NE	Canada	- CFS	Reduction in CFS (nonsignificant)	+	Shift length	Meso (Neighbourhood)	Staffing duty (low)	General	Foot Patrol/Hot spots	10–50 k
Ariel et al. (2016) ($n=72$), Days: 365, E	UK	- Reported Crime - CFS	Reduction in crime & CFS (nonsignificant)	+	Dosage	Micro (150-m radius polygon)	GPS (ping: 1 min) (high)	Destination	Foot Patrol/Hot spots	100–500 k
Ariel et al. (2019) ($n=115$), Days: 183, E	UK	- Reported Crime - CFS	Reduction in crime & CFS (significant)	+	Dosage	Micro (Underground station)	Officer log (low)	Destination	Foot Patrol/Hot spots	> 5 million
Armour (1986) ($n=3$), Days: 70, NE	Australia	- Traffic Speed	Reduction in traffic speed (nonsignificant)	+	Shift length	Micro (Street slip)	na (very low)	Destination	Motor Patrol/Traffic Patrol	< 5000
Barnes et al. (2020) ($n=3,720$), Days: 248, E	Australia	- Reported Crime - Crime Harm Index	Reduction in frequency of crime and crime harm (significant)	-	Dosage	Micro (Hot spot square)	GPS (ping: 9 s) (high)	Destination	Bike and Motor Patrol/Hot spots	1–5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Blattman et al. (2017) (n = 1), Days: 249, E	Colombia	- Reported Crime - Crime Risk	Reduction in crime (non- significant) & perceived risk (signifi- cant)	+	Dosage	Micro (Street Segments)	GPS (ping: 30 s) (high)	Destination	Foot and Motor Patrol/Hot Spots	> 5 million
Bowers and Hirsch (1987) (n = 1), Days: 581, NE	USA	- CfS	No effect found	+	Officers per shift	Macro (City)	Staffing duty (low), shifts	General	Foot Patrol/ General Patrol	500 k–1 million
Cohen et al. (2003) (n = 102), Days: 1066, NE	USA	- CfS	Reduction in CfS related to drug deals (sig- nificant)	+	Not measured	Micro (1/8- mile radius)	na (very low)	Destination	Unknown/ Crack Down	100–500 k
Collazos et al. (2020) (n = 967), Days: 200, E	Colombia	- Reported Crime - Fear of Crime	Reduction in car thefts (significant)	+	Dosage	Micro (Street Segment)	GPS (ping: 30–120 s) (high)	Destination	Motor Patrol/ Hot spots	1–5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/policing strategy	Population
Davies and Bowers (2019) ($n = \text{NA}$), Days: 153, NE	UK	- CFS	No effect found	0	Dosage	Micro (Street Segment)	GPS (ping: 15 s) (high)	General	Motor Patrol/General Patrol	> 5 million
Di Tella and Schargrodsky (2004) ($n = 876$), Days: 275, E	Argentina	- Reported Crime	Reduction in car thefts (significant)	+	Not measured	Micro (Block)	na (very low)	Destination	Unknown/Terror Patrol	> 5 million
Draca et al. (2007) ($n = 1$), Days: 731, NE	UK	- Reported Crime	Reduction in crime (significant)	+	Logged hours	Macro (City)	Deployment data (medium)	General	Foot & Motor Patrol/Terror Patrol	> 5 million
Esbensen and Taylor (1984) ($n = 3$), Days: 1,295, E	USA	- Reported Crime	No effect found	+	Officers per shift	Meso (Police Zones)	Staffing duty (low)	General	Foot Patrol/General Patrol	50–100 k

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Fitterer et al. (2017) (n = 1), Days: 1,095, E	Canada	- Reported Crime	Reduction in crime related to liquor infraction (significant)	+	Officers per shift	Micro (Block)	Staffing duty (low)	Destination	Foot Patrol/ Hot spots	100–500 k
Fritsch et al. (1999) (n = 2), Days: 731, E	USA	- Reported Crime	No effect found	+	Not measured	Meso (Police beats)	Staffing duty (low)	General	Unknown/ General Patrol	1–5 million
Hinkle and Weisburd (2008) (n = 2), Days: NA, E	USA	- Fear of Crime	Increase in fear of crime (sig- nificant)	+	Officers per shift	Micro (Street blocks)	Deploy- ment data (medium)	General	Unknown/ Crack Down	100–500 k
Hutt (2020) (n = 5697), Days: 60, E	UK	- Reported Crime	Reduction in crime (sig- nificant)	+	Shift length	Micro (Grid 250 × 250 m)	GPS (ping: 5 min) (high)	General	Foot Patrol/ Hot spots	> 5 million
Kaplan et al. (2000) (n = 1), Days: 29, E	USA	- Traffic Speed	Initial reduc- tion in traffic speed (significant)	+	Shift length	Meso (Street slip)	Placement (high)	Destination	Motor Patrol/ Traffic Patrol	50–100 k

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/policing strategy	Population
Kelling et al. (1974) (n = 12), Days: 424, E	USA	- Reported Crime - Fear of Crime	No effect found	+	Dosage	Meso (Patrol beats)	Deployment data (medium)	General	Foot Patrol/General Patrol	1–5 million
Kelling et al. (1981) (n = 15), Days: 365, E	USA	- Reported Crime - Fear of Crime	No effect found	+	Shift length	Meso (Patrol beats)	Staffing duty (low)	General	Motor Patrol/General Patrol	100–500 k
Koper (1995) (n = 100), Days: 365, NE	USA	- Reported Crime	Reduction in crime (significant)	+	Dosage	Micro (Address cluster)	Observation (low)	Destination	Foot and Motor Patrol/Hot spots	100–500 k
McGarrell et al. (2001) (n = 5), Days: 93, E	USA	- Reported Crime	Reduction in crime (significant)	-	Logged hours	Meso (Police Beats)	Observation (low)	General	Motor Patrol/General Patrol	500 k–1 million
Medina et al. (2009) (n = 4), Days: 11, E	USA	- Traffic Speed	Reduction in traffic speed (significant)	+	Not measured	Micro (Work zones)	Placement (high)	Destination	Motor Patrol/Traffic Patrol	na
Mehay (1979) (n = 46), Days: na, NE	USA	- Reported Crime	Reduction in crime (significant)	o	Not measured	Macro (State)	Survey to Police of visible (low)	General	Unknown/General Patrol	> 5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/policing strategy	Population
Mitchell (2017) (n = 42), Days: 180, NE	USA	- Reported Crime - CFS	No effect found	0	Dosage	Micro (Street Segments)	GPS (ping: 90 s) (high)	Destination	Motor Patrol/ Hot spots	500 k–1 million
Nakano et al. (2019) (n = 367), Days: na, E	Japan	- Traffic Behaviour	Reduction in non-driving activities (significant)	+	Not measured	Micro (Point at Street)	Not appropriate	Destination	Foot and Motor Patrol/Traffic Patrol	na
Novak et al. (2016) (n = 8), Days: 90, E	USA	- Reported Crime	Reduction in violent crime (significant)	+	Shift length	Meso (Police Beats)	Staffing duty (low)	Destination	Foot Patrol/ Hot spots	100–500 k
Piza et al. (2020) (n = 2), Days: 2,387, NE	USA	- Reported Crime	Reduction in crime related to burglary & motor vehicle theft (significant)	+	Officers per shift	Micro (Street block)	Summons (directed patrol) logs (medium)	General	Foot and Motor Patrol/ Saturation Patrol	100–500 k
Ratcliffe et al. (2011) (n = 120), Days: 60, E	USA	- Reported Crime	Reduction in crime for high crime hot spots (significant)	+	Shift length	Micro (Street block)	Staffing duty (low)	Destination	Foot Patrol/ Hot spots	1–5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/policing strategy	Population
Ravani and Wang (2018) (n = 4), Days: 11, E	USA	- Traffic Speed	Reduction in traffic speed (significant)	+	Not measured	Micro (Street slip)	Placement (high)	Destination	Motor Patrol/Traffic Patrol	na
Richards et al. (1985) (n = 4), Days: 16, E	USA	- Traffic Speed	Reduction in traffic speed (nonsignificant)	+	Officers per shift	Micro (Work zones)	Placement (high)	Destination	Foot and Motor Patrol/Traffic Patrol	na
Rosenfeld et al. (2014) (n = 32), Days: 275, E	USA	- Reported Crime	Reduction in crime (significant)	+	Dosage	Micro (Street blocks)	Radio call data (medium)	Destination	Unknown/Hot spots	100–500 k
Santos (2013) (n = 417), Days: 1827, E	USA	- Reported Crime	Reduction in crime (significant)	o	Visits	Micro (Hot spots)	Response log (very low)	Destination	Unknown/Hot spots	100–500 k
Schaefer et al. (2019) (n = 94), Days: 90, E	USA	- Reported Crime - Cfs	Reduction in crime (nonsignificant)	+	Visits	Micro (Street Block)	Radio call data (medium)	Destination	Unknown/Hot spots	500 k–1 million
Schnelle et al. (1977) (n = 4), Days: 52, E	USA	- Reported Crime	No effect found	+	Officers per shift	Meso (Patrol Zones)	Staffing duty (low)	General	Motor Patrol/Random Patrol	100–500 k

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Sherman and Rogan (1995) (<i>n</i> = 2), Days: 205, E	USA	- Reported Crime	Reduction in crime (sig- nificant)	+	Officers per shift	Meso (Patrol beats)	Staffing duty (low)	General	Motor Patrol/ Hot spots	100–500 k
Sherman et al. (1995a) (<i>n</i> = 207), Days: 199, E	USA	- Reported Crime - CFS	Reduction in crime & CFS (non- significant)	+	Officers per shift	Micro (Street block)	na (very low)	Destination	Unknown/ Crack Down	100–500 k
Sherman et al. (1995b) (<i>n</i> = 110), Days: 365, E	USA	- CFS	Reduction in CFS (signifi- cant)	+	Dosage	Micro (Address cluster)	Observation (low)	Destination	Foot and Motor Patrol/Hot spots	100–500 k
Sisiopiku et al. (1999) (<i>n</i> = 1), Days: 7, E	USA	- Traffic speed	Reduction in traffic speed (nonsignifi- cant)	+	Not measured	Macro (High- way slip)	Placement (high)	Destination	Motor Patrol/ Traffic Patrol	50–100 k
Sorg et al. (2013) (<i>n</i> = 120), Days: 60, E	USA	- Reported Crime	Initial reduc- tion in crime (sig- nificant)	+	Shift length	Micro (Street blocks)	Staffing duty (low)	Destination	Foot Patrol/ Crack Down	1–5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Stephensen (2017) (<i>n</i> = 24), Days: 245, E	USA	- Reported Crime - CFS	Reduction in crime (sig- nificant)	+	Officers per shift	NA (Not Men- tioned)	na (very low)	Destination	Foot and Motor Patrol/Hot spots	100–500 k
Taylor et al. (2011) (<i>n</i> = 83), Days: 90, E	USA	- Reported Crime - CFS	Reduction in crime (significant) & CFS (non- significant)	+	Dosage	Macro (Land parcel)	na (very low)	Destination	Motor Patrol/ Satura- tion Patrol Problem- orientated Policing	500 k–1 million
Telep et al. (2014) (<i>n</i> = 42), Days: 90, E	USA	- Reported Crime - CFS	Reduction in crime & CFS (signifi- cant)	+	Visits	Micro (Street Block)	GPS (ping: unknown) (high)	Destination	Foot Patrol/ Hot spots	100–500 k
Thaler (1977) (<i>n</i> = 1), Days: 365, NE	USA	- Reported Crime	No effect found	o	Officers per shift	Meso (Census tracts)	Calculation (very low)	General	Unknown/ General Patrol	100–500 k

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Walter et al. (2011) (<i>n</i> = 1), Days: 23, NE	UK	- Traffic Speed - Traffic Safety	Reduction in traffic speed (nonsignifi- cant) No effect found for traffic safety (use of mobile phone or seatbelt)	+	Visits	Meso (Street slip)	Observation (low)	Destination	Motor Patrol/ General Patrol	> 5 million
Weisburd et al. (2011) (<i>n</i> = 110), Days: 215, E	USA	- Fear of Crime	No effect found	+	Shift length	Micro (Street Segments)	Deploy- ment data (medium)	Destination	Unknown/ Broken Windows Policing Hot spots	100–500 k
Weisburd et al. (2017) (<i>n</i> = 1), Days: 365, NE	NA	- Reported Crime	Reduction in crime (sig- nificant)	+	Officers per shift	Meso (Bor- ough)	Model Vari- able (high)	Destination	Unknown/Hot spots	10–50 k
Williams and Coupe (2017) (<i>n</i> = 7), Days: 100, E	UK	- Reported Crime	Reduction in crime (sig- nificant)	+	Dosage	Micro (Hot spot grid)	GPS (ping; unknown) (medium)	Destination	Unknown/Hot spots	1–5 million

Table 1 (continued)

Authors (sample size, period of analysis, research design)	Country	Evaluation Effect	Finding	Level of police	Measure of presence	Unit of analysis	Accuracy	spatial focus	Type of police/polic- ing strategy	Population
Zech et al. (2005) (<i>n</i> = 2), Days: 26, E	USA	- Traffic Speed	Reduction in traffic speed (significant)	+	Officers per shift	Micro (Street slip)	Placement (high)	Destination	Motor Patrol/ Traffic Patrol	na

+ = increase, — = decrease, 0 = no change

C/S calls for service

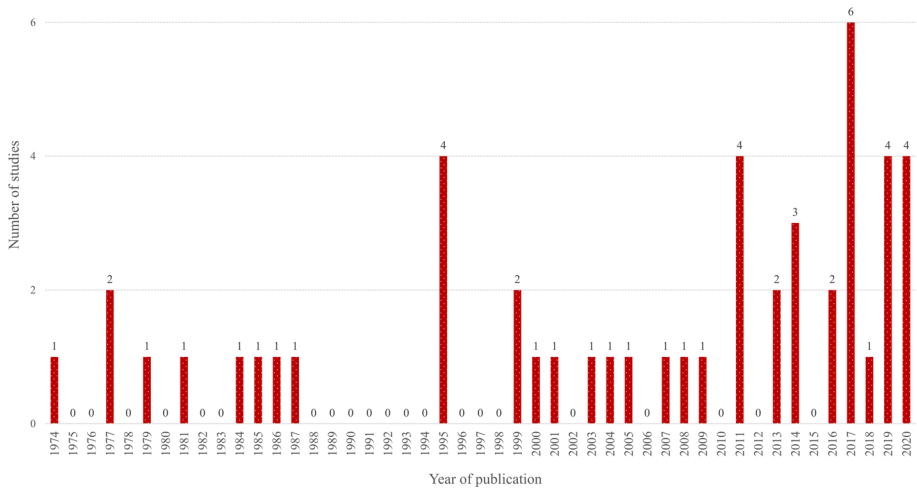


Fig. 2 Reviewed studies by year of publication

Quantitative Effects

Focused (on) Crime Deterrence

Evaluations of police presence focused predominantly on reducing reported crimes ($n=33$). Many studies show significant crime reduction effects, of which the majority implemented (controlled) experimental research designs with high validity ($n=17$). The extent to which police presence is reported to reduce crime varies wildly (e.g. Koper, 1995; Mitchell, 2017; Rosenfeld et al., 2014; Santos, 2013; Weisburd et al., 2017). As various hot spots experiments have established (e.g. Braga et al., 2014, 2019a, 2019b), crime can be reduced through focused police actions (Ratcliffe et al., 2011; Taylor et al., 2011). Focused police strategies aim their efforts at locations that experience elevated levels of crime and often focus on specific crime types (Sorg et al., 2013).

Further, Ariel et al. (2019) pointed out that reduction effects and their statistical significance depend on the baseline of police levels. Essentially, if area x receives comparably high levels of police presence in the first place, any added police forces will most likely show relatively little effects. Therefore, baseline levels of reported crime and police presence have to be considered before evaluating police actions (Ariel et al., 2019). Still, half of the reviewed studies found significant crime reduction effects as a result of police presence ($n=20$).

Police action does not just work best when focused on target areas but also when focused on certain types of crime. Police presence has particular strong crime reduction effects on motor vehicle theft (Collazos et al., 2020; Di Tella & Schargrodsky, 2004; Piza et al., 2020), violent crimes (Novak et al., 2016; Ratcliffe et al., 2011; Taylor et al., 2011) and property crime (Andresen & Lau, 2014). Similarly, gun-related crimes (Rosenfeld et al., 2014; Sherman & Rogan, 1995) and liquor infractions (Fitterer et al., 2017) experienced substantial reductions. Across most studies, significant crime reduction effects were found for specific crime types but not for all.

Table 2 Comprised summary of reviewed studies ($n=49$)

<i>Characteristics</i>		<i>N</i>	<i>Percent</i>
<i>Evaluation country</i>	United States	33	67.3
	United Kingdom	7	14.3
	Australia	2	4.1
	Canada	2	4.1
	Colombia	2	4.1
	Argentina	1	2.0
	Japan	1	2.0
	Theoretical model	1	2.0
<i>Publication type</i>	Journal article	43	87.8
	Dissertation/Thesis	3	6.1
	Report	2	4.1
	Book	1	2.0
<i>Research design</i>	Experimental	36	73.5
	Randomized controlled trial	13	26.5
	Quasi-experimental	16	32.7
	Non-experimental	13	26.5
	Observational	11	22.4
	Agent-Based model	1	2.0
	Natural Experiment	1	2.0
<i>Policing type</i>	Hot spots policing	20	40.8
	General Patrol	10	20.4
	Traffic Patrol	8	16.3
	Crackdowns	4	8.2
	Saturation Patrol	2	4.1
	Terror Patrol	2	4.1
	Broken windows policing	1	2.0
	Random Patrol	1	2.0
<i>Evaluated effect</i>	Reported crime	33	67.3
	Calls for service	14	28.6
	Traffic violations	9	18.4
	Fear of crime and security	6	12.2

Length vs. Frequency of Police Presence

The reviewed studies indicate that length of police visits matters more than frequency (see Koper, 1995; Williams & Coupe, 2017). Koper (1995) provided optimal police stop length of 11 to 15 min and showed that police stops have to last for more than ten minutes to generate any significant deterrent effect and be shorter than 20 min, as added presence does not add additional reduction effects. Williams and Coupe (2017), further, determined that increasing the average stop length by 85% (from 5.2 to 9.6 min) can reduce reported crime by up to 20%.

Ariel et al. (2019) introduced the ‘London Underground Paradox’ referring to the works of Koper (1995), stating that police forces have a statistically larger effect on crime while there was no police presence recorded. This can be well linked to the extension of the *Koper curve* (Koper, 1995) and *residual deterrence*. Residual deterrence describes that

effects of police presence, e.g. reduction in crime, persist for a certain amount of time even after officers left the place (Barnes et al., 2020; Stephensen, 2017; Williams & Coupe, 2017). *Initial deterrence decay* deals with the duration of reduction effects and is interested in how fast deterrent effects decay (Novak et al., 2016; Sisiopiku & Patel, 1999; Sorg et al., 2013). Sherman et al. (1995a) analysed police raids and reported that twelve days after the crackdowns crime reduction effects went back to baseline.

Displacement of Crime

One major concern with increased police presence is the displacement of crime, which describes the transition of reported crime from treatment to neighbouring areas (e.g. Haworth et al., 2013). Criminal activity is not prevented but merely *pushed around the corner* (Blattman et al., 2017). This has been the case for Sherman et al. (1995a) and Sorg et al. (2013). Both studies hypothesized that crime displacement resulted as a consequence of police actions. Consistent with this finding, Ratcliffe et al. (2011) reported a total of 37 displaced crimes during the Philadelphia foot patrol project. In spite of displaced crimes, the net reduction effect stood at 53 prevented violent crimes (Ratcliffe et al., 2011). Many studies accounted for crime displacement or found no support of this side-effect (e.g. Ariel et al., 2016; Collazos et al., 2020; Esbensen & Taylor, 1984; Rosenfeld et al., 2014).

Contrary to hypotheses of displacement, scholars have argued for spillover effects of police presence in form of diffusion of benefits, crime reduction effects extending into neighbouring areas around the target area (Eck & Weisburd, 1995). Piza et al. (2020) demonstrated that motor vehicle thefts decreased in neighbouring areas around the business improvement district in Newark. The ‘London Underground Paradox’ from Ariel et al. (2019) frames the diffusion of crime reduction effects as an outcome of expected police presence in adjacent police areas. Hence, police presence can generate crime reduction effects outside of treatment areas (Ariel et al., 2019; Piza et al., 2020).

Route and Patrol Choices

Reviewed studies suggest that officer discretion influences police practices. Davies and Bowers (2019) analysed police presence and police demand, modelled as the proportion of calls for service per street segment in a street network. Their evaluation attempted to analyse any potential match or mis-match of police resources. Overall, police presence and calls for service were rather balanced across all boroughs in the London Metropolitan area, with slightly higher proportions of police presence than calls for service. For cases of an evident mismatch, two rationales were presented. First, streets that connected a high number of streets were in close proximity of a police station, or classified as major roads received more police presence. Therefore, these streets function as main routes of police while on patrol or responding to calls for service because of their position in the road network (Davies & Bowers, 2019). Second, officer discretion was used to explain different provisions across street segments after controlling for road network characteristics. Davies and Bowers (2019) suggested that officers directed their presence consciously away from certain places, as they might house some form of undesirable social or environmental condition (e.g. land use, ‘no-go’ areas, or low collective efficacy).

Qualitative Effects

Fear of Crime and Feeling of Safety

The investigation into more qualitative effects of police presence on, for example, citizens' feeling of safety or satisfaction with police services remains at the side lines. Only about 12% ($n=6$) of all reviewed studies focus partially on broader themes of safety and public perceptions. In line with publicly held opinion, elevated police levels can lead to a decrease in the feeling of safety (Blattman et al., 2017; Hinkle & Weisburd, 2008). However, in many cases, no change in the feeling of safety nor fear of crime was detected (Kelling et al., 1974, 1981; Weisburd et al., 2011). Collazos et al. (2020) reported an increase in the perceived level of safety in crime hot spots for the six-month intervention period. After that, no differences in perception were examined between treatment and control area.

Interestingly, while reporting no changes in police legitimacy, fear of crime, nor in collective efficacy, Weisburd et al. (2011) found that an increase in police interventions increases perceived physical disorder (i.e. litter or broken windows). Thus, police presence might present a key factor in the individual perception of increased physical disorder and in priming citizens to experience certain areas as more disorderly (see Weisburd et al., 2011).

Appearance Matters

Research results suggest that police presence can reduce crime and traffic speeds (Ariel et al., 2016; Armour, 1986; Kaplan et al., 2000; Ravani & Wang, 2018), even when the presence regards unmanned police vehicles (Kaplan et al., 2000). Armour (1986), Kaplan et al. (2000) and Ravani and Wang (2018) have reported that effects of police presence are not associated with whether a police vehicle is occupied by an officer or not. The mere presence of a police car seems to suffice as a symbol of law enforcement, especially so in high-speed areas such as highways.

Interestingly, effects of stationary police presence versus mobile police presence have yielded mixed results (see Richards et al., 1985; Sisiopiku & Patel, 1999). Sisiopiku and Patel (1999) reported that a stationary police vehicle would lead to a short-term speed reduction. However, after passing the vehicle drivers accelerated back to their prior driving speed or above. Thus, the impact on traffic speeds remained little (Sisiopiku & Patel, 1999). In contrast, Richards et al. (1985) examined driving speeds at work zones and found that a police traffic controller and a stationary police car could reduce the mean speed by up to 26% and 22%, respectively. Although direct comparisons were not made for all six test sites, circulating patrol cars were only able to reduce the mean speed by about 5% (Richards et al., 1985).

As only one study (Ariel et al., 2016) has reported on the uniform style of patrol officers, or the vehicle paint for that matter, no conclusive or comparative results are available for the relationship between officer uniform style or police vehicle colouring and effects of physical police presence. Nevertheless, promising explorations into the significance of flashing lights have been made (Medina et al., 2009; Nakano et al., 2019). Nakano et al. (2019) found that drivers perceived police forces as more noticeable while flashing lights were active. Medina et al. (2009) observed distinct differences between the use of flashing lights and driving behaviour. An enforcement setup of a trailer equipped with activated flashing lights resulted in smaller effects than the deactivated setup. Rather than arguing for a high risk of apprehension, it is hypothesized that activated flashing lights indicate present

police forces are already busy with ongoing incidences and thus not available to enforce regulations on other passing vehicles (Medina et al., 2009).

Tracking Police Presence

Myriad approaches and technologies exist to measure police presence: staffing schedules (e.g. Kelling et al., 1974; Fritsch et al., 1999; Andresen & Lau, 2014; Ariel et al., 2019), officer radio data (e.g. Kelling et al., 1981; Rosenfeld et al., 2014; Santos, 2013; Schaefer et al., 2019) or GPS data (e.g. Ariel et al., 2016; Davies & Bowers, 2019; Mitchell, 2017; Williams & Coupe, 2017). In controlled experimental trials, police presence, i.e. a stationary police car placed in the test area, is an experimental condition and is not subject to measurement. This, however, was mostly the case for traffic-orientated research (see Richards et al., 1985; Zech et al., 2005; Walter et al., 2011; Ravani & Wang, 2018). In the past, officer's position was tracked through officer radio calls by headquarters or logbooks of computer aided dispatch. These constitute protocols of, respectively, officer-initiated communication and dispatcher-initiated activity.

GPS-based technologies have been confirmed as the most precise option to track and measure police presence, as they can collect positional and temporal information at a high rate (Ariel et al., 2016; Collazos et al., 2020). Trackers can be used in body-worn officer radios (Hutt, 2020) or installed in police vehicles as automated vehicle locators (AVL) (Mitchell, 2017). The lower the ping, the more precise the tracked geoinformation. In GPS tracking, a ping refers to the frequency of contacting satellites and sending positioning signals to the receiver. Thus, a ping of ten seconds means that the GPS tracking device sends GPS coordinates every ten seconds to the receiver. Barnes et al. (2020) have been able to track police activity with a ping of nine seconds using smartphones tracking devices.

Data can be linked to a certain level of spatial abstraction. Research has shown that analyses on the microlevel, i.e. street segments or intersections, yield more conclusive results and detect small spatial changes (e.g. Ariel et al., 2019; Davies & Bowers, 2019; Weisburd et al., 2011). This trend also becomes evident throughout research on police presence, as around 60% of studies in this review focused on microgeographic units. However, depending on the research design and effect of interest, using microlevel units is not always feasible (see Schnelle et al., 1977; Thaler, 1977; Sherman & Rogan, 1995; Novak et al., 2016).

The level of police can be determined by measuring the number of officers per shift (see Thaler, 1977; Esbensen & Taylor, 1984; Bowers & Hirsch, 1987; Fitterer et al., 2017), the shift length of officers in target areas (e.g. Armour, 1986; Sorg et al., 2013; Weisburd et al., 2011) or by the number of minutes spent or visits conducted by police forces (e.g. Ariel et al., 2016, 2019; Barnes et al., 2020; Schaefer et al., 2019). The level of police presence is dependent on tracking precision. The tracking technology needs to be so precise that detailed information, i.e. minutes spent in location x, can be retrieved.

Williams and Coupe (2017) introduced a distinction between measured presence as patrol minutes versus officer minutes. This presents two important results and considerations. First, the use of police dosage as minutes spent or visits paid constitutes the best practice to measure actual presence. Second, this distinction allows to adjust findings by the number of police officers or vehicles present and addresses a prevalent problem within police research. Many studies did not mention the size of the police units nor gave detailed descriptions of other characteristics (e.g. Davies & Bowers, 2019; Hutt, 2020; Mehay, 1979; Stephensen, 2017).

Schaefer et al. (2019) and Collazos et al. (2020) reported on initiated measures to enhance officer compliance. Williams and Coupe (2017) provided evidence that officer compliance was relatively low. Officer minutes and patrol minutes were recorded at 90% and 54%, respectively. On average, when officers reported back to be engaged in 15-min patrols, they actually just spent around 10 min on in the assigned target area (Williams & Coupe, 2017). This constitutes an overall compliance rate for 15-min patrols of 67%. Ariel et al. (2016) reported average patrol time per visit to be at 8 min, which constitutes a compliance rate of 53%.

Discussion

Longer and Focused Police Presence

Police presence is most effective when focused on specific places and specific types of crime, in particular motor vehicle theft, violent crimes, property crime, gun-related crimes and liquor infractions (see Ratcliffe et al., 2011; Taylor et al., 2011; Sorg et al., 2013; Novak et al., 2016; Fitterer et al., 2017). All mentioned crime types have one aspect in common, they are rather easily detectable in public spaces and, thus, more policeable for officer. Further, police actions can be focused on a temporal scale. Deriving from routine activity theory, certain times of the day, or seasons, appear to be more prone to specific criminal activity (e.g. Felson, 2002, 2008; Felson & Eckert, 2018).

When police forces focus on specific places, times and crimes, visits in the target areas have larger effects on crime reduction when they are longer rather than more frequent (Koper, 1995; Mitchell, 2017; Williams & Coupe, 2017). Optimal visits last between 11 and 15 min each and deterrent effects of these visits can last up to 4 days (see Koper, 1995; Barnes et al., 2020). Three considerations emerge here. First, officer compliance with given patrol orders can possibly be a great factor in their effectiveness, both, on crime reduction and traffic enforcement (see Davies & Bowers, 2019). Williams and Coupe (2017) have provided estimates that officers' compliance lies at 67%. Cutting visits by these 33% might substantially alter police presence effectiveness, as ordered police visits of 10 to 15 min may result in actual police presence of 6.7 to 10.05 min. Thus, optimal visit length, theoretically, can only be achieved when assigning officers with visit lengths of 14.9 to 22.3 min. Second, as past research indicates that deterrence effects experience a slow decay in the first 4 days and will diminish after 12 days (Barnes et al., 2020; Sherman et al., 1995a), researchers and practitioners can learn from this to adapt general deployment patterns. One possible aim is to focus police presence on a specific place, time, crime type and ensure physical presence of 10 to 15 min per visit. Accounting for slow decays can free police resources and provide departments with more capabilities to respond to incidents or develop more specific policing strategies. Third, questions regarding the reasons why longer visits are more effective than more frequent ones potentially hold path-breaking insights into policing. For instance, police forces might benefit from a disruptive momentum as their visits suddenly change the current environmental setup and citizens become aware of their presence. After a certain amount of time the police presence might be regarded as inherent to the place and police forces are less consciously recognized.

Characteristics of Presence

Police presence is influenced by its nuanced characteristics. Evidence was presented that unit size (Armour, 1986; Kaplan et al., 2000; Ravani & Wang, 2018; Williams & Coupe, 2017), use of flashing lights (Medina et al., 2009; Nakano et al., 2019) and vehicle mobility (Richards et al., 1985; Sisiopiku & Patel, 1999) influence crime reduction, traffic regulation or perception effects of police presence. Simpson (2019) and Simpson et al. (2020) found that police cars with a black and white vehicle paint are more positively received than white and blue models and that the placement of an officer ‘dummy’³ can reduce traffic speed on busy urban roads. Thus, it is fair to assume that extrinsic details of police presence are an important factor to consider.

Which vehicle colour can produce the greatest deterrent effects or reduce fear of crime most effectively? Will the use of flashing lights and sirens be perceived as an indicator for watchful guardians or busy law enforcers? Should officers drive more slowly through certain areas to enhance their level of presence or remain stationary during their focused visit? The answering of these questions requires more detailed reporting of police actions.

Officer-Led Policing

Officer time is accounted for very little and a proportion of their time remains unassigned (e.g. Kelling et al., 1974; Cordner, 1979; Cordner, 1981; Famega, 2005; Famega et al., 2005). Officer compliance with orders in terms of patrol time appears to be rather low (Williams & Coupe, 2017). Patrol and routing decisions seem to lie at the officers’ discretion (Davies & Bowers, 2019) and officers regard this discretion and freedom to patrol quite highly (Koper et al., 2020). Further, Koper et al. (2020) showed that just 56% of larger police departments in their nationwide survey use crime analysis regularly. Without proper crime analysis police forces cannot be optimally guided while on patrol. This evidently leaves a margin for subjective bias. We suggest two improvements.

First, practitioners and researchers alike could benefit from using state of the art technology to examine officers’ compliance with policing directives. Past research has indicated that not all data types allow to gather information on actual police presence (see Kelling et al., 1974; Schnelle et al., 1977; Esbensen & Taylor, 1984; Fitterer et al., 2017). GPS tracking of police activities allows for precise measurement of presence and utilizing big data analyses can shed new light on traditional assumptions of police work (Barnes et al., 2020; Davies & Bowers, 2019; Williams & Coupe, 2017). For quite some time now, researchers have been interested in what officers do and how they patrol (Groff et al., 2015; Wuschke et al., 2018). Making use of precise tracking technology and big data analytics can help researchers to pinpoint effects of different policing styles and enable police departments to test their effectiveness. Several reviews have confirmed the effectiveness of policing strategies, such as hot spots or community policing (see Braga et al., 2014, 2019a, 2019b; Braga & Welsh, 2016). Logically, these strategies have to be implemented as planned to generate effects on crime, disorder, or traffic violations.

³ Simpson et al. (2020) have placed a metal police cut-out or “Constable Scarecrow” to test effects of inanimate police presence.

Second, as almost half of the larger police departments do not deploy sophisticated crime analysis, the prevalence rate of crime analysis can be assumed to be lower in smaller police departments due to limited resources (see Koper et al., 2020). Weisburd et al. (2015) have shown that the concentration of crimes differs between larger and smaller cities. While 6% and 1.6% of street segments in larger cities caused 50% and 25% of all reported crime, respectively, only 3.5% and 0.7% did so in smaller cities (Weisburd, 2015). It remains important that findings are not blindly adapted across structurally different departments and cities but that police are enabled to conduct local crime analysis in order to focus their resources optimally.

Police En Route

All identified research on police presence concentrated either on evaluations in specific destinations or across entire jurisdictions. The majority ($n=33$) examined effects of police presence in small destinations such as crime hot spots or busy streets (e.g. Ariel et al., 2016, 2019; Barnes et al., 2020; Cohen et al., 2003; Collazos et al., 2020; Ravani & Wang, 2018; Williams & Coupe, 2017). The scope of ‘destination-orientated’ research is inevitably limited to small proportions of officers’ time during shifts. Police officers have to move often between destinations, when they are implementing optimal length visits of around 15 min. Ariel et al. (2016) have shown that distances between destinations averaged at 1.6 km and Barnes et al. (2020) noted average distances of 2.5 km, with a maximum of 5.2 km. Assuming, conservatively, an actual visit length of 15 min per destination and a distance of 2 km at a travel speed for foot patrols of 5 km/h, presence at destinations account for approximately 39% of the officer time per shift.⁴ Thus, the remaining 61% of officer time is spent travelling between destinations or back to police stations. Although patrol and response are mostly carried out with police vehicles, this proportion presumably will be lower in rural jurisdictions with larger distances between destinations (Schaefer et al., 2019).

It could be relevant to study police efforts by not just looking at what are effects of police presence at destination but en route. This holds at least three potential improvements. First, shift time is included in its entirety. Destination-orientated approaches focus on a small fraction of shift time and more general perspectives, i.e. at the police beat or city level, mask differences in the microlevel effects of police presence in particular destinations and in transit. Considering that patrol officer compliance was estimated to be around 53 to 67%, evaluations have so far focused on small windows of officer time. Second, police routes can experience novel research, apart from classic framing of routes as shortest paths between response events (Dewinter et al., 2020; Lee et al., 2017; Melo et al., 2006; Reis et al., 2006; Wu et al., 2020). Police presence en routes might have (or not have) important effects we do not know anything about yet. Third, encompassing police presence in destinations and en route might facilitate an extension of analysis to look at effects not just in terms of crime reduction but traffic safety, citizen satisfaction with police services, accounts of personal fear of crime and trust in police. Thus, a more conclusive picture on the effects of police presence and its optimal allocation can be drawn, for all types of police work.

⁴ Calculation based on data available from Ariel et al. (2016).

To achieve the differentiation between time spent in destinations and *en route*, police presence can be tracked with high precision on the microlevel, i.e. street segments. However, analysing police presence on this level might not always be feasible due to lack of data or small sample sizes (see Bernasco & Steenbeek, 2017). Thus, variables of interest, crimes, calls for service, traffic data and police presence can be collected at the most detailed level and, if needed, aggregated to an appropriate unit of analysis.

Seeing and Being Seen

The greatest limitation of police presence analysis is that solely by looking at the data we cannot decode what police officers are doing in the field. This requires more qualitative empirical research and reconsiderations of integral assumptions of deterrence as well as routine activity theory. Following these theories, potential offenders must recognize police officers and be deterred from conducting crimes or notice the absence of police forces and deem the risk low enough to act (see Felson & Clarke, 1998; Felson, 2002, 2008; Durlauf & Nagin, 2011; Nagin, 2013; Paternoster & Bachman, 2013). These perspectives focus strongly on offenders' action and perception of risk. Although one limitation of motor patrol was acknowledged to be the inability to detect crimes due to high travel speeds (see Schnelle et al., 1977), no research has been identified that investigates into the effects of more proactive officer behaviour in terms of actively detecting criminal activity. Borrowing from Jacobs (1962), police officers can have their and can be our 'eyes on the street'. Research could examine whether police can deter crimes, regulate traffic or improve citizen perception of safety through the actions they perform or through merely being present.

Police Routines?

As shown in the result section, a majority of the reviewed studies have focused on either *hot spots* or *general police patrol*. In contrast, conceptualizations of general or routine patrol comprises remains vague. In an earlier review, we attempted to summarize important findings in regard to routine patrol (Dau et al., 2020). It turned out that research lacks clear understanding of the routines of patrol officers or how much specialized policing styles influences the everyday routines of officers in the field. As a consequence, this review opted for a definition of police presence rather than policing or patrolling styles at large. Further discussions about (1) how we measure where police are present and (2) what they do while they are present could potentially benefit future research on policing from various disciplines. This would require complex mixed methodologies to uncover, both, the quantitative and qualitative aspects of police patrol.

Deterrence or Incapacitation

The majority of police presence evaluations focus on the link between police and crime. Still, the evident focus is on reported crime rates rather than including multiple variables (e.g. victimization rates, clearance rates, incarceration rates). As crime rates might be understood as a variable for situational crime prevention strategies,

clearance rates could address the issue of repeat offending in relation to police actions (see Mastrobuoni, 2019, 2020). Interestingly, the combination of crime and clearance rates could draw a more conclusive picture of crime prevention (e.g. Weisburd, 2021). Crime rates can act as a measure of crime that did not take place, presumably due to reduced opportunity of crime, and clearance rates can indicate how police actions can increase or decrease the odds of charges being laid. It has to be noted, that the investigation into the link between police presence, crime, as well as clearance rates requires sophisticated data reporting and access. This might constitute one reason why, to date, no studies have attempted to use this data triangulation.

Limitations

Although more than ten academic databases were searched, one relevant discussion paper was not yielded during the search phase (Blanes i Vidal & Kirchmaier, 2018). This natural experiment from an economics background did not find evidence that an increase in police presence leads to decreases in reported crime rates. Further, the keyword selection and thus the entire search was influenced by classic and contemporary terminologies in criminology research. This could be one explanation for the high representation of studies that focus on the link between police presence and crime rates ($n=33$). Due to a lack of consistency in reporting, this systematic review does not include a meta-analysis (Forero et al., 2019). Thus, the presented findings summarize overall tendencies or effect direction of police presence but cannot account for definite effect sizes (see Braga et al., 2015).

Recommendations and Future Avenues

Practice

- i. Deploy police forces in a focused manner, in terms of area, time and crime type.
- ii. Utilize traditional and novel methods for crime analysis to identify pressing problems within local jurisdictions.
- iii. Deploy police resources to generate optimal police dosage of around 15 min per visit.
- iv. Evaluate departmental compliance with policing and patrolling directives and offer high-quality officer training to make officers capable of acting at their discretion.

Research

- v. Report general information and characteristics of police department and patrol strategies at focus (i.e. unit size, vehicle appearance, use of flashing lights, uniform style, etc.).

- vi. Conduct more holistic analyses, to distinguish between officer time or patrol time spent in patrol or service destinations and en route.
- vii. Pursue interdisciplinary research to obtain more conclusive results on the effects of police presence and link different types of effects (i.e. crime prevention, traffic regulation, public feeling of safety).

Policy

- viii. Reassess and consolidate key performance indicators for police work. Extend the scope beyond crime rates to evaluate success of deployed police actions.
- ix. Prompt a public discussion of what the police can and should contribute to society. Do we need tactical crime fighters to ensure public order or prevention-orientated agents to report on and solve social problems?
- x. Raise public funding for police forces and set up clearly defined police programs. Ensure that police departments, from small to large, have the resources to conduct the appropriate level of crime analysis to identify local problems and develop evidence-based solutions.

Conclusion

This systematic review of 49 studies provides substantial evidence that police presence can generate significant positive effects for crime prevention, traffic regulation, and citizens' feeling of safety, when police efforts are focused on specific areas, times, and crime types. Achieving significant impact on crime prevention and extending deterrent effects requires longer rather than more frequent police visits. Further, compliance with police directives can ensure that police are present in the target areas for the ordered amount of time. We see that effects of police presence are more complex than reported in the past. Both, the appearance of police as well as the type of effect studied are interdependent and require more inter-disciplinary research. Evidence-based research into police presence, with a focus on, both, the locations where they are spending time as well as the routes which connect these locations can draw a more conclusive picture of what police can do about crime, traffic violations, and public fear of crime. Police presence affects along different dimensions and mapping all of these can improve police practices and policing strategies.

Appendix

Table 3 Detailed summary of reviewed studies ($n = 49$)

<i>Characteristics</i>		<i>N</i>	<i>Percent</i>
<i>Evaluation country</i>	United States	33	67.3
	United Kingdom	7	14.3
	Australia	2	4.1
	Canada	2	4.1
	Colombia	2	4.1
	Argentina	1	2.0
	Japan	1	2.0
	Theoretical Model	1	2.0
<i>Publication type</i>	Journal article	43	87.8
	Dissertation/Thesis	3	6.1
	Report	2	4.1
	Book	1	2.0
<i>Research design</i>	Experimental	36	73.5
	Randomized controlled trial	13	26.5
	Quasi-experimental	16	32.7
	Non-experimental	13	26.5
	Observational	11	22.4
	Agent-based model	1	2.0
	Natural experiment	1	2.0
<i>Days of evaluation</i>	Min	7	
	Max	2,387	
	Mean	349.7	
	SD	482.9	
<i>Policing type</i>	Hot spots policing	20	40.8
	General Patrol	10	20.4
	Traffic Patrol	8	16.3
	Crackdowns	4	8.2
	Saturation Patrol	2	4.1
	Terror Patrol	2	4.1
	Broken windows policing	1	2.0
	Random Patrol	1	2.0
<i>Mode of policing</i>	Motor Patrol	23	46.9
	Foot Patrol	20	40.8
	Bike Patrol	1	2.0
	Unknown	13	26.5
<i>Evaluated effect</i>	Reported crime	33	67.3
	Calls for service	14	28.6
	Traffic violations	9	18.4
	Fear of crime and security	6	12.2
<i>Effect Assessment</i>	Significant	31	63.3
	Nonsignificant	10	20.4
	No effect found	11	22.5

Table 3 (continued)

<i>Characteristics</i>		<i>N</i>	<i>Percent</i>
<i>Effect direction</i>	Positive	38	77.6
	Negative	2	2.0
	No effect found	11	22.5
<i>Number of police</i>	Increased	42	85.7
	Decreased	2	4.1
	No difference	5	10.2
<i>Unit of police presence</i>	Officers per shift	13	26.5
	Dosage	13	26.5
	Shift length	9	18.4
	Visits	4	8.2
	Logged hours	2	4.1
	Not measured	8	16.3
<i>Measure of police presence</i>	Staffing and deployment	15	30.6
	GPS-Tracker	8	16.3
	Radio logs and calls	6	12.2
	Experiment condition	6	12.2
	Computer aided dispatch	3	6.1
	Observation	3	6.1
	CCTV	1	2.0
	Estimation	1	2.0
	Not reported	7	14.3
<i>Accuracy of measure*</i>	very low	8	16.3
	low	17	34.7
	medium	8	16.3
	high	16	32.7
<i>Unit of analysis**</i>	Micro	30	61.2
	Meso	13	26.5
	Macro	5	10.2
	Not mentioned	1	2.0
<i>Spatial units under analysis (n = 49)</i>	Min	1	
	Max	5,697	
	Mean	282.3	
	SD	974.5	
<i>Spatial focus</i>	Destination	33	67.3
	General	16	32.7

*Very low: no mention of measurement, unclear basis for calculations

Low: staffing schedules, observations, hand written patrol logs

Medium: deployment data, radio log and call data

High: GPS tracking, experimental placement

** Micro: grid cell, street segment

Meso: neighbourhood, police zone

Macro: city, state

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Author Contribution PMD: conceptualization, data curation, investigation, methodology, visualization, writing—original draft. CV: conceptualization, methodology, validation, supervision, writing—review and editing, funding acquisition. MD: writing—review. FW: supervision, funding acquisition. TVB: supervision, writing—review and editing, funding acquisition.

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Declarations

Conflict of Interest The authors declare no conflict.

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