



Hot Spot Policing

Toolkit technical report

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This report is produced in collaboration with staff from the Campbell Collaboration Secretariat. It is a derivative product, which summarises information from Campbell systematic reviews, and other reviews, to support evidence-informed decision making’.

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Hot Spots Policing: YEF Technical Report

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Summary

This technical report reviews the evidence on the effect of hot spots policing on the involvement of children and young people in crime and violence. The report is based on a recent systematic review and meta-analysis by Braga et al., (2019b).

Crime “hot spots” are small areas, typically within a city, where there is a high rate of criminal behaviour. A place may include an entire neighbourhood, or smaller loci such as shops, homes, apartment buildings, street corners, public transport stations or shelters, and airports.

Research has shown that in cities with high crime rates the locations of these crimes are not distributed evenly, and the majority take place in clusters, or hot spots (Weisburd et al., 2012). Weisburd (2015) identified a tight bandwidth of locations (around 5%) were responsible for more than half of the reported crime. The hot spots within a police force’s jurisdiction are identified using advanced crime mapping software (Braga et al., 2019b).

Hot spots policing interventions involve a police force identifying the clusters where crime is most likely to take place and focusing resources in these areas. The core presumed causal mechanism is that most crimes occur in clusters of places, or hot spots, and by increasing police presence and activities in those areas, crime can be reduced. This will reduce crime according to deterrence theory since deterrence is greater if a crime is more likely to be detected. Rational choice theory, that individuals make rational choices to achieve desirable outcomes is another potential causal mechanism.

There are two broad categories of hot spots policing interventions: problem-oriented policing and increased policing presence. Problem-oriented policing mostly aims to “change the underlying conditions and situational dynamics that caused problems to recur in high-activity

crime places” (Braga et al., 2019b, p. 10). Saturated policing mostly aimed to increase police presence.

Braga et al. (2019b) included 65 evaluations of hot spot policing interventions, the majority of which were conducted in the USA (78.5%). Four evaluations were conducted in the UK.

Hot spots policing has a desirable impact on children and young people’s involvement in crime and violence. Overall hot spots policing reduces offending by 17%. But the effect varies by type of crime, with the largest effects in those crimes which most plausibly involve a higher proportion of young people: violent crime (14%), property crime (16%), disorder offences (20%), and drug offences (30%). In addition, problem-oriented policing interventions were associated with a slightly greater mean effect size compared to increased policing presence.

There is a small diffusion effect, suggesting that the beneficial effects of the hot spots policing programme may be diffused into neighbouring areas rather than displacing the criminal activity (i.e., crimes are simply “moved” from one area to another).

The review of Braga et al (2019b) includes four evaluations from the UK:

- Fielding and Jones (2012) evaluated a hot spots policing intervention at the Trafford Basic Command Unit of the Greater Manchester Police. The intervention used predictive policing to inform directed police patrols. Domestic burglary decreased in both the experimental and control groups, but the decrease was only significant in the experimental group.
- Williams (2015) conducted an evaluation of a hot spots policing intervention in Birmingham, UK with the West Midlands police. Target areas received increased patrols, of between 5 and 15 minutes in length. Hot spots in Birmingham that received increased patrols saw a 14% reduction in street crimes and antisocial behaviour compared to comparison hot spots. Crime also decreased in areas surrounding the target hot spot suggesting that there were positive diffusion effects of the intervention.

- Ariel et al. (2016) evaluated the effectiveness of 'Operation Style' in Peterborough. Crime was reduced by 39% in target areas and calls to emergency services also decreased by 20% in comparison to those in control areas. The analysis also showed significant interaction effects, whereby the number of visits and length of patrol were associated with reductions in calls to emergency services and crime.
- Ariel and Partridge (2017) conducted a randomised controlled trial of Operation Menas in London, England which involved increased visible police patrols at bus stops and a 50-metre buffer zone. During the intervention, a double patrol team of uniformed officers patrolled the target area three times a day, for 15 minutes each time. There was a 37% reduction in incident reports by bus drivers during active patrol hours at the bus stops and the surrounding 50 metres in comparison to control areas. There were no significant changes in the 100-150 metre zone around bus stops.

The Ariel et al. (2016) study also reports a cost-benefit analysis, finding that the benefits from hot spot policing are at least six times greater than costs.

Objective and approach

This technical report reviews the evidence on the effect of hot spots policing on the involvement of children and young people in crime and violence. The report is based on a recent systematic review and meta-analysis by Braga et al. (2019b). The following inclusion and exclusion criteria were used to inform the selection of systematic reviews.

Inclusion criteria

Included in this technical report were systematic reviews and meta-analyses of the effects of hot spots policing on youth antisocial behaviour, juvenile delinquency, and/or offending.

Exclusion criteria

Reviews were excluded for the following reasons:

- The review was a journal publication of a more extensive Campbell Collaboration systematic review and meta-analysis (i.e., Braga et al., 2019a).
- The review was an older version of a more recent updated systematic review (i.e., Braga, 2001; Braga et al., 2014).

Outcomes

Braga et al. (2019b) included evaluations of hot spots policing interventions on officially recorded levels of crimes. These included crimes measured by crime incident reports, citizen emergency calls for service, and arrest data. Also included were “systematic observations” of disorder (Braga et al., 2019b, p. 5). This incorporated several outcomes, such as, social disorder outcomes such as loitering, public drinking, solicitation of prostitutes and physical disorder of places, indicated by the presence of litter, broken windows, graffiti, abandoned homes and vacant lots in an area. Braga et al. (2019b) also included evaluations that reported displacement/ diffusion effects of hot spot policing. These outcomes refer to the observation that when police presence increases in one area (i.e., due to a hot spot policing intervention) that criminal activity may be displaced and moves to a neighbouring area with a lower police presence (though this, overall, is not the case).

The review reported a mean effect size for an overall crime composite outcome and for violent crime, property crime, disorder outcomes, and drug crime.

Description of interventions

Crime “hot spots” are small areas, typically within a city, where there is a high rate of criminal behaviour. Research has shown that in areas with high crime rates, the locations of these crimes are not distributed evenly, and the majority take place in clusters, or hot spots (Weisburd et al., 2012). Hot spots policing interventions involve a police force identifying the clusters where crime is most likely to take place and focusing resources in these areas. The hot spots within a police force’s jurisdiction are identified using advanced crime mapping software (Braga et al., 2019b).

Braga et al. (2019b) outline that ‘focused police interventions’ include activities such as directed patrols, proactive arrests, and problem-oriented policing. In the UK, the College of Policing describe problem-oriented policing as a collection of approaches where a particular problem is identified (e.g., street drug dealing) and then a police force tailors an intervention and response to the specific issue. The evaluations included in the review by Braga et al. (2019b) incorporated a wide range of activities, that are described as:

- Traditional enforcement tactics and situational responses¹.
- Presence of undercover and ‘plain clothes’ police officers on street corners where drugs are sold or targeting or raids of ‘crack houses’ or similar locations where drugs are known to be made, dealt or used.
- Actively monitored CCTV, roadblocks, patrols with licence plate recognition technologies.
- Uniformed police patrols, increased police presence, increased police visibility, directed patrols, increased patrols during high-risk times.
- ‘Intensive enforcement of laws’ surrounding firearms and concealment of firearms through traffic stops and searches, arrest-driven targets.
- Targeting of known repeat offenders or increased surveillance of prominent nominals
- Aggressive disorder enforcement tactics².
- Problem-oriented policing and zero tolerance policies.
- Increased monitoring of particular locations by private security.
- Neighbourhood clean-ups, community engagement, or proactive contact with residents/businesses.

Braga et al. (2019b) describe that there were two broad categories of hot spots policing interventions, namely, problem-oriented policing ($n = 27$) and increased traditional policing presence ($n = 51$). Problem-oriented policing mostly aims to “change the underlying

¹ Traditional enforcement tactics is not explained in more detail, although we have assumed that this refers to increased police patrols and targeted arrests in high crime areas.

² Aggressive disorder enforcement tactics is not explained in more detail, although we have assumed that this refers to activities such as increased arrest quotas for specific crimes, increased vigilant patrols, zero tolerance policies, and increased stop and searches.

conditions and situational dynamics that caused problems to recur in high-activity crime places” (Braga et al., 2019b, p. 10). Increased traditional policing mostly aimed to increase police presence and enforcement activities. Activities in the increased traditional policing interventions most often included increased foot or vehicle patrols ($n = 31$), drug enforcement operations ($n = 6$), offender-focused apprehension programmes ($n = 4$), or actively monitored CCTV with directed patrol ($n = 3$).

Implementation setting and personnel

Hot spots policing interventions are implemented by police forces and individual police officers in areas with a high rate of crime. These interventions take place in areas described as “high-activity crime places” (Braga et al., 2019b, p. 5). For example, a place may include an entire neighbourhood, or smaller loci such as shops, homes, apartment buildings, street corners, public transport stations or shelters (e.g., bus stops), and airports. Braga et al. (2019b) included evaluations of hot spots policing where a specific neighbourhood or community was the unit of analysis, but also evaluations where the unit of analysis was a much more specific location.

Duration and scale

The evaluations included by Braga et al. (2019b) involved very different intervention periods. Some hot spot policing interventions were implemented for only 1 week, whilst others were implemented for up to 3 years.

Theory of change/presumed causal mechanisms

Hot spots policing is a crime prevention initiative that incorporates multiple criminological theories that explain the presumed causal mechanisms. Namely, deterrence theory, rational choice theory, routine activities, and environmental criminology (Braga & Clarke, 2014; Braga & Schnell, 2018; Braga et al., 2019b). The core presumed causal mechanism is that most crimes occur in clusters of places, or hot spots, and by increasing police presence and activities in those areas, crime can be reduced.

Deterrence theory posits that a crime can be prevented if a potential offender considers the costs of offending (i.e., punishment or sanctions) outweigh the benefits. In hot spot policing

interventions, the application of deterrence theory suggests that by increasing police presence and visibility in an area where crime is likely to occur, one can deter potential offenders from committing a crime (Nagin et al., 2015). Important factors in deterrence theory are the certainty of detection of an offence, the swiftness of punishment, or the severity of the punishment. Thus, by increasing police presence in an area, hot spot policing interventions may have a deterrent effect (Braga et al., 2019b).

Broadly, rational choice theory suggests that offenders make decisions about whether to commit crime based on their likelihood of being apprehended and punished (Pratt, 2008). Routine activities theory suggests that crime takes place when an offender and victim are together (in time and place) in the absence of a capable guardian (Cohen & Felson, 1979). Thus, police can reduce crime by altering an offender's perception of their likelihood of being detected and punished (rational choice), while also minimising opportunities for victims and offenders to come together and acting as capable guardians (routine activities). Police do this by increasing their presence in high crime areas through hot spot policing. Similarly, environmental criminology suggests that the attributes of a particular place (e.g., blind alley) can increase the opportunities for potential offenders and so police can reduce crime by altering the environment of the place (Weisburd et al., 1992).

Evidence base

Descriptive overview

Braga et al. (2019b) included 65 evaluations of hot spot policing interventions, the majority of which were evaluated in the USA (78.5%). Four evaluations were conducted in the UK. Most of the evaluations used a quasi-experimental research design (58.5%) and the remainder used randomised controlled trials. Hot spots policing interventions were most commonly implemented in medium (population 200,000 – 500,000 residents; $n = 27$) or large cities (population over 500,000; $n = 25$).

Assessment of the evidence rating

We have confidence that, at the time of writing, the review by Braga et al. (2019) represents the best available evidence on the effectiveness of hot spots policing on our outcomes of

interest. Our decision rule for determining the evidence rating is summarised in the technical guide.

Two independent coders used a modified version of the AMSTAR2 critical appraisal tool to appraise the review by Braga et al. (2019). According to this tool, the review by Braga et al. (2021) was rated 'high'. The results of this assessment are summarised in Annex 3.

The review adequately specified the research question and the inclusion/exclusion criteria. The inclusion criteria included components relating to the population, intervention, comparison group and outcome of interest. Braga et al. (2019b) included evaluations of hot spot policing where an experimental area was compared to an area that received regular policing (i.e., a treatment as usual control group). Random and non-random allocation procedures were eligible for inclusion. Areas, or the population in this case, included in the evaluation had to be labelled a crime hot spot or an area with a high rate of criminal activity and an evaluation had to report effects on officially recorded levels of crime. The types of hot spots policing interventions that were included were "traditional tactics" such as directed police patrols or heightened levels of traffic enforcement (Braga et al., 2019b, p. 5). Other types of interventions included aggressive disorder enforcement, problem-orientated policing, and police 'crackdown programmes' that were focussed on a particular place. Braga et al. (2019b) did not restrict their inclusion criteria based on publication status, but do not specify whether they excluded studies based on language.

Braga et al. (2019b) was an updated review and was published with the Campbell Collaboration. The final report does not refer to a protocol. The review reported a comprehensive literature search strategy including a number of different databases, designated keywords and search strategies. Braga et al. (2019b) also searched bibliographies of existing reviews, contacted authors and experts directly, and searched studies that had referenced seminal hot spot policing studies. Evaluations that met the inclusion criteria for were coded by the four authors.

Braga et al. (2019b) conducted a risk of bias analysis using the Campbell risk of bias assessment tool and report a thorough explanation of the results. The authors also declared the source of funding and declared any possible conflict of interest.

The review team computed a meta-analysis, reported detailed information on the synthesis and estimation of weighted effect sizes and adequately reported the heterogeneity between primary effects. They also examined a number of possible reasons for heterogeneity, such as, the programme type and publication bias.

Braga et al. (2019b) provide a direct estimate of the effectiveness of hot spots policing programmes on crime based on 62 studies and this is the effect size that informs our headline impact estimate. The results are significantly heterogeneous ($I^2 = 80.15$, $p < .001$) and the mean effect is not reported independently for children and young people. The review is rated 'high' on the AMSTAR2 tool, so the overall evidence rating is 3, marked down due to the heterogeneity and the indirect nature of the estimate for understanding the impact on children and young people. Braga et al. (2019b) also report the effects of hot spot policing interventions of different types of crimes.

Impact

Summary impact measure

Based on the meta-analysis by Braga et al. (2019a; 2019b) the findings suggest that hot spots policing have a desirable impact on children and young people's involvement in crime and violence. The mean effect sizes are summarised in Table 1.

Table 1

Mean effect sizes from Braga et al. (2019b).

Outcome	<i>n</i> studies	ES (<i>d</i> and OR)	<i>p</i>	% reduction	Evidence rating on crime and violence
Composite crime outcome	62	<i>d</i> = 0.132 OR = 1.27	.001	17%	3

Violent crime**	44	$d = 0.102$ OR = 1.20	.05	14%	3
Property crime	26	$d = 0.124$ OR = 1.25	.05	16%	3
Disorder offences	15	$d = 0.161$ OR = 1.34	.05	20%	3
Drug offences	10	$d = 0.244$ OR = 1.56	.05	30%	3

Note: ES = the weighted mean effect size; p = the statistical significance of the mean ES; OR = odds ratio; d = Cohen's d ; n = number of studies; ns = not significant; ** = headline impact estimate.

In order to convert the d measures to a percentage reduction, we first used the equation: $\ln(\text{OR}) = d / 0.5513$ (Lipsey & Wilson, 2001). Then we assumed that there were equal numbers ($n = 100$) in the experimental and control conditions, and that 17% of persons in the control condition committed a violent offence (or 25% for non-violent offences).

This calculation shows that overall hot spots policing reduces offending by 17%. But the effect varies by type of crime, with the largest effects in those crimes which most plausibly involve a higher proportion of young people: violent crime (14%), property crime (16%), disorder offences (20%), and drug offences (30%).

Moderators and mediators

In addition to reporting outcomes for different types of crime (see Table 1), Braga et al. (2019b) conducted a moderator analysis to compare the types of hot spots policing interventions included in their meta-analysis. The results showed that problem-oriented policing interventions were associated with a slightly larger mean effect size ($d = 0.164$, $df = 24$, $p < .001$; $I^2 = 86.63$) in comparison to increased traditional policing programmes ($d = 0.108$, $df = 47$, $p < .001$; $I^2 = 71.05$).

The authors also report mean effect sizes for displacement and diffusion effects of hot spots policing interventions. The results show that overall, there was a significant diffusion effect

($d = 0.086, p < .001$) suggesting that the beneficial effects of the hot spots policing programme diffused into neighbouring areas rather than displacing the criminal activity (i.e., crimes are simply “moved” from one area to another).

Implementation and Cost analysis

Implementation evidence

Hot spots policing may be more effective if it is part of a broader programme of community engagement activities. The process evaluation of the National Reassurance Policing Programme reported that the areas with the greatest change in public perceptions of antisocial behaviour by youth were the same areas with targeted problem-solving activity with active community engagement (Tuffin et al., 2006). Similarly, Rosenbaum (2018) criticizes the way in which hot spots policing is often implemented in practice which ignores the principles of problem-oriented policing and community policing. However, as noted above, many interventions included in this review used the problem-oriented policing model.

A recent study in Brazil compared methods of identifying ‘hot spots patrol routes’ finding that a computational method outperformed the traditional method of manual assessment in ensuring that routes covered high crime areas (Chainey et al., 2021).

Cost evidence

Only one study reports a cost-benefit analysis of hot spot policing. Ariel et al. (2016) report a high, positive, ratio of the value of benefits benefit to costs (the benefit cost ratio, BCR) for hot spots policing of between 6 and 23, with substantial savings coming from the reduced costs of imprisonment from averted crime.

Findings from the UK

The review by Braga et al. (2019) included four UK evaluations: Ariel & Partridge (2016); Ariel et al. (2016); Fielding & Jones (2012); Williams (2015). These evaluations are summarised below.

Predictive risk mapping and policing in Trafford, England

Fielding and Jones (2012) evaluated a hot spots policing intervention at the Trafford Basic Command Unit of the Greater Manchester Police. The intervention used predictive policing to inform directed police patrols. The predictive analysis compared spatial and temporal risks associated with domestic burglary revictimization and categorised these on a map with colour-coded risk categories (Fielding & Jones, 2012). The intervention was evaluated using a quasi-experimental design with two control groups: areas similar to the target area in Greater Manchester and national data. The hot spots policing programme took place between May 2010 and May 2011 and official records of burglary were analysed. Specific 'micro-sites' (i.e., specific streets, homes, or shops etc) were the targets of the hot spot policing and the unit of analysis was at the police force level. Braga et al. (2019b) report that domestic burglary decreased in both the experimental and control groups, but the decrease was only significant in the experimental group. The mean effect size for this study was $d = 0.977$ (SE = 0.207).

West Midlands Police randomised controlled trial of crime hot spots.

Williams (2015) conducted an evaluation of a hot spots policing intervention in Birmingham, UK with the West Midlands police. Target areas received increased patrols, of between 5 and 15 minutes in length. The intervention was implemented between June and September 2015 for 150 days, and on 75 days patrols were 5 minutes long and on the remaining 75 days patrols were 15 minutes long. The length of patrols was determined randomly. Williams (2015) used a quasi-experimental design and compared the effect of hot spots policing intervention in target areas to a random selection of comparable hot spots. Williams (2015) used spatial grids to assess displacement effects, and only analysed data from the first 100 days of the intervention when it was determined that the intervention was implemented correctly. The results suggested that "less frequent but longer patrols were associated with slightly lower street crime and antisocial behaviour compared to shorter but more frequent patrols" (Braga et al., 2019, p. 83; Williams, 2015). Hot spots in Birmingham that received increased patrols saw a 14% reduction in street crimes and antisocial behaviour compared to comparison hot spots. Crime also decreased in areas surrounding the target hot spot suggesting that there were diffusion effects of the intervention. Williams (2015) also found that the severity of the average offence increased in the intervention areas. The mean effect size for this study was $d = 0.122$ (SE = 0.19).

Operation Style in Peterborough, England

Ariel et al. (2016) evaluated the effectiveness of 'Operation Style' in Peterborough and compared the effectiveness of two different types of patrols. One patrol was 'sworn' police officers (i.e., official members of the police force) and the other patrol consisted of Police Community Support Officers (PCSO). PCSOs are civilian police staff who do not wear a uniform and do not carry weapons. They also have limited powers to arrest members of the public. In a randomized controlled trial, Ariel et al. (2016) compared the effect of hot spots policing intervention in 72 hot spots identified in Peterborough. Roughly half of these hot spots ($n = 34$) received the intervention (i.e., police/PCSC patrols) and 38 acted as a treatment as usual control group. Ariel et al. (2016) used GPS tracking to ensure that officers and PCSOs adhered to the boundaries of the identified hot spots and measured crime displacement in a 50 metre 'buffer zone' around target areas. Ariel et al. (2016) found that crime was reduced by 39% in target areas and calls to emergency services also decreased by 20% in comparison to those in control areas. The analysis also showed significant interaction effects, whereby the number of visits and length of patrol were associated with reductions in calls to emergency services and crime. The results also suggest that there was a diffusion of effects, in particular for burglary, theft, criminal damage, robbery, and grievous bodily harm (Braga et al., 2019b). The mean effect size for this study was $d = 0.201$ ($SE = 0.237$).

Operation Menas, London

Ariel and Patridge (2017) conducted a randomised controlled trial of Operation Menas in London, England which involved increased visible police patrols at bus stops and a 50-metre buffer zone. The outcomes of interest were calls to emergency services by victims and incident reports by bus drivers. During the intervention, a double patrol team of uniformed officers patrolled the target area three times a day for 15 minutes each time. The intervention was implemented for 6 months, and patrols took place five days a week. In total, 102 bus stops were identified and randomly allocated to the experiment ($n = 51$) or control ($n = 51$) groups. Bus driver incident reports were measured at three times during the day, namely, when patrols were active, when patrols were not active, and combined, but victim calls to emergency services were only measured for times when patrols were active (i.e., between Monday and Friday, 12pm to 6pm). Additionally, two areas around the bus stops were analysed for possible crime displacement effects. The zones were 50-100 metres around the

bus stop and 100-150 metres around the bus stop. Ariel and Patridge (2017) found a 37% reduction in incident reports by bus drivers during active patrol hours at the bus stops and the surrounding 50 metres in comparison to control areas. However, victim-generated crime counts increased in the experimental areas by 25%, but this was not significant in comparison to the control areas ($p = 0.1$). In the 50-100 metre zone around bus stops, incident reports by bus drivers reduced by 40% but victim-generated crimes increased by 23%. There were no significant changes in the 100-150 metre zone around bus stops. The mean effect size for combined outcomes for this study was ($d = -0.006$, $SE = 0.200$).

What do we need to know? What don't we know?

Because hot spots policing is a place-based intervention it is difficult to evaluate its specific impact on the offending and violence of young people. However, given that hot spots policing approaches are often used to target areas with high antisocial behaviour/disorder, and that this is most common amongst younger populations (Moffitt, 1993), we would anticipate that the benefits of this approach would be at least equivalent for children and young people.

Given limited police resources it would be desirable to know more about the long-term impact of hot spots policing. Most hot spots interventions are evaluated only while the targeted approaches are taking place and the impact after the targeting ends is relatively unknown.

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Annex 1: Effect size calculation

This annex shows the calculation based on the results and assumptions given in the text. We assume 200 observations made by police, evenly divided between treatment and control groups. That means there are 100 recorded observations in the control group and 100 recorded observations the treatment group. Our headline impact estimate is informed by the violence outcome reported by Braga et al. (2019b). For violence, we assume that 17% of observations in the control group involved a violent offence. Using this assumption, we can easily transform the mean effect sizes to a percentage reduction in violence.

If the odds ratio for the violent crime outcome is $OR = 1.20$ (Braga et al., 2019b), then using the table below and the formula for an OR, we can estimate the value of X. The odds ratio is estimated as: $A*D/B*C$, where A is the number of observations not involving a violent crime in the treatment group, B is the number of observations that did involve a violent crime in the treatment group, C is the number of observations that did not involve a violent crime in the control group, and D is the number of observations that did involve a violent crime in the control group. Therefore, the value of X is 14.57 for the violent crime outcome.

	No violence	Violence	Total
Treatment	100-x	x	100
Control	83	17	100

Therefore, the relative reduction in violent crime is $(17 - 14.57)/17 = 14.29\%$.

In relation to the other outcomes reported by Braga et al. (2019b), we assume that 25% the recorded observations involved a criminal offence in the control group. For example, if the odds ratio for the composite crime outcome, $OR = 1.27$ (Braga et al., 2019b), the value of X is 20.79 for the composite crime outcome.

	No		
	crime	Crime	Total
Treatment	100-x	x	100
Control	75	25	100

Therefore, the relative reduction in crime is $(25 - 20.79)/25 = 16.84\%$. In relation to the other outcomes reported by Braga et al. (2019b), the value of X is 21.05 for property offences, 19.92 for disorder offences, and 17.61 for drug offences. Thus, the relative reduction was 13.04% for violent offences, 15.79% for property offences, 20.32% for disorder offences, and 29.58% for drug offences.

The number of recorded observations is likely to vary between studies and can be influenced by a number of different factors. If we were to adjust our assumption that 25% of the observations in the control group involved a crime (or 17% for violence), the relative reduction in the intervention group is not greatly affected. Table 3 outlines the change in the relative reduction according to various assumptions about the base rate of violence.

For example, if we assume that 40% of the observations for the control group involved a crime, the 2x2 table would be as follows for and the value of X is 34.42 (for the composite crime outcome). Therefore, the relative reduction is 13.94% (i.e., $(40 - 34.42)/40 * 100$).

	No		
	crime	Crime	Total
Treatment	100-x	X	100
Control	60	40	100

Similarly, if we assume that 10% of the observations recorded for the control group involved a crime, the value of X is 8.05 (for the composite crime outcome) and the relative reduction is 19.55%. Given the dramatic difference in the assumed recorded observations involving a crime, the percentage relative reduction does not vary in a similar fashion. Table 4 shows this further.

Table 3

Variation of the relative reduction in violent crime outcomes reported by Braga et al. (2019b) based on various assumptions.

Assumed prevalence	Relative reduction in violent crime (OR = 1.20)
5%	16%
17%	14.29%
33%	11.82%

Table 4

Variation of the relative reduction in outcomes reported by Braga et al. (2019b) based on various assumptions.

		Composite crime	Property offences	Disorder offences	Drug offences
Assumed prevalence		Relative reduction			
10%		19.55%	18.37%	23.43%	33.51%
25%		16.84%	15.79%	20.32%	29.58%
40%		13.94%	13.04%	16.94%	25.15%

Annex 2: Process evaluation evidence

	Success factors	Challenges	What parents and children say

Annex 3 – AMSTAR Quality Rating

Modified AMSTAR item		Scoring guide	Hot spots policing
			Braga et al. (2019)
1	Did the research questions and inclusion criteria for the review include the components of the PICOS?	To score ‘Yes’ appraisers should be confident that the 5 elements of PICO are described somewhere in the report	Yes
2	Did the review authors use a comprehensive literature search strategy?	At least two bibliographic databases should be searched (partial yes) plus at least one of website searches or snowballing (yes).	Yes
3	Did the review authors perform study selection in duplicate?	Score yes if double screening or single screening with independent check on at least 5-10%	Yes
4	Did the review authors perform data extraction in duplicate?	Score yes if double coding	Yes
5	Did the review authors describe the included studies in adequate detail?	Score yes if a tabular or narrative summary of included studies is provided.	Yes
6	Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	Score yes if there is any discussion of any source of bias such as attrition, and including publication bias.	Yes
7	Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Yes if the authors report heterogeneity statistic. Partial yes if there is some discussion of heterogeneity.	Yes

8	Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Yes if authors report funding and mention any conflict of interest	Yes
	Overall		High



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