

Evidence-Based Policing and the Stratified Integration of Crime Analysis in Police Agencies: National Survey Results

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Abstract Using data collected from a 2008 national survey of over 1,000 agencies, this paper presents findings about the stratified integration of crime analysis into police patrol operations. Relationships are examined among stratified crime analysis integration, and the agency's commitment to crime analysis, evidence-based crime reduction approaches, and accountability mechanisms. The analysis shows that there is no connection between patrol commanders' commitment to crime analysis or prioritization of evidence-based practices and the appropriate use of crime analysis by line-level officers, first-line supervisors, and managers (i.e., stratified crime analysis integration). The analysis does show that having a designated crime analyst and prioritizing accountability for crime reduction at all ranks were strong predictors of stratified crime analysis integration. The findings suggest that the presence of a primary analyst and of accountability mechanisms is more than agencies simply 'saying' that evidence-based practices or crime analysis is important.

Introduction

Over the last several decades or so, there has been an interest in identifying evidence-based policing (Sherman, 1998) strategies to control, reduce, and prevent crime and disorder (Telep and Weisburd, 2012; Weisburd and Eck, 2004). Santos (2014) argues a key element necessary in the successful implementation and use of evidence-based policing strategies is crime analysis which is 'a profession and process in which a set of quantitative and qualitative techniques are used to analyze data valuable to police agencies and their communities' (International Association of Crime Analysts, 2014,

p. 2). However, what is lacking in the description and research of evidence-based practices is guidance for integrating crime analysis into the day-to-day crime reduction operations of a police department.

In this article, we examine how a newer approach to crime reduction—stratified policing (Santos and Santos, 2015)—is a viable option for integrating crime analysis into police crime reduction operations. To make this assessment, we examine data collected from a mail-based survey administered to over 1,000 police agencies in the summer of 2008. Our findings have implications for police leaders

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who seek to institutionalize evidence-based practices and crime analysis within their own departments.

Crime analysis and stratified policing

A substantial body of empirical evidence suggests the most effective crime reduction strategies implemented by police are those that are proactive and highly focused on addressing specific crimes, locations, and offenders (Telep and Weisburd, 2012). To date, there is compelling evidence that innovations such as problem-oriented policing (POP) (Weisburd *et al.*, 2010), hot spots policing (Braga *et al.*, 2012), and focused deterrence (Braga and Weisburd, 2012) are effective in the reduction of crime. Other strategies such as community-oriented policing (COP) (Gill *et al.*, 2014) and disorder policing (Braga *et al.*, 2015) show some crime reduction, but less so. Lastly, a third group of innovations, namely predictive policing (Perry *et al.*, 2013), and police department managerial models Compstat (Police Executive Research Forum [PERF], 2013) and Intelligence-led Policing (ILP) (Ratcliffe, 2016), have not been systematically evaluated, but have been lauded by practitioners as effective in reducing crime.

Some scholars contend crime analysis is essential to the effective deployment of the strongest evidence-based policing strategies such as POP, hot spots policing, and focused deterrence, in actual practice (Santos, 2014). Crime analysis, and more specifically, crime mapping plays a pivotal role in the identification of hot spots. In depth analysis and knowledge of a hot spot and prolific offenders can also guide tailored responses which are especially crucial in interventions that utilize a combination of hot spots policing and POP approaches, focused deterrence, or focused disorder policing strategies targeting specific environmental conditions (Telep and Weisburd, 2012). To that end, crime analysts play a role in every step of the problem solving process beginning with the identification of crime

and disorder problems and ending with assessment (Boba, 2003).

In addition, crime analysis is crucial to empirically untested, yet common police agency managerial strategies, such as Compstat and ILP (Santos, 2014). Crime mapping is one of the core components of Compstat-like programs, as it is needed for providing up-to-date crime counts and intelligence on the crime and disorder problems facing a district in order to direct responses and evaluate outputs and outcomes (PERF, 2013; Weisburd *et al.*, 2003). Analysis is a crucial part of Compstat's accountability mechanism as it provides the crime counts that are used to assess the performance and impact of the geographic commander's crime control and reduction strategies (Silverman, 2006).

Under ILP, analysis is key to identifying prolific offenders, deriving solutions to problems, and making a case to police administrators regarding where resources could best be allocated (Ratcliffe, 2016; Santos, 2014). Also, crime analysis is essential to predictive policing strategies that require the use of sophisticated statistical analysis techniques to identify high risk locations (Santos, 2014). Lastly, in COP, crime analysis entails crucial functions such as providing crime statistics for community meetings, neighbourhood watch groups, or police department publications, and collecting information from citizens through surveys about topics such as fear of crime or satisfaction with police services (Santos, 2014).

Consequently, as police departments seek to implement crime analysis along with evidence-based strategies, they require a structure for 'how' to do so. One recent approach that shows promise for systematically implementing crime analysis and evidence-based policing strategies is stratified policing (Boba and Santos, 2011; Santos and Santos, 2015). This approach is an organizational model that standardizes analysis, creates clear expectations for personnel, and provides a system of accountability meetings to ensure crime analysis is utilized and crime reduction occurs within the day-to-day operations of the department.

Stratified policing begins with the assumption that the role of the police is to address crime, disorder, and quality of life concerns, and such issues vary in terms of complexity and temporal nature (Santos, 2016; Santos and Santos, 2015). Thus, crime problems are categorized in terms of their complexity and longevity. For example, immediate problems and serious incidents are isolated occurrences that may manifest only once and are resolved in minutes, hours, or possibly even days. Short-term problems consist of repeat incidents (i.e. calls for service at the same place or involving the same offender), and patterns (i.e. groups of two or more crimes treated as a single unit of analysis due to similarity, no known connection between victim and offender, or the limited nature of the incidents). Long-term problems occur over several months, seasons, or years and can be further categorized in terms of risky places, hot spots, problem offenders, problem victims, and problem types of property (Santos, 2016; Santos and Santos, 2015).

The stratification of problems leads to their being designated to personnel within the agency based on the roles and responsibilities of ranks and divisions. For instance, the least complex of problems, incidents and serious incidents, are typically assigned to and resolved by patrol officers or detectives, while short-term crime patterns may be assigned to sergeants (Santos, 2016; Santos and Santos, 2015). Actionable crime analysis products are created pertaining to each strata and provided to the appropriate ranks tasked to handle them. Lastly, every rank is held accountable for utilizing crime analysis products to address the problems delegated to them. The accountability mechanisms align with

the stratification of problem and rank with daily (e.g. briefings), weekly, and monthly meetings during which personnel are required to discuss the problems they have been assigned and how they are developing responses with the aid of the analytic products (Santos, 2016; Santos and Santos, 2015).

While crime analysis is an important tenet of the overall model, stratified policing encompasses much more than the integration of crime analysis, thus, this study seeks to examine three aspects of stratified policing implementation related to crime analysis. Specifically, we examine whether agencies that (1) prioritize evidence-based policing strategies, (2) are committed to the usefulness of crime analysis, and (3) prioritize crime reduction accountability routinely use (i.e. integrate) crime analysis products for different type of problems and at different ranks. We also consider the size of the agency and whether they have a designated full-time crime analyst in their integration of crime analysis. What follows is a description of our methods, results, and their implications.

Data and methods

The data examined in this article were collected by PERF.¹ The data were derived from a national survey of over 1,000 US city, county, and state police agencies. This survey was part of a larger project carried out by PERF to gain insight into the then current state of the integration of crime analysis products within patrol operations.² An interrelated goal was the identification of possible impediments to crime analysis integration so

¹ Funding from the Office of Community-Oriented Policing Services (COPS Office) (Cooperative Agreement Number 2007-CK-WX-K010).

² The survey instrument itself was based on a previous survey conducted by PERF (e.g. Taylor et al, 2007), a national survey conducted by the Department of Justice and the COPS Office in 2000 (e.g. O'Shea and Nicholls, 2002; 2003), research into efforts to best incorporate analysis and accountability at all levels through stratified policing (Boba and Santos, 2011; Santos and Santos, 2015) and focus group discussions with practicing crime analysts and police administrators and officers (Taylor and Boba, 2011).

further investigation could take place in an effort to remedy such problems.³

A random sample of 1,023 local, county, and state agencies stratified by size and geographic location were selected from the 2007 National Directory of Law Enforcement Agencies (NDLEA) database. Surveys were disseminated via US mail to the selected agencies in the summer of 2008.⁴ The mailings contained two separate survey instruments. One survey was intended to be completed by the person in charge of crime analysis, and the other to be completed by the senior patrol commander. Both instruments contained a number of questions about demographic variables, the analytic capabilities of the agency, the use and dissemination of crime analysis products, and the prioritization of various police actions.

All totalled, out of the 1,023 surveys that were mailed, 564 patrol surveys were completed and returned and 567 analyst surveys were completed and returned representing response rates of 55.1% and 55.4%, respectively. The original researchers noted this response rate was low, yet acceptable for PERF. To detect possible differences that may confound findings, non-respondent agencies were compared with those agencies that did respond via bivariate analysis of factors such as region of the country, population size, and the number of officers employed (as reported by NDLE). No statistically significant differences were found (Santos and Taylor, 2014).

This study primarily uses data from the patrol commander survey. In addition, as our study is primarily focused on the integration of crime analysis within city police departments, county and state agencies were excluded from our final database. Very large agencies employing 4,000 or more officers, such as Los Angeles Police Department and New York City Police Department, were excluded

from the database as their size is atypical of police agencies in most jurisdictions. There were four such agencies. Our final sample includes 300 city police departments serving populations ranging from 91 citizens to 1,341,156 citizens. The median population served was 59,743 citizens.

Dependent variable

The single dependent variable is a composite measure representing the integration of crime analysis within patrol operations that would be expected in a pure, properly implemented stratified policing model. That is, stratified policing ensures different ranks in the patrol division are assigned to address different levels (i.e. strata) of problems depending on their day-to-day duties and scope of responsibility. Line-level officers use analysis for short-term problems; first-line supervisors use analysis for short- and long-term problems; and managers use analysis for long-term problems and evaluation of crime reduction efforts (Boba and Santos, 2011).

Thus, the integration according to stratified policing was operationalized into nine different analytical products categorized by three levels of analysis: tactical, strategic, and evaluation-oriented. Tactical crime analysis examines crime problems occurring in the short-term lasting no more than 4–6 months and is represented on the survey by three analytical products:

1. analysis determining repeat call locations;
2. crime patterns (e.g. linked by suspect, MO, time/day, property type); and
3. crime maps (e.g. clustering of small numbers of incidents).

Strategic crime analysis examines crime problems occurring in the long-term as lasting more

³ More details regarding the project were published in Taylor and Boba's (2011) guidebook *The Integration of Crime Analysis into Patrol Work: A Guidebook* and in a separate paper by Santos and Taylor (2014).

⁴ Proven survey distribution techniques were utilized such as mailing multiple waves of surveys, and following up with reminder letters, faxes, and phone calls to motivate recipients to complete and return the instruments.

than 6 months and is represented on the survey by three analytical products:

1. analysis determining high crime/call locations;
2. analysis determining repeat offenders; and
3. crime maps (e.g. hotspot identification).

Finally, evaluation-oriented crime analysis focuses on citywide problems and evaluation and is represented on the survey by three analytical products:

1. analysis of citywide problems (e.g. false alarms);
2. evaluation of police operational response to a crime problem; and
3. evaluation of a crime prevention response.

Each analytical product was listed in a matrix and the patrol commander was instructed to check a box to identify which rank(s) in the agency routinely used each of the nine products. The ranks were represented in general terms as (1) patrol officers, (2) first-line supervisors, (3) management to account for differences among police agencies' organizational structures.⁵ Unchecked boxes were coded as '0' and checked boxes were coded as '1.'

Because stratified policing prescribes crime reduction activities are implemented differently by rank within the patrol division, certain ranks utilize specific crime analysis products with more frequency than others. Thus, the ranks selected by the patrol commander were weighted in the final variable based on the ideal stratification of crime reduction responsibility within stratified policing. For example, under a pure stratified policing model, while officers, first-line supervisors, and management may all receive information regarding

repeat calls for service, stratified policing assigns first-line supervisors the responsibility to address repeat call locations for service (i.e. repeat incidents) (Boba and Santos, 2011). Thus, if a respondent agency indicated their first-line supervisors routinely used the repeat calls for service product, instead of a '1,' the response would be coded as a '2.' The following list is the schema for the weights (i.e. these responses received a '2').⁶

Tactical crime analysis

1. analysis determining repeat call locations when used by first-line supervisors;
2. crime pattern analysis when used by first-line supervisors and management; and
3. crime maps when used by first-line supervisors and management.

Strategic crime analysis

1. analysis determining high crime/call locations when used by first-line supervisors and management;
2. analysis determining repeat offenders when used by first-line supervisors and management; and
3. crime maps when used by management.

Evaluation-oriented crime analysis

1. analysis of citywide problems when used by management;
2. evaluation of police operational response to a crime problem when used by first-line supervisors and management; and
3. evaluation of a crime prevention response when used by first-line supervisors and management.

The weighted and unweighted items in each category were summed to create a total integration

⁵ In cases where these three options were not relevant, other potential answers were provided: 'this product is not produced,' 'no one uses the product,' 'a team of personnel,' and 'other.'

⁶ Even though stratified policing does present a specific structure, there is adaptability in assignment of responsibilities, so some categories show more than one rank using the product as ideal. Also, agencies were still given a value of '1' and thus not penalized if they selected a 'wrong' rank according to the ideal stratified policing model.

score for each agency. The integration index ranged from 0 (i.e. none of these ranks uses any of the nine products) to 42 (i.e. all three ranks are using all nine products with the intended rank using specific products as prescribed by stratified policing).⁷

Independent variables

Three independent variables were included in the analysis and coincide to the three focus areas of the study. The first independent variable is a composite measure of the agency's prioritization of the use of evidence-based policing strategies. We argue progressive police departments, or those engaged in stratified policing, should be using evidence-based policing strategies in tandem with crime analysis and crime mapping to achieve greater crime reduction gains. Thus, it is reasonable to assume patrol commanders who prioritize the use of evidence-based practices should also report better integration and use of crime analysis products within their agency.

The patrol commander was presented with a Likert scale ranging from '1' representing 'not a priority at all' to '5' representing 'very high priority.' They were instructed to indicate the priority his/her agency placed on the use of eleven different police actions. Five of eleven⁸ actions were used to construct this variable:

1. Transforming the agency to support officer partnership building and problem-solving (e.g. through decentralization)
2. Problem-oriented policing (POP)
3. Hot spot policing

4. Crime analysis
5. Crime mapping.

Unfortunately, the survey did not include any measures for focused deterrence or disorder policing, so they could not be included in the evidence-based variable. The responses to each item were summed to create an evidence-based policing measure ranging from 5 (if all 1's were checked) to 25 (if all 5's were checked).⁹

The second independent variable is a single measure of the agency's stated commitment to crime analysis. Under an ideal stratified policing model, commitment to crime analysis and problem-solving should be embraced and espoused by all members of the command staff. Therefore, we would expect in agencies that view crime analysis as critical to their operations there would be higher levels of integration as reflected by the use of analytic products in the patrol division for addressing short-term and long-term problems and evaluating results. The patrol commander was presented with the statement, 'Overall, how does crime analysis fit with the agency's goals and objectives?' and asked to select one of the responses: 'The Crime analysis function is ...' (1) critical, (2) fairly well aligned, (3) neutral, (4) poorly aligned, or (5) runs counter to the agency goals and objectives. For interpretation, this variable was reverse coded so higher values represented more positive perceptions about crime analysis.

The third independent variable is a composite measure of the priority the agency places on various measures of accountability. Accountability at all

⁷ The Cronbach's α for the integration scale was 0.935, which indicates the scale is highly reliable, as α values closer to 1.00 reflect highly reliable measures.

⁸ Not all of these actions were included in the creation of the variable for a variety of reasons. 'Responding to calls for service and investigating crimes' was excluded as these are basic services offered by most police agencies that fall under the standard model of policing (e.g. Weisburd and Eck, 2004) and are not considered innovative. 'Intelligence-led policing (ILP),' 'Compstat,' 'Actively encouraging officers to form community partnerships,' and 'Regularly collecting data from citizens about community problems' were excluded as there are no known empirical evaluations of their effectiveness in reducing crime, and our study was only interested in including strategies that had been subjected to and sustained rigorous empirical evaluation, or in the case of the 'crime analysis' and 'crime mapping' variables were endemic to the success of the strategies. 'Crime prevention' was removed for being too nebulous a term.

⁹ The Cronbach's α for the five-item evidence-based policing strategy scale was 0.846, which indicates the scale is reliable.

levels is a crucial element of stratified policing to ensure members of each rank are using analytic products to assist in performing their assigned crime reduction responsibilities to contribute to the cumulative and collective agency goals of crime control and reduction. Therefore, under an ideal stratified policing model, patrol commanders that prioritize accountability measures should also report integration (i.e. routine use of analytic products). The patrol commander was asked to select from a Likert scale with options ranging from '1' representing 'not a priority at all' to '5' representing a 'very high priority' to indicate the priority his/her agency placed on the use of four different accountability mechanisms:

1. To help determine whether the agency is effective in reducing crime and disorder.
2. To hold officers accountable for crime reduction and prevention.
3. To hold first-line supervisors accountable for crime reduction and prevention.
4. To hold management/command staff accountable for crime reduction and prevention.

The responses to each item were summed to create an accountability measure ranging from 4 (if all 1's were checked) to 20 (if all 5's were checked).¹⁰

Control variables

Two control variables were included in the analysis, the number of sworn officers and the presence of a primary crime analyst on staff. The number of sworn officers was included as a proxy for agency size. It may be surmised larger agencies would have more access to resources, bigger budgets, or provide service to more expansive areas with diverse crime problems. Thus, large agencies may have stronger analytic capabilities and may be more integrated. Therefore, it is

necessary to control for agency size to ensure it is not confounding our attempt to predict integration. The number of sworn officers was collected from the patrol instrument in which the patrol commanders were required to enter the approximate number of sworn officers employed by their agencies in 2007. The Federal Bureau of Investigation's (FBI) count of officers by city for the year 2007 was consulted to account for missing data (FBI, 2007).

The second control variable is the presence of a primary crime analyst. This was coded as a dummy variable in which '1' represented that the agency had a primary crime analyst whose only task was conducting analysis. Zero represented that the agency either did not have a primary analyst and/or other personnel who conducted crime analysis. This variable was included based on conclusions in Santos (2014) that a more innovative agency would have a primary crime analyst on staff since crime analysis is necessary to carry out evidence-based policing strategies.

Analytic strategy

The goal of our analysis is to see how well each of the independent variables predicts the level of integration of crime analysis as would be expected under an ideal stratified policing model. We also intend to control for agency size and the presence of a primary crime analyst so we may better isolate and understand the influence of the independent predictors on the dependent variable. To achieve these ends, we utilized multiple regression which will assess how well our model fits the data, predicts our dependent variable of integration, and allow us to identify how each of our independent variables uniquely contribute to the prediction while simultaneously controlling for potentially confounding factors (Allison, 1999; Weisburd and Britt, 2007).

¹⁰ The Cronbach's α for the four-item accountability measure was 0.945, suggesting very high reliability.

Table 1: Measures of central tendency for dependent, independent, and control variables

Variable	Minimum	Maximum	Range	Mean	Median	Standard deviation
Integration	0	42	42	21.72	23	13.02
Evidence-based	7	25	18	17.93	18	3.91
Commitment	1	5	4	4.08	4	0.86
Accountability	4	20	16	13.08	13	4.30
Sworn officers	1	3,977	3,976	325.22	86	590.23
Crime analyst						
Yes:139 47.9%						
No:151 52.1%						

Results

Table 1 displays the measures of central tendency and dispersion for all of the variables included in our database and analysis. Assessment of the dependent variable, integration, indicates that, on average, agencies fall in the middle of the range. While there are agencies with high values,¹¹ 50% of the agencies reported integration below 23% and over 24% reported integration of less than 10. Thus, the majority of agencies have a mid to low level of integration. In addition, on average, patrol commanders valued evidence-based practices and prioritized accountability mechanisms slightly higher than the middle of the possible range (17.93 and 13.08, respectively).¹² Patrol commanders indicated, on average, crime analysis was fairly well aligned with their agency's goals (4.08).¹³

There was a great deal of variation in the number of sworn officers. Agencies had between 1 and 3,977 officers and an average of 325.22 with a standard deviation of 590.23, which indicates that there were several outliers. However, half of the agencies in the

final sample had less than 86 officers with 72% having less than 200. Lastly, slightly more than half of the agencies reported they did not have a primary crime analyst on staff. This indicates those without a primary crime analyst either assign someone to conduct analysis as a secondary responsibility or do not have any employees on staff who conduct analysis.

The results of the multiple regression analysis are displayed in Table 2.¹⁴ Overall, it is a robust model.¹⁵ The adjusted R^2 was nearly the same as R^2 confirming the model is generalizable to the population. Out of the five independent variables, only two emerged as statistically significant.

Having a primary crime analyst on staff emerged as the most significant predictor of integration ($\beta = 0.28$; $p < 0.001$). In other words, agencies that employ at least one primary crime analyst are more integrated in terms of the use of various crime analysis products for problem solving by all three user groups in the patrol division. This finding makes intuitive sense considering agencies that employ at least one full time primary analyst

¹¹ This is evidenced by the large standard deviation of 13.02 which indicates positive skewness.

¹² These were normally distributed as evidenced by the median of 18 and a standard deviation of about four for evidence-based practices and a median of 13 and standard deviation of 4.30 for accountability mechanisms.

¹³ The median (4) which is close to the mean and standard deviation (0.86) also indicate a relatively normal distribution.

¹⁴ The model was assessed for compliance with ordinary least squares assumptions such as independence of observations, linearity among all variables, homoscedasticity, lack of multicollinearity, lack of influential points, and normally distributed error terms. No violations of these assumptions were detected.

¹⁵ The model yielded an R^2 of 0.33 and an adjusted R^2 of 0.32. The R^2 was significant evidenced by the F ratio which was significant at the 0.001 level.

Table 2: Final multiple regression model for predicting the level of crime analysis integration

Variables	<i>B</i>	SE <i>B</i>	β	<i>t</i> -value
(Constant)	-0.73	3.66		-0.20
Evidence-based	0.34	0.29	0.10	1.18
Commitment	1.33	1.11	0.09	1.20
Accountability	0.54*	0.22	0.18	2.49
Sworn officers	0.00	0.00	0.10	1.64
Crime analyst	7.52***	1.68	0.29	4.49
<i>R</i>	0.58			
<i>R</i> ²	0.33			
Adjusted <i>R</i> ²	0.32			
<i>F</i>	24.29***			

N = 252, **p* ≤ 0.05, ***p* ≤ 0.01, ****p* ≤ 0.001.

would, at a minimum, be expected to have analytical capabilities and most likely some integration of the analysis products within operations in order to make a full-time staff position financially feasible.

In addition, prioritization of accountability was also statistically significant predictor of integration ($\beta = 0.54$; $p < 0.01$). As the agency puts a higher priority on accountability, the integration of crime analysis products within patrol operations also increases. This finding supports stratified policing which stresses the importance of accountability mechanisms for all ranks. As the accountability mechanism is prioritized, analytic products are used by more ranks, and because of the weighted variable, arguably the 'right' ranks. None of the remaining predictors emerged as significant in the model. The implications of the findings are discussed in the next section.

Discussion

The first focus of this study was to examine the relationship between the self-reported priority of evidence-based policing strategies and the integration of crime analysis products routinely used by the patrol division. However, this relationship was not statistically significant in the analysis and suggests there may not be a connection between how patrol commanders rate the priority of evidence-

based practice within their agencies and the actual integration of analysis products within patrol operations. At a minimum, this finding suggests there is a disconnect between reported perceptions of the importance of evidence-based strategies and actual crime analysis integration. One possible explanation could be the patrol commander believes the agency has implemented the evidence-based practices and believes they are important, but in reality, has not provided the necessary guidance, resources, and the structure to do so effectively.

A similar insignificant result was found in the relationship between the stated commitment to the use of crime analysis and integration. In other words, however, the patrol commander rates the importance of crime analysis to achieving agency goals, this assessment does not reflect the true integration of crime analysis. Thus, if a patrol commander indicates his/her agency puts a premium on analysis, the actual use of analytical products within the patrol division may be minimal. These findings are similar to those of earlier studies (e.g. O'Shea and Nicholls, 2002; 2003; Santos and Taylor, 2014) which suggest analysis is not being used to generate actionable intelligence useful to patrol operations.

The implications of these insignificant findings point to a crucial limitation in using survey-based methods to study the police. Self-report measures

are often subject to bias, a fact that may be even more salient when considering the nature of the questions asked specific to this study. To the patrol commander who answers survey questions about whether his/her agency utilizes evidence-based strategies and whether crime analysis figure prominently within the agency's operations, there may be temptation to answer in the affirmative, lest their agency be thought of as not doing its job or being progressive. This need to appear progressive to outside inspection while internally maintaining the status quo may be attributable to loose coupling, which is a concept derived from institutional theoretical explanations of behaviours of public sector agencies. Simply put, institutional theory posits that public service agencies, such as the police, lack the means to demonstrate their effectiveness through easily measurable goals, such as crime prevention. Therefore, in order to maintain public and private support and funding necessary for continued survival, the organization will claim to adopt structures and practices that it is expected to have, regardless of whether the structures or practices actually exist in day to day operations. Thus, it can be said that the organization espouses certain ideals to stakeholders while the realities of every day practice are 'loosely coupled' to those ideals (Crank, 2003; Crank and Langworthy, 1992).

In some ways, our findings above are similar to those of Weisburd and colleagues (2003) who reported Compstat adoption enabled police agencies to espouse their progressive and innovative nature, when in reality Compstat adopters were largely functioning in an identical manner to non-adopters. Their findings, as well as ours, may be attributable to loose coupling, and the nature of our survey elucidates this relationship. In other words, what the agency 'says' they are doing is quite different from what they 'are' doing in actual practice. While the integration variable, which is intended to measure actual use of crime analysis products within the patrol division, provides some insight into operational reality, the argument can be made that it does not get to the heart of the issue.

Direct measures are always better than proxy measures, and future researchers should seek to directly measure and/or observe an agency's use of accountability mechanisms and the deployment of evidence-based strategies in the field.

The third focus of the study was the relationship between the priority of accountability mechanisms within the agency and the integration of crime analysis products within the patrol division. These significant results suggest that as self-reported measures of accountability increase, so does analysis integration within patrol. This finding is interesting for two reasons. First, this is a self-report measure like the evidence-based policing strategies and commitment measures, yet, unlike those measures, it emerged as a statistically significant predictor of integration. Thus, one might conclude the patrol commanders who realize the importance of accountability mechanisms are ensuring the use of crime analysis products to solve problems, since they oversee patrol operations. Second, this variable reflects the accountability measures for all ranks being positively linked to analysis integration weighted by use by the 'appropriate' rank. Thus, the result speaks to the effectiveness of approaches, such as stratified policing, that place a high importance on accountability and use crime analysis for all ranks appropriately, which is in contrast to traditional Compstat-like programs that provide analysis to and focus accountability solely on the geographic commander (PERF, 2013).

Lastly, the most significant result was that integration of crime analysis within agency operations is strongly related to whether the agency has a primary crime analyst on staff as opposed to a person who performs analysis as a secondary responsibility or no analyst at all. This makes intuitive sense, because an agency that employs a primary crime analyst would likely have the need for the position and would have more advanced analytical capabilities, at least compared to agencies that have no analysts at all. On the other hand, making a distinction between employing a primary crime analyst versus an employee who performs analysis as a secondary

responsibility is critical. According to Santos (2016), since the crime analyst is usually a civilian employee, instead of creating an official crime analysis position, agencies often reassign individuals (e.g. secretaries, records clerks, light-duty officers, or administrative assistants) to perform crime analysis as a secondary responsibility. It is possible that delegating analytical tasks to personnel not specifically hired or trained to do crime analysis undermines the importance of crime analysis in the agency as well as to the person conducting the analysis. Consequently, hiring a trained and qualified crime analyst may facilitate a higher level of integration since the task of analysis is taken seriously by the person specifically hired to do the job. Also, the creation of the position sends a message to all personnel about the importance of crime analysis within the agency.

Limitations and future research

Several limitations of the current study bear mentioning. As noted, the PERF survey from which the data were derived was administered in the summer of 2008. It is possible that the integration of crime analysis products within police agency operations has changed in the ten years that have passed since the data were collected.¹⁶ Another limitation is the response rate is low for surveys conducted by PERF. The original researchers (e.g. Taylor and Boba, 2011; Santos and Taylor, 2014) mentioned the low response rate and contend perhaps some agencies did not respond to the survey because they lacked a vested interest in crime analysis.

Additional concerns pertain to the operationalization of the variables. It should be noted the PERF project was originally conceived for another purpose (e.g. Taylor and Boba, 2011) which led to the

necessity to create composite variables in order to measure the concepts examined here. As was noted earlier in the discussion, the accuracy of the survey instrument depends on the honesty of the respondents. Given the nature of the survey, it is conceivable a patrol commander may answer in the affirmative to questions about innovation and best practice so the agency does not come across as being an underachiever.

This is the first and only national survey on crime analysis integration, and these findings should encourage other researchers to pursue this avenue of inquiry especially with the increased focus on crime analysis in policing (Santos, 2014). In doing so, researchers should seek ways to directly measure concepts whenever possible in surveys but also couple quantitative data collection with qualitative observations of agencies' practices. Future research should include in depth site visits for a larger number of agencies to confirm survey data and enhance the findings.¹⁷ Future research should also be sensitive to the emergence of new crime reduction strategies and innovations, for example, those such as ILP and predictive policing (Santos, 2014).

Policy implications and conclusion

Limitations notwithstanding, the results here suggest two important implications for police agencies to consider. First, police agencies should invest in having a dedicated crime analyst when implementing evidence-based policing approaches to reducing crime. Our findings support agencies having a full-time primary analyst on staff whose sole responsibility is to conduct analysis versus having someone tasked to undertake analysis as a secondary responsibility, or no analyst at all. This is a real concern as agencies that delegate crime analysis responsibilities

¹⁶ We are not aware of more recent national research on crime analysis integration that indicates meaningful changes taking place. In addition, the second and third author have worked with police agencies over the last 20 years and while we have seen crime analysis data systems and technology improve to some extent over the last 10 years, the practices around integrating crime analysis into the day-to-day operations of most police agencies are similar to practices of 10 and even 20 years ago.

¹⁷ For example, in the original project, the methodology also included focus groups and three site visits to innovative agencies (Taylor and Boba, 2011).

to a current staff member as a secondary responsibility are not putting value on crime analysis or the products created (Santos, 2016). Moreover, a primary crime analyst is in a good position to make recommendations to command staff about innovative data, techniques, and evidence-based strategies. For instance, in a recent study, Piza and Feng (2017) noted suggestions from crime analysts may play a key role in administrative decision making since the analyst is not an outsider, non-practitioner, or an academic that may be viewed as out of touch with the realities of police practice.

Second, police agencies should implement accountability mechanisms (i.e. a set of meetings based on the temporal nature of the crime attempting to address) that address crime problems in the immediate, short term, and long term. The nature of the accountability mechanism is of specific importance. The meetings must include staff at all ranks and divisions from the line-level patrol officer to management. We would not recommend the adoption of mechanisms that target accountability of only one group of personnel.

While it is difficult to discern which specific attributes are most beneficial to an agency hiring a crime analyst or adopting an accountability structure, it is reasonable to assert, from our findings, that crime analysts, and accountability at every level are needed to achieve crime analysis integration. Thus, police agencies that seek to incorporate evidence-based policing strategies should place an emphasis on crime analysis, accountability, and processes that help integrate and institutionalize the use of crime analysis throughout the agency. In conclusion, while we were only able to examine a few aspects of stratified policing, our findings indicate the presence of a full-time analyst and accountability mechanisms are more important to the integration of crime analysis into patrol practices than 'saying' that either evidence-based practices or crime analysis is important. Thus, even though researchers and practitioners may know 'what works' in policing through decades of research (Telep and Weisburd, 2012), it is the

presence of crime analysis and mechanisms of accountability, two tenets of stratified policing, that appear to 'make it work' in actual implementation (Santos and Santos, 2015).

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