Final Final Report

To Bigler in BCI
2) Steve E for ILD
3 Grant file
on 9/25/2000

Rec'd 9/18/2000

194128

Expanding Research Capacity to Support the Implementation of Community Policing Through the Development of a Multi-Agency Research Partnership Involving the Chandler, Glendale, and Scottsdale, Arizona Police Departments and Arizona State University West

Final Report

National Institute of Justice
Grant Award # 98IJCX0006

Submitted by

Arizona State University West

March 2000

FINAL REPORT archive

Approved By: [signature]

Date: 1/18/02

Table of Contents

This report describes a project to build a research collaboration among three police departments located in the Phoenix, Arizona metropolitan area and the Administration of Justice Department at Arizona State University West. In 1998 the National Institute of Justice awarded Arizona State University West a grant under the NIJ Locally-Initiated Research Partnership program to support the development of the multi-partner research collaboration. This report describes the process and outcomes of the partnership development effort. The report is divided into the following sections: Project Background and Initial Design, The Research Partners, The Partnership Process, Project Modification and Specific Research Activities, Future Partnership Activities, and Lessons Learned and Recommendations to Others. Technical reports of specific partnership research project findings can be found in the Appendices.

Project Background and Initial Design

The goal of the research collaboration development effort reported on here was to build a research collaboration and partnership between three police departments in the Phoenix Metropolitan Area and Arizona State University West. Three police departments, who in 1998 were in varying stages of implementing community policing, agreed to participate in project along with researchers from the Administration of Justice Department at Arizona State University's West Campus. The three police departments were those of Chandler, Glendale, and Scottsdale, Arizona. As originally proposed, the research partnership was to have several objectives. One objective was to build a partnership to do research on issues related to community policing. Another objective was to conduct research and produce research products that would be useful to the partner agencies while at the same time having value for the more general law enforcement and criminal justice research communities. Providing ASU West researchers and students with increased exposure to the research needs of local law enforcement

agencies was another objective. The development of an expanded "valley-wide" research consortium was another project objective. Finally, an important project objective was to learn about the partnership development process itself, and to share those lessons with others who might be considering the development of similar research partnerships.

As will be noted throughout this report, the proposed objectives of the project were met in varying degrees, with some objectives yet to be met. Several practical issues related to the development of a multi-agency partnership are identified and recommendations for improving the process are made.

The process underlying the development of the research partnership involved a team of university researchers joining with liaisons from each of the partner police agencies to build a research agenda that addressed one or more of the research needs of each agency. Meetings among police department liaisons and the university researchers were held to discuss general issues related to the implementation of community policing and to identify potential research projects that could inform each department's community policing efforts.

Each of the three partner police agencies assigned a liaison to project and ASU West assigned three administrations of justice faculty\researchers to the project. Police liaisons included a captain in charge of criminal investigations, a captain in charge of field operations, and a crime analyst. One university researcher was paired with a agency liaison and assigned to serve as the lead researcher for that agency's research project. Police agency liaisons were to provide entry to the agency and to coordinate and facilitate research support activity in their respective department. As was noted previously, the original plan was to have university researchers and police liaisons meet as a group once projects were identified and implemented in order to review progress and issues related to conducting the research, and to review findings and make research findings-based recommendations back to each department's command structure.

The Research Partners

This section provides a brief description of the research partners and the larger setting in which the partnership was developed. It should be noted that the Phoenix Metropolitan Area, commonly referred to as the Valley of the Sun, is one of the fastest growing areas in the country. Geographically, the Valley of the Sun (equivalent to Maricopa County Arizona) is one of the largest metropolitan areas in the country, with a population of approximately 3,000,000. The three partner police agencies were located approximately 25-30 miles from each other, and two of the three (Chandler and Scottsdale) were located about that distance from the Arizona State University West campus. These distances, while seemingly not that far apart are misleading. Travel time between the agency partners or even to a central location can be an hour or more, and as will be noted later, travel time consumed en route to meetings had a significant impact on the partnership process.

Chandler Police Department.

According to some reports, Chandler, Arizona may be the fastest growing community in the United States. Located in the "East Valley," this traditional agricultural center has become the center of much of the Valley's computer technology industry. Current estimates put Chandler's population at 160,000, which is nearly an 80 percent increase since 1990. The community is very diverse both economically and ethnically. Much of the community's growth stems from high paying jobs in the technology sector, yet at the same time, Chandler is home to a sizable agricultural and service worker population. Chandler is also home to a sizable population of illegal immigrants from Mexico. Throughout the life of the grant one major theme in the rapidly growing Chandler Police Department was developing and using community policing

strategies in a very diverse community. Chandler's experience with community policing dates back to 1991.

Glendale Police Department.

Glendale is a diverse and growing community located on the West Side of the metropolitan area. By 2000, the city's population had approached 200,000, an increase of over 30 percent since 1990. The Glendale Police Department had nearly ten years experience with community policing by the time the research partnership was implemented. The geographic expansion of the City of Glendale resulted in increased pressure to decentralize the police department. One important theme in the department throughout the life of the partnership grant was the planning and implementation of organizational change to better position the department to address needs related to geographic decentralization and community policing.

Scottsdale Police Department

Scottsdale, Arizona is considerably more affluent and less diverse than the Chandler or Glendale. Located in the northeast portion of the Valley, Scottsdale, like other Valley communities, is experiencing rapid growth and recent estimates put its population at nearly 200,000, which is an increase of over 50 percent since 1990. Community policing in Scottsdale began in 1992. One of the major themes in the Scottsdale Police Department was developing and institutionalizing formal approaches to problem solving that reflected sensitivity to issues related to area accountability and cross-shift integrity.

Arizona State University West.

Arizona State University West is located in the northwestern part of Phoenix, and is approximately 10 miles from Glendale Police Department headquarters, about 25 miles from Scottsdale Police Department headquarters, and about 35 miles from Chandler Police Department headquarters. ASU West, a part of the Arizona State University system, is a

relatively new (1988) campus with a mission that calls for extensive research and service in support of the development area agencies and communities. The research partner at ASU West was the Administration of Justice Department. This department has responsibility for undergraduate and masters-level criminal justice education, and in recent years has developed an expanded capacity for conducting evaluation and policy research.

The Partnership Process

The research partnership process was conceptualized as having four stages. The first stage consisted of using team meetings to finalize a research agenda. In preparing the original proposal for the partnership project, each agency was asked to identify three potential research topics, one of which would be transformed into a research project and implemented if the partnership grant were awarded. Meetings during the early weeks of the project were used to narrow down each agency's list of potential topics to one research project that would be implemented as part of the research partnership. A series of three meetings involving agency liaisons and university researchers were used to identify three specific research topics.

The second stage in the process can be thought of as the research design stage. The specific topics identified in the first stage were transformed into specific research projects. Individual researchers, in consultation with other researchers and with their agency liaison, were responsible for this stage of the partnership process.

The third stage of the process consisted of implementing the three research projects identified and developed in the first two stages. As will be pointed out elsewhere in this report, two of the three projects were completely fully implemented and completed within the life of the partnership grant. The third project was only partially implemented, and full implementation and completion of that project will not take place until near the end of 2000.

The fourth stage consisted of individual research project completion and dissemination of findings and recommendations. As was noted above, two projects were completed and research reports for those two projects are appended to this report. The dissemination of findings and recommendations was only partially completed at the end of the partnership project. The original proposal called for review and dissemination of findings to each agency by the partnership research team, and this task has not yet been completed. In addition, the original proposal called for the use of a valley-wide mini-conference involving area police departments to disseminate findings and recommendations. That mini-conference was to be the springboard for the development of a valley-wide police research consortium. These tasks were not implemented during the life of the project grant, but are slated for completion in the last half of 2000.

Project Modification and Specific Research Activities

The overall research partnership project and the process that was actually implemented differed from that originally proposed in several different ways. Several unanticipated factors made it necessary to modify the original approach to reflect the realities of time, distance, and organizational change. Originally, the idea was to involve agency liaisons and university researchers as a team throughout the partnership project. By doing so it was hoped that agencies and team members would exchange information related both to community policing and the research process. The principal mechanism for the team process was to be team meetings scheduled throughout the course of the 18-month project. It should be noted that the start of the project was delayed by nearly two months due to the official grant award being lost in a transfer of mail in Denver, Colorado. This delay, along with difficulty in scheduling team meetings, made it necessary to move from a team approach to more of a one on one approach with individual researchers working with personnel in their assigned agency. Team meetings (consisting of all agency liaisons and university researchers) became too time consuming and

difficult to schedule in a timely fashion, and resulted in delaying implementation of individual research projects. Rather than continuing to delay the implementation of the specific research projects, the partnership process was modified to move from team meetings to the one on one, or university researcher to individual agency approach.

As was previously noted, three specific research projects were identified as part of the larger research partnership project. Two of the three were completed during the life of the partnership grant, and one project will be completed in late 2000. These three projects are summarized below.

Chandler, Arizona Evaluation of Project Restoration.

This research project was an evaluation of the Chandler Police Department's Operation Restoration, which was an attempt to impact problems of crime and disorder in Chandler's redevelopment district, an area comprised of some of the oldest neighborhoods in the city. The department integrated its Neighborhood Response Team, which is a specialized community policing team, with its Neighborhood Services Unit, which is a civilian code enforcement unit. The redevelopment district was divided in to four zones, and the integrated unit carried out focused enforcement activities, one zone at a time, for a period of 45-60 days. This process was repeated twice so that both the Neighborhood Response Team and Neighborhood Services Unit operated together in each zone twice during the study period.

This partnership research project was completed and a full report on the project can be found in Appendix A of this report. Generally, there were few problems with project, although there were some major delays in obtaining Calls for Service data due to personnel changes in the Chandler Police Department.

Scottsdale Police Department Evaluation of an Evolving Compstat Model.

This partnership research project examined the Scottsdale Police Department's efforts to implement a "Compstat-like" process to help direct its community policing and traditional law enforcement efforts. The Scottsdale Compstat model involves the use of regular meetings of management personnel where crime statistics and enforcement efforts are discussed in order to assess crime trends, design enforcement strategies, and assess the results of enforcement efforts. The research project consisted of a process evaluation that involved intensive observation of the SPD Compstat process including an assessment of how crime trend data actually gets used at the district and beat levels.

This partnership research project has been completed and a copy of the full report can be found in Appendix B. In general, there were few difficulties encountered in completing this project.

Glendale Police Department's Evaluation of Efforts to Integrate Investigations and Community Policing.

One of the organizational goals of the Glendale Police Department has been to integrate the department's investigative function with its patrol-based community policing efforts. A department reorganization for decentralizing the investigative function and co-locating investigators with patrol and Community Action Officers in geographically dispersed precincts was planned. The belief was that such decentralization and integration would result in higher clearance rates for property crimes due to investigators having direct access to patrol officers, Community Action Officers, and the community. The partnership project with the Glendale Police Department was conceptualized as an effort to evaluate the outcomes of this integrated approach.

This partnership research has not been completed largely due to persistent delays in implementing the department's planned reorganization. Part of the integrated approach called

for the joint use of crime analysis and crime mapping information by detectives, patrol officers, and CAT officers, and that feature of the integration is still not fully implemented. The actual reorganization itself was not completed until late 1999 and that made it impossible to complete the evaluation during the life of the partnership grant. In retrospect, it might have made sense to abandon this project after the first/or second delay in implementing the planned reorganization. However, this was a project that seemed important to the Glendale Police Department and the decision was made to delay the project in hopes that the reorganization would be completed so that it could be evaluated as part of the partnership project. The ASU West research team is committed to continuing with the project and anticipates completing it in the last half of 2000.

In sum, the research partnership process originally proposed was modified to reflect the realities of constraints such as a, shorter than anticipated project time frame, difficulties in scheduling meetings, excessive time consumption involved in travel to meetings, changes in agency personnel and practices, and delays in implementing agency strategies and organizational change. The principal modification of the process involved placing greater emphasis on university researchers working with the police agencies on a one to one basis, and less emphasis placed on the planned team approach that would have involved police agency liaisons and university researchers meeting and working together throughout the project. Nevertheless, the modified approach produced some useful research products and productive relationships between the individual agencies and the university.

Future Partnership Activities

Several partnership-related activities are planned for the future. The project as originally proposed called for a mini-conference at the end of the project to disseminate research findings and launch a Valley-wide police research consortium. This conference was not held during the

original grant period, but will be held instead in the fall of 2000. The evaluation of the Glendale Police Department's integration of investigations and patrol will also continue with completion anticipated in late 2000. A review of research findings with each department will also take place, and the university researchers will prepare additional journal articles and conference papers in order to disseminate research findings from the partnership research projects.

Implicit in the development of research collaborations between universities and police agencies is the goal of institutionalizing the partnership relationship so that it continues over time. It appears that to date, there has been mixed results in achieving this goal. Fairly strong individual and institutional relationships exist between the university and police agencies. For example, university researchers are involved in research projects that were not part of the original partnership grant with each of the three agencies. One of the three agencies has made the commitment to participate in a police agency-university research network, and in all likelihood, the two other agencies would make a similar commitment if called on to do so. Nevertheless, even though good working relationships between the police agencies and the university exist, and these relationships are at least partially due to the partnership project, it cannot be claimed that any unique set of institutional arrangements comprising a *multi-agency research partnership* exists. The relationships that will endure are between individual police agencies and the university and it's researchers, but as of yet, an identifiable set of collective relationships among agencies and the university has not been developed.

Lessons Learned and Recommendations to Others

The multi-agency research partnership produced some good working relationships between partner police agencies and the university as well as some useful research on community policing-related practices. The partnership experience also generated considerable knowledge

about the partnership process itself, and some of the lessons learned from this experience are summarized below.

1. **Time.** Controlling and capturing the time to operate a multiple-agency partnership process is extremely difficult, and finding time to schedule all of the project meetings originally planned for the partnership became problematic. It s difficult enough in a simple partnership involving one university and one police agency to allocate and manage time properly: a partnership involving three police agencies greatly exacerbates the problem. Compared to police agency personnel, university researchers enjoy an unusual degree of flexibility when it comes to scheduling and managing time, and they find it relatively easy to allocate time to project meetings and related activity. On the other hand, police agency personnel are much more constrained by such things as fixed shifts, compressed work weeks, and vacation schedules, and are more limited in their ability to attend project meeting and participate in partnership activities. They also have less control over their own time and are not as able to reallocate their time from traditional agency responsibilities to non-traditional activities such as a research partnership. Those planning multiple agency research partnerships should be well aware of the specials problems that such partnerships present for time allocation and time management, and they should build in a sizable "fudge factor" when planning project timelines.

2. **Geography Makes a Difference.** The success and institutionalization of a multi-agency research partnership is impacted by the initial identification and selection of partners in several different ways, including the geographical proximity of the partners to each other. Obviously, the magnitude of distances between partners impact the operation of a research partnership through the consumption of time driving to and from project meetings and other scheduled project activity. However the geographical proximity of the partners can

affect the success and institutionalization of multi-agency partnerships in more subtle ways as well. As was previously noted, one of the shortcomings of this research partnership project was the failure to operate and institutionalize the partnership as a true multi-agency partnership. Instead, what quickly evolved out of necessity were three individual university-agency partnerships. In some ways this is not surprising, since the police agencies involved in the partnership were geographically dispersed and non-adjacent to each other, and had a limited history of sharing information and participation in joint operations. Of course the common thread among the three agencies is that they were all police agencies situated in the Valley of the Sun. However, this was not sufficient to make them "natural" research partners. Each police department in the partnership was of course unique, but more importantly, they were at very different developmental stages in their ability to generate and consume research information. It is quite possible that these differences served as barriers making it difficult for the different departments to interact as research partners.

In retrospect, the selection of police agency partners might have benefited from the use of criteria that included such things as sharing adjacent jurisdictional boundaries, a history of agency collaboration, and equivalent capacity and experience in areas such as crime analysis and research and planning. Perhaps the increased use of electronic technology including conferencing and e-mail can make up for some of the limitations imposed by geographical dispersion and distance. Future research partnerships will benefit by carefully selecting partners using criteria such as those listed above.

3. **Research on Anticipated Organizational Changes is Risky.** Two of the three research projects planned as part of the research partnership were successfully completed, and the

implementation of one of the projects was delayed and will not be completed until after the end of the partnership project. In addition to substantive/topical differences among the three projects, there is one very important difference that had a direct bearing on whether or not a project could be implemented and completed within the time frame of the research partnership grant. All three of the projects involved evaluations of agency innovations, and two of projects involved innovations related to varying degrees of organizational change. However, a major difference was that the two projects that were successfully completed involved organizational change interventions that were already firmly in place (Scottsdale's Compstat and Chandler's Operation Restoration), whereas the Glendale project, the one not completed, involved organizational changes that were only planned. The Glendale project was premised on extensive organizational changes that were supposed to occur a few months into the project. However, these changes were postponed on multiple occasions for a variety of reasons including resistance in certain parts of the organization and additional study and planning of changes in the command structure. The decision to design a partnership research project on organizational change that is planned but not yet implemented, always entails the risk that the planned change may not be implemented, or implemented on time, which is what happened with the Glendale project. The lesson learned seems pretty clear. Research partnerships with limited time frames for project completion should be very cautious in selecting research projects premised on planned organizational changes simply because these changes may not occur in time to complete the research. The decision to design partnership research projects premised on organizational change should be based on substantial evidence (written plans, memoranda, order, etc.) that the change is imminent.

Summary and Conclusion

The multi-agency research partnership of the Chandler, Glendale, and Scottsdale, Arizona Police Departments and Arizona State University West produced good working relationships between the partner police agencies and the university as well as research on the implementation and impact of community policing strategies. Several partnership activities will continue beyond the NIJ-supported partnership including the completion of one additional research project, a Valley-wide conference on police research, and an attempt to created a larger consortium of police agency and university based researchers.

Although the partnership project has several important accomplishments, one shortcoming is that in the end, it operated more like three individual university-agency partnerships than a single multi-agency partnership. A variety of unanticipated factors produced this outcome including limitations imposed by the geographical dispersion of the partners and the special problems of time allocation and time management associated with multiple partners. Several lessons about partnership operations and dynamics were learned as a result of the multi-agency research project experience that should benefit others designing and implementing similar partnerships.

APPENDIX A

An Assessment of the Chandler Police Department's Operation Restoration

AN ASSESSMENT OF THE CHANDLER POLICE DEPARTMENT'S OPERATION RESTORATION

Prepared for the Chandler, Arizona Police Department

by

Charles M. Katz, Ph.D.
Vincent J. Webb, Ph.D.
David Schaefer, M.A.

Administration of Justice

ARIZONA STATE
UNIVERSITY WEST

June 2000

AN ASSESSMENT OF THE CHANDLER POLICE DEPARTMENT'S OPERATION RESTORATION

Prepared for the Chandler, Arizona Police Department

by

Charles M. Katz [b]
Vincent J. Webb [c]
David R. Schaefer [d]

ARIZONA STATE UNIVERSITY WEST

[a] This research was funded in part by grant no. 98-IJ-CX006 from the National Institute of Justice. The opinions expressed in this paper are those of the authors and are not necessarily those of the Department of Justice. The authors would like to express special thanks to Chief of Police Bobby J. Harris, Lieutenant Cliff Anderson, Dick Charapata, Lieutenant Mike Kelly, and Larry Rife for their assistance with this project. We would also like to thank Chester Britt and Alex Piquero for their comments and advice on earlier drafts of this paper.

[b] Charles M. Katz is an Assistant Professor in the Administration of Justice Department at Arizona State University West. His research interests include the police response to gangs, community policing, drugs and crime, and organizational theory.

[c] Vincent J. Webb is Professor and Chair of the Administration of Justice Department at Arizona State University West. His research interests include program evaluation, community crime prevention, drugs and crime, and the police response to gangs.

[d] David R. Schaefer is a Faculty Research Associate in the Administration of Justice Department at Arizona State University West. His research interests include innovations in survey research methodologies and program evaluation.

TABLE OF CONTENTS

INTRODUCTION

Over the past two decades, police agencies across the nation have been adopting community policing strategies centered on the aggressive enforcement of disorder offenses. These aggressive policing strategies are popularly known as "zero-tolerance," "order-maintenance," and "quality-of-life" policing (Cordner, 1998).[1] These strategies stand apart from other community policing efforts in that they do not attempt to address crime through community cooperation, but rather they attempt to address crime through the aggressive enforcement of disorder (Eck and Maguire, 2000: 21). The origin of quality-of-life policing can be traced back to the broken-window's thesis, first prescribed by Wilson and Kelling in 1982. Wilson and Kelling's (1982) broken windows theory is based on the hypothesis that if social and physical disorder in a community is not attended to more serious forms of disorder, and, eventually, increased levels of crime will follow. For this reason, the authors' argued that to combat crime the police must re-orient their focus toward addressing neighborhood disorder.

Despite the relatively large body of literature that has explained, described and expounded upon the broken-windows hypothesis (Kelling and Coles, 1996; Skogan, 1990; Skolnick and Bayley, 1986; 1988; Taylor, 1998; Walker, 1984; Wilson and Kelling, 1982) little research has examined the nature of the organized response to disorder. Much of what we currently know about the police response to disorder comes from the media (Kocieniewski and Cooper, 1998; O'Hara, 1998; Panzarella, 1998) and police executives (Bratton, 1996; 1998). Only a few researchers have examined quality-of-life policing (Dilulio, 1995; Silverman, 1999; Sykes, 1986) and even fewer have examined the effectiveness of the strategy on reducing crime (for exceptions see Novak et al. 1999; Sherman, 1990; Kelling and Coles, 1996).

[1] Hereafter, we use the generic phrase "quality-of-life" policing to describe these policing strategies.

The purpose of this paper is to examine the impact of quality-of-life policing on crime and disorder. Specifically, we examine a quality-of-life initiative in one jurisdiction that was grounded in an operational strategy of policing social and physical disorder. The study will attempt to advance our understanding of the effects of enforcing order maintenance laws and zoning ordinances on crime and disorder. In the next section we begin by outlining the broken windows hypothesis and the empirical support for the theory. This is followed by a discussion of the implications of the broken windows hypothesis for policing strategies and a review of the research on policing crime and disorder. We then describe the nature and content of the intervention examined in the present study. Last, we present our methodology, findings, and discuss the policy implications of the findings.

THE BROKEN WINDOWS HYPOTHESIS

Wilson and Kelling (1982), in their seminal essay, "Broken Windows: The Police and Neighborhood Safety," hypothesized that disorder and crime are "inextricably linked" (p. 31). They argued that if social disorder (e.g., public drinking, street level drug dealing, prostitution) and physical disorder (e.g., vandalism, neighborhood dilapidation) are left unchecked by the community an environment is created that attracts serious crime. According to the authors disorder signals to those around that crime and delinquency will be tolerated, and will not be subjected to the same amount of scrutiny as might be found in other neighborhoods. Their point being that "minor offenses have serious consequences for the life of neighborhoods and communities" (Kelling and Bratton, 1998: 1219).

Kelling and Coles (1996) further explain that disorder leads to crime in a rather formulaic manner. Visible disorder, they argue, if left uncontrolled, heightens citizens' fear of crime and leads citizens to believe that a neighborhood is unsafe. After citizens begin to feel unsafe they withdrawal from the community, both physically and psychologically, by reducing their public

presence and severing social ties with other residents. The authors maintain that after residents withdrawal, detaching themselves from their community, informal social control mechanisms break down. Residents are no longer present to supervise youths or others in the community that are prone to mischief and misbehavior and no longer feel the same sense of mutual responsibility to react to such behavior (Skogan, 1990). As a consequence, more serious forms of disorder begin to materialize, eventually leading to an increase in serious crime. As such, advocates of the broken windows hypothesis argue that it is to late to react to crime problems after serious offenses have taken place (Kelling and Bratton, 1998). Intervention, according to the broken windows hypothesis, must take place at the first sign of disorder to prevent the neighborhood from spiraling deeper into decline (Skogan, 1990).

While there has been a great deal of discussion surrounding the broken windows hypothesis remarkably little research has examined the relationship between disorder, fear and serious crime. One of the few studies to examine this issue was conducted by Skogan (1990) in his attempt to empirically substantiate the broken windows hypothesis. In his analysis, Skogan (1990) primarily relied upon survey data obtained from 13,000 residents in 40 neighborhoods in 6 major cities. The survey questions focused on victimization, perceptions of disorder, fear of crime, and neighborhood satisfaction. Skogan's (1990) analysis provided two major findings. First, perceptions of crime, fear of crime, and victimization were all positively related to neighborhood social and physical disorder. He emphasized that these relationships were stronger than other correlates of crime such as ethnicity, poverty, and residential instability. Second, Skogan (1990) reported that disorder preceded serious crime in the studied neighborhoods. These two findings taken together have provided much of the empirical support for the broken windows theory and provided justification for police strategies targeted at social and physical disorder.

However, some researchers have begun to question the fundamental notion that disorder and crime are interwoven and temporally linked. Harcourt (1998), for example, re-analyzed Skogan's data and found that there was no association between disorder and serious crime. He explained that Skogan's findings are the consequence of data obtained from a few neighborhoods in which the relationship between disorder and crime was particularly strong. However, Eck and Maguire (2000), addressing this debate, point out that had Skogan (1990) removed other neighborhoods from his analysis the relationship between disorder and crime would have been even stronger. Accordingly, Eck and Maguire (2000) in their review of this debate conclude that "Skogan's results are extremely sensitive to outliers and therefore do not provide a sound basis for policy. Rather, they suggest possible relationships that deserve further inquiry" (p. 24).

Despite the lack of consistent research in support of the broken windows hypothesis, Wilson and Kelling's (1982) work sparked a revolution in policing and caused police agencies across the country to rethink the proper role of the police. A number of police executives and researchers argued that the policy implications of broken windows theory were evident and clear—that to reduce crime the police must re-focus their energy and resources and aggressively police social and physical disorder. As a consequence, a number of police agencies across the country began to move toward a role that incorporated quality-of-life concerns.

POLICING CRIME AND DISORDER

Aggressive Policing

Quality-of-life policing, based on the broken windows argument, is founded on the principle that for the police to control crime they must attend to such issues as disorder, minor crime, and the appearances of crime (Cordner, 1998). This strategy is typically characterized by the aggressive enforcement of crime and disorder for the purpose of restoring order to a community and to signal to potential offenders that the police are taking back the streets. Some

researchers have pointed out that aggressive policing strategies are one of the few policing strategies that have repeatedly been shown to effectively control crime (Sherman, 1997).

Wilson and Boland (1978) examined the relationship between aggressive policing and crime in 35 large cities. The authors used the number of traffic tickets issued by each police department as a proxy for aggressive policing, arguing that aggressive traffic enforcement is an indicator of the level of police surveillance on city streets. They hypothesized that the more aggressive the police patrolled city streets, the more effective they would be in deterring street crimes such as robbery. The authors reported an inverse relationship between the rate of traffic citations issued per officer and the city's robbery victimization rate. Thus, they conclude that aggressive patrol strategies deter robbery. Sampson and Cohen (1988) replicated the study using a larger sample and slightly altered methodology. The authors combined the number of traffic tickets issued and the number of disorder conduct arrests per officer to create an aggressive policing component for each police department. Similar to Wilson and Boland, the authors found that police aggressiveness was related to lower robbery rates.

Not all of the research on aggressive policing, however, has indicated that the strategy is effective. Weiss and Freels (1996) examined aggressive traffic enforcement (as a measure of aggressive policing) and its impact on crime in Dayton, Ohio. The authors used a quasi-experimental design with one police district serving as a control area and another police district serving as an experimental area. Patrol officers that worked in the experimental district were told to aggressively enforce traffic laws. Analysis indicated that officers in the experimental district conducted three times as many traffic stops as officers in the control district. While Weiss and Freels found that aggressive policing, as measured through traffic enforcement, led to increases in arrests for offenses related to DUI, drugs, and weapons, it was unrelated to arrests for index crimes.

Others have studied the effectiveness of aggressive policing strategies through the examination of field interrogations. The San Diego Field Interrogation Experiment conducted by Buydstun (as summarized by Sherman, 1992) examined the impact of conducting proactive field stops on suppressible crimes in San Diego, California. The author, using official data obtained from a target and two control areas, reported that the police district employing the use of aggressive field stops and interrogations had significantly less reported crime than districts that did not use aggressive field stops and interrogations.

Perhaps the most widely acclaimed support for this strategy has come from studies examining aggressive policing directed at specific locations. Sherman (1990) notes that because crime is not randomly distributed, but rather is typically concentrated in particular locations, the police can more effectively use their resources by directing them to areas where crime is most likely to occur. For example, Sherman et al. (1989) reported that in Minneapolis about five percent of addresses accounted for over half of all calls for service in the city. As a result, many police agencies over the past twenty years have been adopting aggressive directed patrol strategies aimed at neighborhoods and locations with unusually high levels of crime.[2]

Cordner (1981) examined the impact of aggressive directed patrol on robbery, burglary, auto theft, and theft from vehicles in Pontiac, Michigan. The aggressive directed patrol strategy involved officers actively stopping suspicious persons, engaging in field interrogations, and aggressively stopping vehicles. The officers were to perform aggressive directed patrol during non-committed time. Cordner found that arrests during the intervention period substantially increased, and concluded that the strategy was effective in reducing street crime in the targeted

[2] Over the past five years there has been a burgeoning body of research that has examined the impact of directed patrol on crime. Because space does not permit a thorough review of this literature we only review a subset of the literature that has focused on aggressive directed patrol and do not focus on such issues as the impact of patrol density on crime (Kelling et al, 1974; Police Foundation, 1981) and crime specific policing focusing on special problems such as guns (Sherman and Rogan, 1995), drunk driving (Ross, 1982), and drug markets (Weisburd and Green, 1995; Sherman and Rogan, 1995).

areas. However, he also found that the overall level of crime did not decrease in the city and that the drop in crime in the targeted areas may have been displaced to other areas.

In the late 1980s, the National Institute of Justice (NIJ) funded a study aimed at understanding the impact of police presence on crime and disorder in Minneapolis, Minnesota. Researchers from the Crime Control Institute and Rutgers University identified 110 hot spots and then randomly selected 55 of the hot spots to receive increased patrol presence (i.e., more aggressive policing). Using calls for service and observational data, researchers reported that calls for service decreased by 6 to 13 percent and disorder decreased by 50 percent in the targeted areas compared to the control areas (Sherman and Weisburd, 1995). "They also found a relationship between the amount of time that a police officer was present at a hot spot and the length of time that the hot spot was free from crime after the officer left the location" (Sherman, 1997: 15). In particular, the analysis indicated that the longer the officer was present at a location, at least up to a point, the longer the location remained free from crime after the officer left the location (Koper, 1995).[3]

Quality-of-Life Policing

Quality-of-life policing differentiates itself from the above police operational strategies in that it specifically focuses police resources on the aggressive enforcement of social and physical disorder. By aggressively policing social and physical disorder it is believed that community members will be more inclined to care for their neighborhood, which will restore orderliness, and will eventually lead to community members feeling safer and signal to potential criminals that lawbreaking will not be tolerated (Roberts, 1999). While some agencies have adopted quality-of-life policing as part of a departmental wide policing strategy (Bratton, 1996; Kelling and

[3] Koper (1995) reported that patrol presence of 15 minutes generates the longest period of time in which a location remains crime free, after which time continued police presence exerts less of an effect—or reaches a point of diminishing returns.

Bratton, 1998) it is more often employed in specific neighborhoods identified as having serious problems with crime and disorder (Kelling and Coles, 1996).

A few researchers across the country have begun to examine the impact of quality-of-life policing on crime. One of the first studies to investigate the impact of policing disorder on serious crime was conducted by Sherman (1990). Sherman examined an order maintenance crackdown on public drinking and parking violations and its impact on robbery in Washington, DC. As part of the research protocol the police operational strategy included three phases: the first phase included publicizing the nature of the crackdown and area that the crackdown was to take place; the second phase included a substantial increase in the enforcement of parking violations and liquor offenses; and the third phase was characterized by the police abruptly ending the crackdown. Sherman found that while the order-maintenance crackdown had a positive and significant impact on the publics' perception of safety, it did not have a significant effect on street robberies.

More recently, Novak et al. (1999) examined the impact of the enforcement of liquor laws (i.e., public drunkenness, minor in possession of alcohol) on robbery and burglary. The aggressive enforcement strategy took place over a thirty-day period in an experimental area, which was later analytically compared to a control area. Using official data for the analysis, the authors reported that the intervention did not have a significant impact on either robbery or burglary. Novak et al. argued that this might have been because the intervention only lasted thirty days, or because the dosage level was not substantial enough to have an impact on serious crime. The authors reported that only 140 arrests and citations were issued during the entire project.

These two studies taken together suggest that policing disorder may not substantially reduce serious crime as hypothesized by Wilson and Kelling (1982). The lack of empirical

support found in the above two studies, however, may be a consequence of the operational strategy used by the police agencies under study. First, both of the above responses were primarily aimed at policing alcohol violations. Such a response is narrowly focused on policing a specific type of disorder rather than responding to all forms of disorder. Such a strategy is analogous to repairing every tenth "broken window" and assuming that these few repairs will have a substantial effect on serious crime. It would not be hard to imagine that the same communities that suffer from alcohol-related disorder might also have problems with drug trafficking, prostitution, and homelessness.[4] Addressing one of many problems may not repair the community to a state in which residents feel safer and regain their capacity to control crime.

Second, the above strategies primarily limited their response and evaluation to social disorder. While social disorder involves events and activities, physical disorder persists on a day-to-day basis and often times becomes the dominant characteristic by which a neighborhood comes to be known—both within and outside the neighborhood (Skogan, 1990). While researchers as of yet have failed to untangle the relative importance of social and physical disorder on serious crime (Taylor and Herrel, 2000) researchers have found that they are highly correlated with one another (Skogan, 1990). Like social disorder, physical disorder has been found to be interwoven and temporally linked with serious crime (Schuerman and Kobin, 1986; Taylor and Covington, 1990). As a consequence, the failure of the above programs to respond to and incorporate a strategy to address neighborhood physical disorder may be the reason for the lack of programmatic success.

One of the few studies to examine the impact of policing social and physical disorder on crime was conducted by Kelling--as reported in Kelling and Coles (1996). They explain that in the 1980s the New York City subway was in a state of disrepair. A number of stationhouses

[4] Neither of the studies reported the overall environmental climate in which the studies took place so it is difficult to

were deteriorated, graffiti covered many walls and trains, and disorderly conduct by youths and homeless persons had become the norm. The New York City Transit Police Department, under the command of William Bratton, and guided by George Kelling, developed an operational strategy based on the broken windows thesis. The strategy involved strictly enforcing disorder laws, ejecting the homeless and loitering youths from the tunnels, and refurbishing trains and station houses. Over the course of the intervention the number of people ejected from the subway tripled and the number of misdemeanor arrests almost quadrupled. Kelling reported that the quality-of-life initiative resulted in a significant reduction in serious crime (Kelling and Coles, 1996).

While Kelling's report provides some support for quality-of-life policing, a number of questions remain. First, while Kelling and Coles (1996) extensively discuss the content of the intervention performed by the New York City Transit Authority, they present little detail with regard to programmatic outcomes other than such qualitative statements as "Consequently, when action was taken against farebeaters, serious crime dropped" (Kelling and Coles, 1996: 134) and

> Disorder and crime are no longer serious problems in New York's subway—it is among the safest in the world. It feels, smells, and 'tastes' different. Indeed, the culture was so different that by the mid-1990s the Transit Authority initiated a civility campaign, encouraging citizens to queue before boarding trains—a campaign that would have been a joke in the late 1980s. Returning ex-New Yorkers are stunned by the changes. (Kelling and Bratton, 1998: 122)

Second, Kelling and Coles themselves question whether or not their findings should be generalized to neighborhoods and municipal police departments. They point out that subways are qualitatively different environments in which to operate, being that they are spatially bound and have formal entrances and exits. They further explain that the "subway community" is much simpler to police "compared to the complexity of a community [being that] the system is set up to provide a single service; riders pay to use it; and they ride it for relatively short periods of

---

know the amount of disorder that was present in each targeted area.

time." (p. 137). Additionally, the authors point out that the transit police are not continually responding to calls for service which permits them more time to aggressively enforce disorder and to solve more complex problems when compared to municipal police officers.

THE PRESENT STUDY

Prior research suggests that while police agencies across the nation are beginning to adopt quality-of-life strategies, there is no consistent evidence that suggests that these strategies are effective in controlling crime. The stronger research designs that have been used to test the effectiveness of quality-of-life policing have failed to find support for the strategy. However, at the same time, these same studies appear to have measured a response that failed to fully and holistically address community disorder (Novak et al., 1999; Sherman, 1990). With the exception of Kelling and Coles (1996) there has been little research that has examined the impact of policing both social and physical disorder on crime. These shortcomings make it difficult to understand the extent to which policing disorder impacts crime.

Using data obtained from the Chandler, Arizona Police Department we examine the department's quality-of-life police initiative aimed at reducing social and physical disorder for the purpose of reducing crime. The study will attempt to advance our understanding of the effects of enforcing order maintenance laws and zoning ordinances on crime and disorder. While this study is not an evaluation of the broken windows hypothesis, it does attempt to evaluate the strategy suggested by Wilson and Kelling (1982) for combating crime.

QUALITY-OF-LIFE POLICING IN CHANDLER, ARIZONA

Project Setting

The present study reports on findings from an evaluation of a community policing initiative conducted in Chandler, Arizona. Chandler is located in the southeast corner of the Phoenix metropolitan area and is bordered by cities such as Phoenix, Mesa, Tempe, Gilbert, and

the Gila Indian Reservation. Chandler is the second fastest growing city in the United States with a population of over 170,000 residents. The current estimate is that the city's population is growing by 800 to 900 residents a month. The Chandler Police Department, like the community, has experienced substantial growth, having grown by over 50 percent in the past four years. In 1996, the department employed 193 sworn officers; today, there are 295 full-time sworn officers.

The quality-of-life initiative being evaluated took place in Chandler's Redevelopment District. The Redevelopment District consists of a 4.75 square mile area in the center of the city. As seen in Table One, the Redevelopment District is substantially different from the city in terms of socio-demographic characteristics and crime. With regard to socio-demographic characteristics the Redevelopment District contains more Hispanics and younger people compared to the entire city. The Redevelopment District is also economically depressed compared to the city as a whole. For instance, the median household income is about $27,500 in the Redevelopment District compared to about $46,000 for the city; and the median home price in the Redevelopment District is 70 percent of that found in the city ($70,700 compared to $99,000). Households in the Redevelopment District are also about twice as likely to by headed by a female and are almost 1.5 times more likely to be rented as compared to owned. Crime in the Redevelopment District is also substantially higher than that found in the entire city. Comparing police Calls For Service in the Redevelopment District with the rest of the city illustrates the relatively high level of crime and related activity in the Redevelopment District. During the first six months of 1997, the number of Calls for Service in the Redevelopment District was 2.76 times higher per 1000 residents in comparison to the rest of the city. During this time period there were 540.1 Calls for Service per 1000 residents in the Redevelopment District and 104.9 per 1000 residents in the rest of the city. The volume of Calls for Service during that period was 21,596 in the Redevelopment District and 110,773 in the rest of the city.

In other words, nearly one out of every five Calls for Service originated in the Redevelopment District, which is a relatively small geographic area in the city.

Table 1: 1995 Background Characteristics of the Redevelopment District and the City of Chandler, Arizona*

	Redevelopment District	City of Chandler
Population	21,596	132,369
# of Housing Units	6,871	49,099
Median Household Income	$27,597	$46,096
Ethnic Characteristics		
White	42.7	67.8
Hispanic	51.0	17.3
African American	2.8	2.6
Asian	1.8	2.4
Native American	1.7	1.2
Other	0.5	8.7
Population Age		
> 5	10.8	9.4
5-13	17.7	16.2
14-17	6.2	5.6
18-21	6.2	4.3
22-54	45.7	54.0
55-59	3.0	2.9
60-74	7.3	5.6
+ 75	3.1	2.0
% Female Headed Household	23.2	11.0
Median Home Price	$70,700	$99,000
% Own Home	54.8	72.5
% Rent	45.2	27.5

* Data is based on the 1995 Special Census. It was obtained from the City of Chandler Economic Development Office.

Operation Restoration

In November 1995, the Chandler City Council established a Neighborhood Task Force that was charged with identifying quality-of-life problems in the city. In response the Task Force surveyed residents, held community meetings, and met with key community stakeholders. They concluded that the most influential problem affecting the quality of-life of residents in the City of Chandler was the increase in physical deterioration and social disorder in the city's aging neighborhoods. Residents complained of a high level of street level drug trafficking, prostitution, and bootleg liquor sales. Community residents and leaders also complained that the

older sections of the community were in a constant state of disrepair. They explained that many of the homes had broken or missing windows, doors falling off their hinges, and significant amounts of trash and debris cluttering the property (Building Stronger Neighborhoods, 1996; Chandler Police Department, 1997).

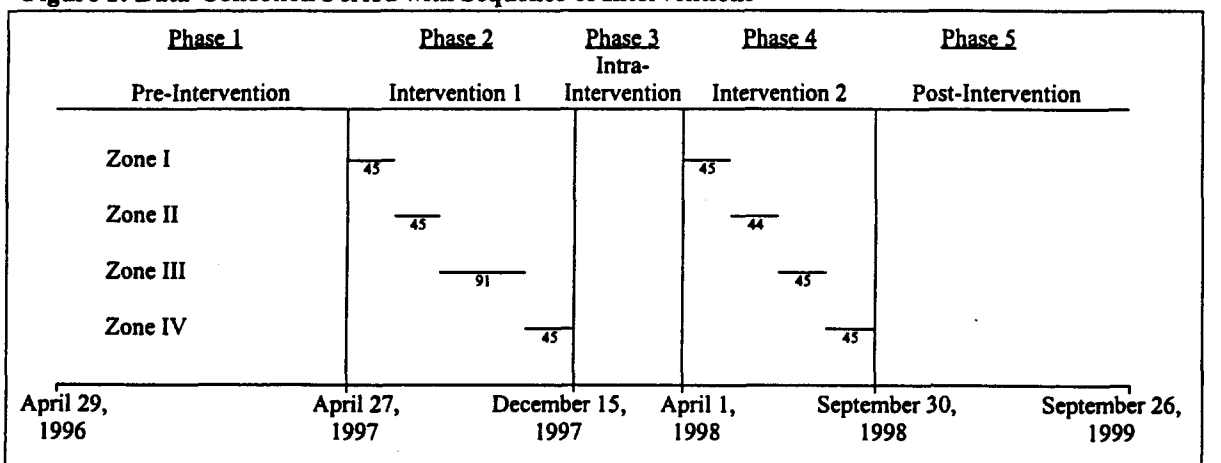
The city first responded by transferring its zoning enforcement responsibilities to the police department from the Planning and Development Department in early 1997. This unit, hereafter called the Neighborhood Service Unit, was staffed with seven civilians: four inspectors, two graffiti painters, and one supervisor. The unit was responsible for enforcing city code violations pertaining to weeds, debris, inoperable vehicles, and graffiti abatement. The unit also conducted a seven point "house check" on private residences to ensure that properties met city-zoning standards. At approximately the same time the police department received federal funds from the Community Oriented Policing Services (COPS) office to develop a Neighborhood Response Team. The team consisted of six sworn officers and one sergeant. The officers patrolled neighborhoods on bicycles conducting field interviews, traffic stops, and aggressively enforcing all municipal codes and county laws. The officers were also responsible for attending bi-monthly beat meetings (attended by beat detectives, beat patrol officers, and community members) for the purpose of identifying and responding to neighborhood problems.

In April 1997, the Neighborhood Services Unit and the Neighborhood Response Team were organizationally integrated for the purpose of focusing their resources on quality-of-life and crime issues in the Redevelopment District of the city. The Chief of Police, at the recommendation of the Neighborhood Task Force, selected the city's Redevelopment District for the special operation because it comprised some of the oldest neighborhoods in the city. The Task Force determined that it was the area of the city where physical deterioration was the worst

and had historically generated the most calls for police services (Chandler Police Department, 1997).[5] This special operation came to be known as "Operation Restoration."

To enable the two units to focus their resources on smaller areas the Redevelopment District was geographically divided into four zones ranging in size from 1 to 1.5 square miles. Both units focused on a single zone for 45 days and then moved to the next zone.[6] Once the two units completed working in all 4 zones they waited approximately a month and a half before repeating the process (see Figure 1). Thus, the units operated in each zone twice. At the beginning of the operation in each zone a community meeting was held with zone residents. At each meeting police officials educated attendees about the nature of the operation and asked them to pass the information to others in the neighborhood. Police officials also used the meetings as a forum for residents to express their concerns about quality-of-life issues in their neighborhood and to give residents an opportunity to ask any questions or convey any concerns related to the operation.

Figure 1: Data-Collection Period with Sequence of Interventions



NOTE: Lines indicate the period of the interventions in each zone. The numbers below the lines represent the duration of the intervention in the particular zone.

[5] Interviews with police officers indicated that the city's problems with prostitution and street level drug trafficking were primarily restricted to this neighborhood.

At the beginning of the operation in each zone, Neighborhood Service Specialists inspected all private and business properties. Inspectors cited property owners for such violations as weeds on developed areas, vehicles parked on unimproved surfaces, abandoned or inoperable vehicles, litter, trash, or outdoor storage, and unsecured or dirty swimming pools. It was also not unusual to cite property owners with failure to properly maintain their property (i.e., needing to paint their house) or possessing farm stock within city limits without a license (i.e., raising chickens and goats for personal consumption). Upon being served with a violation notice owners had 20 days to bring their property into compliance. After 21 days Neighborhood Service Specialists would re-inspect the property and if the property had not been brought into compliance issue a citation.[7]

Neighborhood Response Team officers used both unmarked vehicles and bicycles to patrol zones. Unmarked vehicles were used for the surveillance of street level drug trafficking, prostitution, gang activity, and suspicious persons. Bicycles were used to conduct field interrogations, issue summonses for traffic offenses and to aggressively enforce disorder crimes. Bike patrol was also used to increase the officers' accessibility to neighborhood residents. Special emphasis was placed on making contact with business owners and residents to increase officer awareness of neighborhood problems. Neighborhood Response Team officers were not dispatched to calls for service so that the officers were free to aggressively police crime and disorder in the target area.

---

[6] The treatment protocol was deviated once during the first round of enforcement efforts when Zone Three received 91 days of treatment, instead of the proscribed 45 days and once in the second round when Zone Two received 44 days instead of the proscribed 45 days.

[7] Extensions were permitted for owners that needed additional time to complete lengthy projects. Additionally, cases in which individuals could not bring their property under compliance, for physical or financial reasons, were forwarded to a volunteer project coordinator or a city outreach program for assistance.

Treatment Content and Dosage

The activity that took place during Operation Restoration consisted of a change in the content of police services and an increase in the amount (or dosage level) of police services in each targeted zone. Officers who were typically assigned to the target area continued their work as normal. Because the officers assigned to the Neighborhood Response Team were not assigned calls for service they represented a substantial increase in the amount of patrol presence and proactive police activity in targeted zones. The civilians assigned to the Neighborhood Services Unit were also restricted from working in neighborhoods outside of the targeted zone, except in cases where they were required to re-inspect property that had previously been cited with a zoning violation. Their efforts resulted in a substantial increase in code enforcement efforts by the police department. Because the specialists wore uniforms and drove vehicles that identified them as employees of the Chandler Police Department they appear to have increased the amount of police departmental presence, though this cannot be stated for certain.[8]

Table Two shows that the activity generated by the Neighborhood Response Team during Operation Restoration resulted in a considerable amount of contact with the public. Specifically, it shows that the officers conducted 630 arrests, issued 1,049 citations, and made 4,914 field contacts over the course of the operation. The Neighborhood Service Unit initiated 3,270 cases in the four zones. Review of the re-inspection data revealed that over 97 percent of those cited with a violation voluntarily complied with the request to make property improvements. The remaining 82 cases (2.5%) were resolved through citations to appear in City Court. This

[8] Police commanders, police officers, members of the Neighborhood Service Unit and civilians all agreed that the presence of the Neighborhood Service Unit increased the department's capacity to identify criminal activity and increased citizen awareness of the presence of the police department. This was re-affirmed through complaints lodged against the police department, by citizens complaining that they were "confused" by the Neighborhood Service Unit's uniforms and that they mistook specialists for sworn police officers.

suggests that the physical condition of the Redevelopment District was significantly improved over the course of the operation.

Table 2: Intervention Activities that took place during Operation Restoration

	Neighborhood Services Unit				Neighborhood Response Team			
	Cases Initiated[1]	Cases Complied	Graffiti Abated	Total Improvements[2]	Arrests[3]	Citations[4]	Field Activity[5]	Total Police Contacts[6]
Zone I								
Intervention 1	281	248	67	315	89	171	358	618
Intervention 2	214	214	42	256	81	197	518	796
Zone II								
Intervention 1	281	256	62	318	54	117	384	555
Intervention 2	131	131	25	156	38	115	316	469
Zone III								
Intervention 1	1,198	1,189	229	1,418	123	104	310	537
Intervention 2	309	304	72	376	78	51	174	303
Zone IV								
Intervention 1	611	601	90	691	101	74	188	363
Intervention 2	245	245	21	266	66	220	987	1,273
Entire Redevelopment District	3,270	3,188	608	3,796	630	1,049	3,235	4,914

[1] Cases were initiated for the following reasons: parking on unimproved surfaces, weeds, litter, trash, debris, outside storage, inoperable vehicles, fences, pets, keeping of roosters, commercials, and graffiti.
[2] Total improvements equals number of cases complied plus amount of graffiti abated.
[3] Arrests included felonies, misdemeanors, juvenile referrals, and warrants.
[4] Citations were made for civil, curfew, liquor, traffic, and city violations.
[5] Field activity consisted of GIMIC cards, field interviews, service requests, night eyes, and bicycle registrations.
[6] Total police contacts equals arrests plus citations plus field activity.

DATA

We examine the impact of the intervention on crime and disorder using calls for service (CFS) data collected from the Chandler Police Department's crime analysis unit. Traditionally, efforts to measure crime and disorder by place have been restricted to police crime reports. However, a number of researchers have argued that official crime data are inappropriate for such studies (Mazerolle et al., 2000; Sherman et al., 1989; Sherman and Weisburd, 1995; Skogan, 1990; Weisburd and Green, 1995). Two major reasons have been noted. First, official police records substantially underreport, and perhaps distort, disorder problems. Police scholars maintain this is largely because police officers are more likely to handle such incidents informally (Sherman, 1986; Skogan, 1990). For example, Black (1980), in his observational study of police officers in Boston, Chicago, and Washington, DC, found that only about 40 percent of minor complaints are officially recorded (See also Sherman, 1986). The second weakness of official crime data is that the mean number of official offenses recorded in an intervention area is typically too low to generate a sufficient amount of statistical power.[9] Therefore, the probability of finding a significant effect is decreased (Mazerolle et al., 2000; Sherman and Weisburd, 1995; Weisburd and Green, 1995).

CFS data have been recognized by many police scholars as a more reliable indicator of change in crime and disorder, particularly when examining place-based police interventions (Mazerolle et al., 2000; Sherman et al, 1989; Sherman and Weisburd, 1995; Weisburd and Green, 1995). This is largely because it is not as susceptible to the discretionary behavior of individual police officers (Sherman et al., 1989; Warner and Pierce, 1993). In this regard

[9] For example, Novak et al. (1999) in their study of the aggressive policing of disorder on serious crime concluded that their findings may have been influenced by the fact that the official data that they used did not contain enough variability, and, therefore, their likelihood of finding a relationship between the two was limited.

Sherman et al. (1989: 36) argued that, "Calls to the police provide the most extensive and faithful account of what the public tells the police about crime."[10] Accordingly, we use CFS data to examine the impact of the quality-of-life operation. The CFS data were collected from April 29, 1996 through September 26, 1999 for a total of 1,245 days. This includes data for a period of 362 days prior to the first intervention and 361 days following the last intervention.

ANALYTIC STRATEGY

The unit of analysis in the present study is the daily number of CFS in the Redevelopment District and within each zone.[11] The dependent variables in our analyses are the number of calls for service for ten offense categories. In particular, calls were assigned to one of the following ten categories: (1) person crime (2) property crime, (3) drug crime, (4) suspicious persons, (5) assistance, (6) public morals, (7) physical disorder, (8) nuisance, (9) disorderly conduct, and (10) traffic. All other types of calls for service were removed from the data (*i.e.*, 911 hang-ups). The final data set included a total of 47,270 calls for service in the Redevelopment District over the 1,245 day period. Because each of the four zones received interventions at different points in time we also examine each zone separately, allowing us to more precisely model changes in disorder and crime.[12] This resulted in 50 sets of time series data, each spanning a total of 1,245 days.

We use two types of analyses to assess the impact of the intervention on crime and disorder in the targeted areas. Our first set of analyses compares mean changes in the dependent variables before and after the interventions using *t* tests to compare means. In particular, we compare (1) the pre-intervention period to the intra-intervention period (i.e., period following the

[10] See Klinger and Bridges (1997) for a thorough discussion of the limitations of CFS data.
[11] The data set includes both emergency and non-emergency calls for service.
[12] Because the intervention focuses on different zones in the Redevelopment District at different times we might not capture temporary or gradual intervention effects. For example, the intervention in Zone 1 took place almost 6-months prior to the intervention in Zone 4, by which time any intervention effects in Zone 1 may have dissipated. Accordingly, we believed that it was also necessary to model the impact of the intervention by zone.

first intervention but before the second intervention); (2) the pre-intervention period to the post-intervention period; and (3) the intra-intervention period to the post-intervention period. We use these analyses to examine the impact of the intervention in both the Redevelopment District and within each zone.

Means tests are not always the most appropriate analytical technique when examining time series data. If a time series is autocorrelated or contains a drift or trend the standard errors used in a *t* test will be biased, leading to biased *t* values and possible Type I error (Abraham, 1987; McDowall, 1980). Since many of our time series were found to be autocorrelated we utilize the procedure outlined by Box and Jenkins (1975) and construct a series of ARIMA models. Additionally, the interrupted time series approach for our second set of analyses permits us to examine several different "impact patterns" that might not otherwise be observed. In particular, it allows us to test for (1) an abrupt and permanent change in CFS, (2) a gradual and permanent change in CFS, or (3) an abrupt and temporary change in CFS.

We built each model using the three step model-building strategy outlined by McDowall et al. (1980). First, we identified each series empirically by examining graphs of the raw data for the 365-day pre-intervention period (the autocorrelation functions (ACF), and the partial autocorrelation functions (PACF)). With the exception of the nuisance category, the analyses revealed that our series were stationary in both variance and level and suggested that they were not in need of differencing (McCleary and Hay, 1980; McDowall et al., 1980). The nuisance series displayed a clear weekly pattern and was thus differenced with a lag of seven. Second, we checked each tentative model to see if the parameter estimates fell within the bounds of stationarity/invertibility and whether they were statistically significant. We identified autoregressive and/or moving average components for 27 of the 50 time-series examined. Third,

we diagnosed model residuals to ensure that they were not different from white noise as indicated in ACFs and PACFs of the residuals and a Ljung-Box statistic.

Once the univariate ARIMA models were satisfactorily identified we tested for the impact of the interventions. For each offense category, in each targeted area, we estimated three models to test for three types of effect – abrupt/temporary, abrupt/permanent, and gradual/permanent.[13] We then compared intervention parameter estimates across models to ascertain the best fitting model (i.e. out of range or insignificant intervention coefficients indicated a poor fitting model).

The greatest weakness of our analytic strategy is the possibility that something other than the intervention could have caused the level of CFS to change – what is referred to as *history* (Campbell & Stanley, 1963; Cook & Campbell, 1979). While ARIMA models can control for trend or drift over time they do not necessarily eliminate the effects of external factors. Because the Redevelopment District is distinctly different from other neighborhoods in Chandler, Arizona in terms of the nature and extent of social disorder, physical decay, and crime, we were not able to utilize a typical experimental and control group design. Nevertheless, the intervention design corresponds with what Cook and Campbell refer to as an *interrupted time series with multiple and switching replications*. The advantage of this design is its ability to control for most threats to internal validity. As Campbell and Stanley state, "the more numerous and independent the ways in which the experimental effect is demonstrated, the less numerous and less plausible any singular rival invalidating hypothesis becomes. The appeal is to parsimony" (p. 36). Thus, if the intervention had an impact in all four zones (at four different points in time) across two years then it is likely the effect is due to the intervention rather than some other unknown event.

[13] Many of the gradual/permanent models failed to converge initially and required the loosening of the convergence criteria (from .001 to .005 or.01) in order to estimate them.

Accounting for Spatial Displacement and Diffusion of Benefit Effects

As of late, a number of researchers have strongly argued for the importance of examining possible displacement and diffusion effects resulting from police interventions.[14] In the current study, we focus specifically on spatial displacement and the related issue of diffusion of benefits.[15] Spatial displacement involves measuring the extent to which crime moves from one location to another. Researchers have hypothesized that blocking opportunities in one place simply results in crime being displaced to a near-by place where opportunities are not blocked (Barr and Pease, 1990; Gabor, 1978; Green, 1995; Hakim and Rengert 1981; Reppetto, 1976; Weisburd and Green, 1995). The theoretical underpinnings of this hypothesis are based on the rational choice and opportunities literature (Clark, 2000).

A number of studies have empirically documented displacement effects. For example, Press (1971) reported that a crackdown on crime in one police district in New York City resulted in increased crime in surrounding districts. Chaiken et al. (1974) found that crime prevention strategies aimed at reducing bus robberies in New York City led to increased robberies in the subway. Additionally, Caulkins and Rich (1991) discovered that a drug market crackdown in one neighborhood in Hartford resulted in the drug market moving to a nearby neighborhood. However, other research has suggested that police led interventions can reduce crime without increasing crime in a contiguous area. Matthews (1990), for example, reported that a successful police led crackdown on prostitution in a red light district in England did not lead to increased prostitution in other locations. Similarly, Sherman and Rogan (1995) examined the effects of gun seizures on violent crime in Kansas City. They reported that the intervention led to gun

---

[14] For a thorough review of the displacement and diffusion of benefits literature see Barr and Pease (1990) and Clark (2000).

[15] The literature suggests that there are five types of displacement: temporal, spatial, tactical, target, and crime type (Hakim and Rengert, 1981). However, we restrict our analysis in the present study to spatial displacement because we do not have data that would allow us to test for the other four types.

crimes decreasing by almost 50 percent in the targeted area, with no increase in gun crime in the surrounding districts.

As of recent, some research has shown that areas contiguous to intervention areas even experience a decrease in crime. Such findings have led some researchers to suggest that there may be a "diffusion of benefits" in which areas that surround treatment areas, but do not actually receive any treatment, receive residual benefits from interventions (Green, 1995; Weisburd and Green, 1995). Clarke and Weisburd (1994) describe two forms of diffusion. First, they argue that diffusion of benefits can be invoked through deterrence, whereby would-be offenders noticean increased level of enforcement, which they perceive to increase their risk of apprehension. Second, the authors maintain that diffusion of benefits can be achieved through discouragement. Here, potential offenders weigh the amount of effort that is required to commit the crime--the greater the effort, the less likely offenders are to commit the crime. Green (1995) examined the diffusion of benefits hypothesis in her study of drug hot spots in Oakland. She reported that municipal codes and drug nuisance abatement laws were effective in reducing drug problems in the targeted areas, and resulted in a diffusion of benefits to adjoining areas. She argued that this may have been the consequence of the program "discouraging drug buyers and sellers, and decreasing the total number of persons involved in drug activity" (p.752)

Therefore, in addition to assessing the impact of the intervention in the targeted areas we examine changes in crime and disorder in the areas immediately adjoining the targeted areas. We use two analytic strategies in attempting to identify displacement and diffusion of benefit effects. First, we look for changes in crime and disorder by examining the ¼ mile boundary area (approximately 4 city blocks) around the Redevelopment District.[16] We then test for mean

[16] The size of the area to examine for displacement effects appears to be a relatively arbitrary decision. For example, Green (1995) and Weisburd and Green (1995) used a two-block catchment area. This largely appears to be because they were examining the impact of crackdowns on hotspots, which are generally fairly small areas. Novak et al.

changes in crime and disorder using CFS in the contiguous area – first with *t*- tests and then with ARIMA models.[17]

Second, we created a ¼ mile boundary around each zone and look for changes in crime and disorder within these areas. This analysis is necessarily limited because of the proximity of each of the intervention areas. In particular, because each zone borders the other zones we encounter a methodological problem of overlapping catchment areas (part of each zone's catchment area either just received the intervention and/or will receive the intervention next). To minimize this contamination we limit our analysis of the areas adjoining the targeted zones to the 363-day pre-intervention period (the period before the project started), the 45-day period that the zone received the treatment, the 106-day intra-intervention period (the period when none of the zones received treatment, and the post-intervention period (the period after the intervention had been completed in all four of the zones). Thus, with the exception of the periods in which the zone was receiving treatment the same data points were used for examining each zone's contiguous area. In this manner we identified any immediate spatial displacement surrounding each zone.

RESULTS

Difference of Means

Table 3 presents the mean number of calls for service for each offense type in the Redevelopment District and in each of the four zones during the pre-intervention, first intervention, intra-intervention, second intervention, and post-intervention periods. The table indicates significant changes in the number of CFS from the pre-intervention to the post-

---

(1999), on the other hand, explained that they used a three to four block catchment area because their target area was larger than that of Green (1995) and Weisburd and Green's (1995) hotspots. While our decision to examine four city blocks for displacement was determined in part out of necessity (our data is broken done into quarter mile grids), it appears to be of reasonable size based on the literature.

intervention period in the Redevelopment District for public moral offenses, physical disorder, and nuisance offenses. In particular, the number of CFS for public moral offenses declined significantly from .46 calls per day to .30 calls per day (or, on an annualized basis, the number of CFS for public moral offenses declined from 168 to about 110). On the other hand, the number of CFS for physical disorder significantly increased from .86 calls per day to 1.10 calls per day (for an annual change of 314 to 402 CFS) and the number of CFS for nuisances significantly increased from 3.88 calls per day to 4.38 calls per day (for an annual change of 1,416 to 1,598 CFS).

When examining the change in mean daily CFS by zone, the findings are somewhat mixed. When comparing pre-intervention to post-intervention periods, CFS for crimes against persons and suspicious persons decreased significantly in some zones but increased significantly in one zone. Likewise, property crime offenses decreased significantly in three zones and increased significantly in one zone. The analysis revealed that the significant increases in CFS for persons, property, and suspicious person's categories were restricted to zone four. Calls for assistance increased significantly in two zones, but did not change significantly in the two other zones. Finally, CFS for drug-related offenses only changed significantly in zone three during the study periods.

The most consistent findings across the four zones were found in the public morals and physical disorder categories. CFS for public morals decreased significantly from the pre-intervention to the intra-intervention period in three of the four zones, however only two zones maintained that decrease in the post-intervention period. The opposite trend was observed for the physical disorder category, where CFS increased significantly in all four zones between the

[17] It is possible for displacement or diffusion effects to take a gradual/permanent form. Thus, we also ran a series of models that included a first order transfer function for each intervention. These models did not produce any significant sets of intervention coefficients and thus are not included here.

pre-intervention period and the intra-intervention period. Like the public morals category, changes in levels of physical disorder CFS remained stable in the post-intervention period in only two zones with one zone returning to its pre-intervention level.

Table 3: Mean Daily CFS in the Redevelopment District and in each of the Four Zones by Crime Type

Type of CFS	Entire Redevelopment District	Zone I	Zone II	Zone III	Zone IV
Person					
Pre-Intervention	6.83	1.52	1.47	1.99	1.85
Intervention 1	6.63	1.18	1.09	2.04	1.82
Intra-Intervention	6.27	1.54	1.43	1.81	1.87
Intervention 2	6.74	1.47	1.30	1.40	2.02
Post-Intervention	6.53	1.49	1.28[A]	1.72[A]	2.06[A,B]
Property					
Pre-Intervention	10.65	2.25	2.13	3.74	2.58
Intervention 1	10.92	1.76	2.11	3.96	2.69
Intra-Intervention	10.68	2.34	2.15	3.73	2.78
Intervention 2	11.08	2.20	1.45	3.64	3.22
Post-Intervention	10.22	2.01[A,B]	1.91[A,B]	3.44[A]	3.14[A]
Drug					
Pre-Intervention	.80	.20	.21	.21	.15
Intervention 1	.79	.13	.18	.22	.24
Intra-Intervention	.64	.17	.19	.29	.14
Intervention 2	.59	.16	.05	.09	.24
Post-Intervention	.77	.16	.18	.18[B]	.17
Suspicious Person					
Pre-Intervention	3.89	.91	.77	1.41	.88
Intervention 1	3.72	.71	.62	1.15	1.04
Intra-Intervention	3.88	.80	.67	1.40	1.08[A]
Intervention 2	3.90	.76	.68	1.44	.87
Post-Intervention	3.62	.69[A]	.59[A]	1.28	1.07[A]
Assistance					
Pre-Intervention	1.03	.24	.28	.30	.22
Intervention 1	.99	.24	.33	.31	.27
Intra-Intervention	.97	.22	.23	.24	.26
Intervention 2	1.15	.27	.41	.18	.18
Post-Intervention	1.07	.31[A,B]	.23	.26	.30[A]
Public Morals					
Pre-Intervention	.46	.12	.13	.12	.07
Intervention 1	.34	.13	.09	.12	.07
Intra-Intervention	.17[A]	.05[A]	.06[A]	.09	.02[A]
Intervention 2	.37	.09	.09	.13	.13
Post-Intervention	.30[A,B]	.07[A]	.10	.08[A]	.07[B]
Physical Disorder					
Pre-Intervention	.86	.15	.09	.33	.29
Intervention 1	1.04	.18	.16	.49	.09
Intra-Intervention	1.57[A]	.26[A]	.16[A]	.50[A]	.50[A]
Intervention 2	1.36	.38	.18	.56	.24
Post-Intervention	1.10[A,B]	.25[A]	.09[B]	.42	.37[A]
Nuisance					
Pre-Intervention	3.88	.91	.73	.99	1.26
Intervention 1	3.89	.78	.69	1.11	1.60
Intra-Intervention	4.15	.73[A]	.75	1.21[A]	1.48
Intervention 2	3.80	1.13	.70	.87	1.22
Post-Intervention	4.38[A]	.87	.77	1.03	1.52[A]
Disorderly Conduct					
Pre-Intervention	3.43	.91	.77	.96	.91
Intervention 1	3.77	1.11	.91	1.11	.98
Intra-Intervention	3.17	.85	.63[A]	.90	.94
Intervention 2	3.37	1.00	.43	.89	.87
Post-Intervention	3.28	.77[A]	.69	.93	.93
Traffic					
Pre-Intervention	4.14	.85	.64	1.54	1.00
Intervention 1	3.85	1.11	.82	1.55	1.07
Intra-Intervention	4.02	.69[A]	.70	1.68	.85[A]
Intervention 2	3.78	.67	.52	1.27	1.18
Post-Intervention	3.89	.66[A]	.60	1.49	1.16[A,B]

[A] $p < .05$ (t-test comparison to Pre-Intervention period), [B] $p < .05$ (t-test comparison to Intra-Intervention period)

Interrupted Time Series Analysis

Table 4 presents a summary of the impact of the quality-of-life initiative on each offense type in the Redevelopment District and in each of the four zones (See Appendix 1, 2, and 3 for parameter estimates). It displays the direction of the effect and the type of intervention that best fit the data (i.e., abrupt/permanent, gradual/permanent, or abrupt/temporary).[18] The table shows that the quality-of-life program had different effects on different categories of crime and that the impact of the program varied by zone.

Table 4 reveals that several significant changes took place after the implementation of Operation Restoration in the Redevelopment District. The CFS data indicate an abrupt and permanent decrease compared to the pre-intervention period in the number of public moral calls after both the first and second intervention period. The findings also depict an abrupt and temporary decrease in the number of nuisance calls after the first intervention. The time series analysis also revealed that the intervention had a significant impact on the number of CFS for drugs and disorderly conduct. In particular, it showed an abrupt and temporary increase in CFS for offenses in these categories. We also found that the quality-of-life intervention had an abrupt and permanent impact on CFS for physical disorder. The analyses indicated that when compared to the pre-intervention period the number of calls for physical disorder significantly increased in both the intra-intervention period and the post-intervention period.

[18] The appropriate intervention form was determined by examining the omega and delta coefficients. In first-order transfer functions applied to a pulse series, the delta coefficient cannot be negative and cannot be greater than one (even values close to one indicate the system may be unstable). Additionally, for the intervention to be considered significant the omega parameter must be significantly different from zero. In first-order transfer functions applied to a step series, both the omega and delta coefficients must be significantly different from zero to conclude that the intervention had an effect. Once again, the delta coefficient must lie between zero and positive one.

Table 4: Summary of Time Series for the Redevelopment District and each Zone by Crime Type – Best Fitting ARIMA Model

Type of Crime	Entire Redevelopment District	Zone I	Zone II	Zone III	Zone IV
Person					
Intervention 1					-
Intervention 2				-	+
Form of Effect				A,P	A,T A,P
Property					
Intervention 1					+
Intervention 2		-			+
Form of Effect		A,P			A,T A,P
Drug					
Intervention 1				+ +	
Intervention 2	+				+
Form of Effect	A,T			A,T A,P	A,T
Suspicious Person					
Intervention 1					+
Intervention 2		-	-		+
Form of Effect		A,P	A,P		A,P
Assistance					
Intervention 1					
Intervention 2		+			+
Form of Effect		A,P			A,P
Public Morals					
Intervention 1	-	-	-		-
Intervention 2	-	-		-	+
Form of Effect	A,P	A,P	A,P	A,P	A,P
Physical Disorder					
Intervention 1	+	+	+	+ +	+
Intervention 2	+	+	-		
Form of Effect	A,P	A,P	A,P	A,T A,P	A,P
Nuisance					
Intervention 1	-	-			-
Intervention 2		+			
Form of Effect	A,T	A,T			A,T
Disorderly Conduct					
Intervention 1			-	+	
Intervention 2	+	+ -		+	+
Form of Effect	A,T	A,T A,P	A,P	A,T	A,T
Traffic					
Intervention 1		-			
Intervention 2		-			+
Form of Effect		A,P			A,P

Significant effects ($p<.05$) are described as "A,P" "G,P" and A,T. The "+" and "– " indicate the direction of the effect as compared to the pre-intervention period.

A,P Abrupt, Permanent

G,P Gradual, Permanent

A,T Abrupt, Temporary

The time series analysis presented in Table 4 also suggests that the impact of the intervention varied by zone. Table 4 shows that the intervention resulted in an abrupt and temporary decline in the number of crimes against persons calls in one of the four zones during the intra-intervention period. In addition, crimes against persons decreased abruptly and permanently in one zone and increased abruptly and permanently in another zone after the second intervention. There was an abrupt and permanent increase in CFS for assistance during the post-intervention period in two zones. For property crimes, there was an abrupt and temporary increase after the first intervention along with an abrupt and permanent increase after the second intervention in Zone IV. Calls for drug offenses were found to abruptly and temporarily increase in one zone during the intra-intervention period, and found to abruptly and temporarily increase in another zone during the post-intervention period. Calls to the police about suspicious persons abruptly and permanently increased during the intra-intervention period and during the post-intervention period in zone four. Suspicious person calls also decreased abruptly and permanently in two zones during the post-intervention period. For nuisance calls, there was an abrupt and temporary decrease in one zone during the intra-intervention period and in another zone there was a decrease in nuisance calls during the intra-intervention period followed by a significant increase during the post-intervention period. Finally, traffic CFS abruptly and permanently decreased in both periods in zone one while a similar increase was noted in zone four only in the post-intervention period.

The most consistent findings by zone were for the public morals, physical disorder, and disorderly conduct offense categories. The data revealed that the intervention had an abrupt and permanent impact on public morals calls during both the intra-intervention period and the post-intervention period. In particular, we found that calls for public morals during this period declined in three of the four zones. The intervention also had an abrupt and permanent impact

on calls for physical disorder. During the intra-intervention period calls for physical disorder significantly increased in all four of the zones. Although, interestingly in the post-intervention period calls for physical disorder significantly increased only in zone one. The time series for the disorderly conduct offense category showed that in three of the four zones the intervention resulted in an abrupt and temporary increase in calls for service during the post-intervention period. The analysis also showed that in one zone disorderly conduct calls increased during the intra-intervention period and in another zone they decreased.

Displacement and Diffusion Effects

Examining changes in calls for service in the contiguous areas surrounding the treatment areas suggests that there may have been some displacement. In particular, Table 5 suggests that the mean number of calls for service related to traffic increased significant after both interventions outside of two of the zones and outside of the whole Redevelopment District. This finding is confirmed through the interrupted time series analysis, which shows that traffic calls increased significantly in the area outside of the Redevelopment District between the pre-intervention period and the post-intervention period (See Table 6). Tables 5 and 6 also show that calls for drug related offenses increased significantly in the area just outside of the Redevelopment District (See Appendix 4 for parameter estimates).

Table 5: Mean Daily Calls for Service in the Areas Contiguous to the Redevelopment District and Each Zone (Displacement and Diffusion Effects)

Type of CFS	Redevelopment District	Zone I	Zone II	Zone III	Zone IV
Person					
Pre-Intervention	.92	2.04	1.12	1.44	1.87
Intervention 1	.87	1.87	1.18	1.44	1.71
Intra-Intervention	.90	1.72	1.05	1.41	1.83
Intervention 2	1.06	2.07	1.14	1.13	1.84
Post-Intervention	.89	1.96	1.13	1.35	1.62[A]
Property					
Pre-Intervention	2.39	2.82	1.97	2.99	3.10
Intervention 1	2.58	2.87	1.76	3.32	3.49
Intra-Intervention	2.16	2.86	2.28	3.11	3.32
Intervention 2	2.30	2.84	2.14	3.24	3.11
Post-Intervention	2.36	2.91	1.64[A,B]	2.99	2.73[A,B]
Drug					
Pre-Intervention	.09	.28	.13	.13	.21
Intervention 1	.08	.31	.13	.09	.36
Intra-Intervention	.07	.20	.16	.08	.18
Intervention 2	.11	.16[A]	.18	.13	.18
Post-Intervention	.16[A,B]	.27	.17	.18[B]	.24
Suspicious Person					
Pre-Intervention	1.01	.94	.66	.99	1.03
Intervention 1	1.18	.98	.64	.99	.76
Intra-Intervention	.96	1.00	.60	.98	.95
Intervention 2	.86	1.07	.66	1.02	.84
Post-Intervention	1.04	.92	.63	1.01	1.08
Assistance					
Pre-Intervention	.18	.33	.26	.30	.27
Intervention 1	.22	.24	.22	.25	.24
Intra-Intervention	.21	.38	.17	.18[A]	.25
Intervention 2	.26	.42	.39	.27	.60[A,B]
Post-Intervention	.27[A]	.33	.28[B]	.39[B]	.29
Public Morals					
Pre-Intervention	.07	.18	.08	.11	.15
Intervention 1	.07	.13	.09	.04[A]	.07
Intra-Intervention	.03[A]	.05[A]	.05	.01[A]	.08[A]
Intervention 2	.07	.07[A]	.02[A]	.11	.18
Post-Intervention	.05	.12[A,B]	.06	.08[B]	.10
Physical Disorder					
Pre-Intervention	.16	.22	.18	.19	.17
Intervention 1	.30[A]	.29	.31	.29	.18
Intra-Intervention	.57[A]	.46[A]	.34[A]	.45[A]	.58[A]
Intervention 2	.27[A,B]	.31	.41[A]	.38	.24[B]
Post-Intervention	.30[A,B]	.28[B]	.17[B]	.24[B]	.23[B]
Nuisance					
Pre-Intervention	.74	1.14	.46	.88	.92
Intervention 1	.66	.87	.42	.77	1.04
Intra-Intervention	.58	.97	.48	.87	.77
Intervention 2	.63	1.51[B]	.50	.58	.71
Post-Intervention	.84[B]	1.33[B]	.45	.94	1.00
Disorderly Conduct					
Pre-Intervention	.47	1.01	.59	.72	1.01
Intervention 1	.55	1.29	.62	.79	1.11
Intra-Intervention	.52	.84	.47	.72	1.01
Intervention 2	.51	.80	.77	.62	.80
Post-Intervention	.49	1.02	.56	.73	.83[A]
Traffic					
Pre-Intervention	1.07	1.31	1.32	1.33	1.36
Intervention 1	1.06	1.07	1.02	1.35	1.29
Intra-Intervention	1.42[A]	1.32	1.35	1.70[A]	1.61
Intervention 2	1.35[A]	1.24	1.14	1.18[B]	1.27
Post-Intervention	1.55[A]	1.52[A]	1.35	1.55[A]	1.54

[A] $p < .05$ (t-test comparison to Pre-Intervention period), [B] $p < .05$ (t-test comparison to Intra-Intervention period)

We found some evidence of diffusion of benefit effects. Table 5 shows that the mean number of public morals calls significantly decreased between the pre-intervention period and the intra-intervention period around the Redevelopment District and around three of the four zones. However, the mean number of public morals calls also significantly increased between the intra-intervention period and the post-intervention period around two of the four zones. The time series analysis did not confirm a significant change in public morals calls (over the course of the project). Additionally, the mean number of physical disorder calls increased significantly between the pre-intervention period and the intra-intervention period and decreased significantly between the intra-intervention period and the post-intervention period in the areas surrounding the Redevelopment District and around all four of the zones. The time series analysis in Table 6 shows that physical disorder calls in the displacement zone outside of the Redevelopment District Significantly increased over the course of the study periods.

Table 6: Time Series for the Area Adjoining the Redevelopment District (Displacement and Diffusion Effects).

	Person	Property	Drug	Suspicious Person	Assistance	Public Morals	Physical Disorder	Nuisance	Disorderly Conduct	Traffic
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
ω_2	-.046 (.081)	.177 (.194)	-.013 (.033)	.175 (.094)	.041 (.042)	-.001 (.022)	.149* (.054)	-.020 (.012)	.084 (.060)	-.005 (.122)
ω_3	-.021 (.107)	-.257 (.253)	-.026 (.044)	-.044 (.124)	.026 (.055)	-.046 (.029)	.412* (.071)	.010 (.018)	.053 (.080)	.350* (.159)
ω_4	.143 (.088)	-.099 (.210)	.018 (.036)	-.142 (.102)	.075 (.045)	-.003 (.024)	.111 (.058)	-.009 (.012)	.048 (.065)	.301* (.133)
ω_5	-.028 (.072)	-.034 (.173)	.069* (.030)	.037 (.083)	.090* (.037)	-.025 (.019)	.150* (.048)	-.007 (.009)	.022 (.054)	.482* (.109)
χ^2	25.90 df=24	23.35 df=21	18.82 df=22	21.17 df=23	24.06 df=24	29.84 df=24	21.95 df=22	24.12 df=19	24.52 df=24	21.92 df=22

* $p < .05$

ω_2 = Intervention 1 (compared to Pre-Intervention)

ω_3 = Intra-Intervention (compared to Pre-Intervention)

ω_4 = Intervention 2 (compared to Pre-Intervention)

ω_5 = Post-Intervention (compared to Pre-Intervention)

χ^2 = Ljung-Box statisticDISCUSSION

The present study examined a quality-of-life policing project conducted by the Chandler, Arizona Police Department. Operation Restoration consisted of a unit that: 1) aggressively policed social disorder crimes such as prostitution, street level drug dealing, and loitering and 2) addressed physical disorder conditions in the same neighborhoods through activities such as graffiti abatement, property inspections, and removing trash and litter from private and public spaces. We used calls for service data obtained from the Chandler Police Department's crime analysis unit and compared pre-intervention, intra-intervention and post-intervention periods to evaluate the impact of the program. This data was also used to account for spatial displacement and diffusion of benefit effects..

The comparison of changes in mean level of CFS for the entire Redevelopment District and its four zones for ten different categories of crime and disorder resulted in 250 different statistical comparisons, of which 45 were statistically significant, a number that substantially exceeds what one would expect by chance. However, several of the significant changes were in the unintended direction, i.e. an increase rather than an decrease in the mean level of the CFS crime category. One zone in particular, Zone IV, had an unusually large number of significant pre-and post-intervention changes in mean level CFS that were in the "wrong" direction including crimes against person, property crimes, drug crimes, as well as several of the order categories, although the time series analysis indicates an abrupt and permanent change for only serious crime category, i.e., property. Why are the results so different for Zone IV? One possibility might be due to the fact that Zone IV was the last zone of the three to receive the intervention, and perhaps the level of effort waned as project officers and staff approached that zone. The data in Table 2 provide mixed evidence in support of this possibility. Compared to

the other zones, there were considerably fewer police contacts in Zone IV during the first intervention, which could be an indication less effort and consequently a lower dosage. However, during the second intervention the number of police contacts in Zone IV nearly quadrupled and greatly exceeded those in the other zones, but still most of the impacts were in the wrong direction. It should be noted that most of the increase in police contacts were in the "field activity" or "citations," categories, while the actual number of arrests decreased. This would seem to suggest that field activity was an ineffective component of the overall intervention . We queried Chandler police officials about the anomalous findings in Zone IV, and they attributed the increases to differences in the zones, with more gangs and gang members residing in Zone IV than in the other zones.

Overall, the findings suggest that the quality-of-life initiative had the strongest intended impact on three categories of crime and disorder: public morals, disorderly conduct, and physical disorder. The time-series analyses indicated that the intervention resulted in an abrupt and permanent decline in public morals calls during the 7-month intra-intervention period. However, when comparing pre- post-intervention periods the findings with regard to public morals calls were somewhat mixed. In particular, while the analyses of means indicated a significant decline in three of the five tests, the time-series analyses did not confirm a change in calls for service for public morals calls between the pre post-intervention periods. We suggest that these findings lend partial support for the claim that the quality-of-life operation in the Redevelopment District was successful in reducing public morals crimes. This finding should not be surprising. The operational strategy of the Neighborhood Response Team was such that it aggressively enforced "public" forms of crime and disorder. When compared to the other crime categories the officers were more inclined to come in contact with public morals crimes. Public morals crimes (e.g.,

prostitution and public drinking) are often times the most visible forms of disorder and crime within a neighborhood and as such are perhaps the most suppressible by the police.

We also found that the intervention resulted in abrupt and temporary increase in calls for disorderly conduct. It is not clear as to why disorderly conduct calls would increase significantly for a brief time after the completion of the operation. It may be that as a consequence of the presence of the officers, residents were more aware of the police department's efforts to address crime and disorder in their neighborhood. Resident awareness of the operation may have peaked near the end of the operation and increased awareness may have led to a greater number of calls for service for disorderly conduct during the operation; and after the completion of the operation (and the subsequent removal of police presence) the impact of the intervention may have decayed. In the case of Chandler's Operation Restoration, the decay might stem from another form of awareness, i.e., awareness that the operation was over and a belief that the police were less likely to respond or be able to respond to calls related to disorderly conduct. Sherman (1990) argues that effect decay is a fairly common pattern in longer-term interventions (as opposed to short-term interventions). However, he goes on to explain that the processes that result in effect decay are not completely understood. Research in the future should consider examining the reasons for effect decay on longer-term intervention in the future.

Additionally, the quality-of-life program had a strong and consistent impact on physical disorder. We found that physical disorder calls increased significantly in the intra-intervention period, but then declined significantly in the post-intervention period. These findings may suggest that after residents became familiar with the operation, and its focus on physical disorder, they contacted the police more frequently to ensure the physical improvement of their neighborhood. However, after the physical improvement of the neighborhood there may have

been fewer physical disorders for the residents to call the police about, resulting the reduction in the number of calls to the police.

It should also be noted that we found similar patterns to the above in the contiguous areas surrounding intervention sites. The analyses indicated that traffic problems were displaced to contiguous areas. Due to the higher levels of police activity in each targeted zone, traffic violators may have been cognizant of the increased patrol presence and drove to near-by areas that they believed that they might not be as likely to come into contact with the police. A similar pattern was observed for drug calls. We found that in the area just outside of the Redevelopment District calls for drug offenses increased significantly. The increased police presence may have displaced drug use and sales to near-by areas. We also found strong evidence that there was a diffusion of benefits to near-by areas for public morals crimes and physical disorder. These findings add to a growing body of literature that suggests that place-oriented interventions impact areas spatially wider than just the targeted area. In sum there are at least two principal conclusions that can be drawn from the present study. The first is that the program appears to have had an impact on physical and social disorder. Placed in the context of previous research these findings should not necessarily be surprising. Crime specific policing focusing on special problems such as guns (Sherman and Rogan, 1995), drunken driving (Ross, 1982) and drug markets (Sherman and Rogan, 1995; Weisburd and Green, 1995), just to name a few, has repeatedly shown that the police are perhaps most successful when they focus their energy and resources on a particular problem, and not a multitude of problems. While the ultimate goal of quality-of-life policing is to reduce serious crime (through the reduction of disorder), the finding that this operational strategy had a significant impact on disorder should not be discounted. The impact of the project on disorder has important implications for many communities, and there are

those who argue that the reduction of physical and social disorder is "justifiable in its own right in that it contributes to the establishment of a civil, livable environment in which citizens may, without fear, exercise their right to pursuit their livelihood, commerce, self-expression, entertainment and so on" (Mastrofski, 1988: 48).

The second principal conclusion of the study is that in comparison to disorder-related crimes and violations, the program did not have as nearly as substantial impact on serious crime. In other words, the benefits of the project were primarily restricted to those problems that the project specifically focused on—physical and social disorder. Although the comparison of means resulted in a significant decrease in property crime CFS in three of the four zones, the time series analysis identified abrupt and permanent changes in the desired direction in only one of the zones. Additionally, an abrupt and temporary change reflecting an decrease in property crime CFS was found after the first intervention in one zone. The pattern for person crime category is also mixed in that the time series analysis indicates and abrupt and permanent change in the desired direction (decrease) in one zone, an abrupt and temporary change in another, and an abrupt and permanent increase in another. Several explanations may account for the failure of the program to have the desired impact serious crime. First, police removal of social and physical disorder may not immediately result in a change in the social meaning that residents assign to their neighborhood that generates the type of social influence that produces general deterrence. Instead, it may take a substantial amount of time for residents and neighborhoods to re-establish the type and level of orderliness that leads to residents feeling safe and able to enforce local social norms. While there has been some attention to the spiraling decay of neighborhoods and its impact on crime, there has been little research that has examined the processes that lead to the revitalization of neighborhoods (Taylor and Harrell, 2000). Research in the future should further

examine the impact that the police response to disorder has on the social meaning that residents assign to their neighborhoods and the impact that it has on residents' attitudes and behavior.

The findings from this study provide very limited support for Wilson and Kelling's 'broken windows" hypothesis or more generally for social norm theory (Ellickson, 1996; Kahan 1997; Kahan, 1998), which views quality of life policing as altering social meanings and producing the social influences that result in general deterrence. This limited support might be the consequence of the nature of the community in which the project took place. Wilson and Kelling (1982) stipulated that police agencies should focus their resources and energy on responding to disorder in communities that are "deteriorating but not unreclaimable." They argued that some neighborhoods are simply beyond repair and are not salvageable. Perhaps the Redevelopment District in Chandler, Arizona is one such community. However, no research to date has empirically examined this claim, nor has there been any research that has determined the tipping point for which a community is beyond repair and cannot be restored.

Of course the other possibility is that the hypothesis is flawed in the first place. The failure of the program to decrease serious crime may be the result of faulty assumptions. To date there has been very little research that has empirically validated the broken windows hypothesis, and the research that has been conducted has not yielded consistent results (See Eck and Maguire, 2000). Obviously, if the theoretical foundation of quality-of-life policing is not correct we should not assume that this strategy would be effective at reducing crime. A growing body of research suggests that one of the most effective ways of controlling crime is to focus on specific types of crimes and places (See Sherman, 1997; Sherman and Weisburd, 1995; Weisburd and Green, 1995). Cordner (1998) notes that quality-of-life initiatives are often times "employed without the benefit of careful problem identification or analysis, without any effort to identify

underlying conditions and causes, and without careful consideration of a wide range of possible alternatives" (p. 309). Greene (2000) raises the possibility that some quality of life initiatives:

> "may actually return the police and the community to a conflictual relationship. Just as important, zero tolerance policing may be returning the community to a passive role in crime and order maintenance in favor of a more aggressive and active role on behalf of the police (p.33)

In other words, it may be that some quality of life initiatives are counter productive and have an adverse impact on the community's ability to serve as a partner in the co-production of public safety. Over the long run, weakened links between the community and the police could nullify any short-term gains in serious crime reduction resulting from a quality of life policing imitative. We have no evidence that this is what happened in Chandler or that it is responsible for the apparent weak link between reduction of disorder and more serious crime. For now it remains a hypothesis that needs to be examined in the future research.

Quality-of-life policing is at the forefront of the public's attention (Roberts, 1999). Police departments across the country are using this police strategy to address a wide range of community and neighborhood problems. The findings of our research, combined with other recent research on broken windows theory (Harcourt, 1998) and quality-of-life policing (Novak et al, 1999; Sherman, 1990) suggests that researchers should further evaluate the relationship between crime and disorder and examine the impact that the police can have on crime by policing social and physical disorder in order to determine if quality of life policing is good public policy. Additionally, part of the quality of life policing research agenda should be an examination of what Roberts (1999) refers to as the "pernicious impact of order-maintenance policing (813)." She argues that such policing strategies have a differential and undesirable impact on racial minorities since in her view "the categories of order and disorder have a pre-existing meaning that associates Blacks with disorder and lawlessness (813)." If she is correct,

then quality of life policing initiatives may increase the conflict with and distrust of police in those communities that oftenneed them the most, America's minority communities.

REFERENCES

Abraham, B. 1987. "Application of Intervention Analysis to a Road Fatality Series in Ontario." *Journal of Forecasting* 6: 211-219.

Barr, R. and Pease, K. 1990. "Crime Placement, Displacement, and Deflection." Pp. 277-318 in *Crime and Justice: A Review of Research*, Volume 12, edited by M. Tonry and N. Morris. Chicago: University of Chicago Press.

Black, Donald 1980. *The Manners and Customs of the Police.* New York: Academic Press.

Building Stronger Neighborhoods. 1996. *Chandler: Neighborhood Task Force.*

Bratton, W. 1996. "Remark: New Strategies for Combating Crime in New York City." *Fordham Urban Journal* 23: 781-785

Bratton, W. 1998. *Turnaround: How America's Top Cop Reversed the Crime Epidemic.* New York: Random House.

Campbell, D. and Stanley, J. 1963. *Experimental and Quasi-Experimental Designs for Research.* Boston: Houghton Mifflin.

Cook, T. and Campbell, D. 1979. *Quasi-Experimentation: Design and Analysis Issues for Field Settings.* Boston: Houghton Mifflin.

Caulkins, J. and Rich, T. 1991. *Geography's Impact on the Success of Focused Local Drug Enforcement Operations or Crackdowns.* Mimeographed document.

Chaiken, J. Lawless, M., and Stevenson, K. 1974. *The Impact of Police Activity on Crime Robberies in the New York City Subway System.* New York: Rand Corporation.

Chandler Police Department. 1998. *Operation Restoration: A Community Partnership.* Chandler: Chandler Police Department.

Clarke, R. 2000. "Situational Crime Prevention: Successful Studies." Pp. 182-226 in *Policing Communities*, edited by Glensor, R., Correia, M., and Peak, K. Los Angeles: Roxbury Publishing.

Clarke, R. and Weisburd, D. 1994. "Diffusion of Benefits." Pp. 165-184 in *Crime Prevention Studies,* edited by Ron Clarke. Monsey: Criminal Justice Press.

Cordner, G. 1981. "The Effects of Directed Patrol: A Natural Quasi-experiment in Pontiac." Pp. 37-58 in *Contemporary Issues in Law Enforcement*, edited by James Fyfe. Beverly Hills: Sage Publications.

Cordner, G. 1998. "Problem-oriented Policing vs. Zero Tolerance." Pp. 303-329 in *Problem Oriented Policing*, edited by Tara Shelley and Anne Grant. Washington DC: Police Executive Research Forum.

DiIulio, J.J. 1995. "Arresting Ideas: Tougher Law Enforcement is Driving Down Urban Crime." *Policy Review*, 74.

Eck, J. and Maguire, E. Forthcoming. "Have Changes in Policing Reduced Violent Crime? An Assessment of the Evidence." Washington DC: National Institute of Justice.

Ellickson, R.C. 1996. "Controlling Chronic Misconduct in City Spaces: Of Panhandlers, Skid Rows, and Public-Space Zoning." *Yale Law Journal.* 1165.

Gabor, T. 1978. "Crime Displacement: The Literature and Strategies for its Investigation." *Crime and Justice* 6: 100-107.

Green, L. 1995. "Cleaning up Drug Hot Spots in Oakland, California: The Displacement and Diffusion Effects." *Justice Quarterly* 12(4): 737-754.

Greene, J.R. 2000. "Community Policing in America: Changing the Nature, Structure, and Function of the Police." Washington, D.C; National Institute of Justice (forthcoming).

Hakim, S. and Rengert, G. 1981. *Crime Spillover*. Beverly Hills: Sage Publications.

Harcourt, B. 1998. "Reflecting on the Subject: A Critique of the Social Influence Conception of Deterrence, the Broken-Windows Theory, and Order Maintenance Policing New York Style." *Michigan Law Review* 97: 291-389.

Kahan, D.M. 1997. "Between Economics and Sociology: The New Path of Detterence." *Michigan Law Review.* 2477.

Kahan, D.M. 1997. "Social Influence, Social Meaning, and Detterence." *Virgina Law Review*.83: 349.

Kelling, G. and Bratton, W. 1998. "Declining Crime Rates: Insiders' Views of the New York City Story." *Journal of Criminal Law and Criminology* 88(4): 1217-1231.

Kelling, G., Pate, A., Dickman, D., and Brown, C. 1974. *The Kansas City Preventative Patrol Experiment: Technical Report.* Washington, DC: Police Foundation.

Klinger, David and Bridges, George 1997. "Measurement Error in Calls for Service as an Indicator of Crime." *Criminology.* 35(4): 705-726.

Kelling, G. and Coles, C. 1996. *Fixing Broken Windows*. New York: Free Press.

Kocieniewski, D. and Cooper, M. 1998. "Police to Tighten the Scrutiny of All Suspects Under Arrest." *New York Times*, May 28th: A1.

Koper, C. 1995. "Just Enough Police Presence: Reducing Crime and Disorderly Behavior by Optimizing Patrol Time in Crime Hot Spots." *Justice Quarterly* 12: 649-672.

Mastrofski, Stephen. 1988. "Community Policing as Reform: A Cautionary Tale." Pp. 47-68 in *Community Policing: Rhetoric or Reality*, edited by Stephen Mastrofski and Jack Green. New York: Praeger.

Matthews, R. 1990. "Developing More Effective Strategies for Curbing Prostitution." *Security Journal* 1: 182-187.

Mazerolle, L., Ready, J., Terrill, W., Waring, E. 2000. "Problem-Oriented Policing in Public Housing: The Jersey City Evaluation." *Justice Quarterly* 17(1): 129-158.

McCleary, R. and R. Hay Jr. with E. Meidinger and D. McDowall. 1980. *Applied Time Series Analysis for the Social Sciences.* Beverly Hills: Sage Publications.

McDowall, D., McCleary, R. Meidinger, E. and R. Hay Jr. 1980. *Interrupted Time Series Analysis*. Beverly Hills: Sage Publications

Novak, K., Hartman, J. Holsinger, A., and Turner, M. 1999. "The Effects of Aggressive Policing of Disorder on Serious Crime. *Policing* 22(2): 171-190.

O'Hara, P. 1998. "Bratton's Turnaround: Glimpse of the Future or Reinvention of the Past?" *Law Enforcement News*, June 15/30th: 13-14.

Panzarella, R. 1998. "Bratton Reinvents Harassment Model of Policing." *Law Enforcement News,* June15/30th: 13-15.

Press, S. 1971. *Some Effects of an Increase in Police Manpower in the 20th Precinct of New York City*: New York: Rand Institute.

Reppetto, T. 1976. "Crime Prevention and the Displacement Phenomenon." *Crime and Delinquency* 2: 166-177.

Roberts, D. 1999. "Froward: Race, Vagueness, and the Social Meaning of Order-Maintenance Policing." *Criminal Law and Criminology* 89(3): 775-836.

Ross, L . "Deterrence of Drinking and Driving in France: An Evaluation of the Law of July 12, 1978. Law and Society Review.

Sampson, R. and Cohen, J. 1988. "Deterrent Effects of the Police on Crime: A Replication and Theoretical Extension." *Law and Society Review* 22: 163-189.

Schuerman, L and Korbin, S. 1986. "Community Careers in Crime." Pp. 67-100 in *Crime and Justice: A Review of Research*, Volume 8, edited by M. Tonry and N. Morris. Chicago: University of Chicago Press.

Sherman, L. (1986). "Policing Communities: What Works?" Pp. 343-386 in *Crime and Justice: A Review of Research*, Volume 8, edited by A. Reiss and M. Tonry. Chicago: University of Chicago Press.

Sherman, L. 1990. "Police Crackdowns: Initial and Residual Deterrence." Pp. 1-48 in *Crime and Justice: A Review of Research*, Volume 12, edited by M. Tonry and N. Morris. Chicago: University of Chicago Press.

Sherman, L. 1992. "Attacking Crime: Policing and Crime Control." Pp. 159-230 in *Crime and Justice: A Review of Research*, Volume 15, edited by M. Tonry and N. Morris. Chicago: University of Chicago Press.

Sherman, L. 1997. "Policing for Crime Prevention." Pp. 8-1 to 8-58 in *Preventing Crime: What Works, What Doesn't, What's Promising*. Washington DC: Office of Justice Programs.

Sherman, L. and Rogan, D. .1995. "Effects of Gun Seizures on Gun Violence: Hot Spots Patrol in Kansas City." *Justice Quarterly* 12: 673-694.

Sherman, L. and Weisburd, D. 1995. "General Deterrent Effects of Police Patrol in Crime Hot Spots: A Randomized, Controlled Trial." *Justice Quarterly* 12: 625-648.

Sherman, L, Gartin, P., Buerger, M. 1989. "Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place." *Criminology* 27: 27-55.

Silverman, Eli. 1999. *NYPD Battles Crime: Innovative Strategies in Policing*. Boston: Northeastern University Press

Skogan, W. 1990. *Disorder and Decline*. New York: Free Press.

Skogan, W. and Bayley, D. 1986. *The New Blue Line: Police Innovation in Six American Cities*. New York: Free Press.

Skogan, W. and Bayley, D. 1988. "Theme and Variation in Community Policing." In *Crime and Justice: A Review of Research*, Vol. 10, edited by M. Tonry and N. Morris. Chicago: University of Chicago Press.

Sykes, G. 1986. "Street Justice: A Moral Defense of Order Maintenance Policing." *Justice Quarterly* 3(4): 497-512.

Taylor, R. 1998. *Orienting Overview on the Incivilities Thesis*. Paper presented at the National Conference on Community Policing, Alexandria, VA: November 9th.

Taylor, R. and Covington, J. 1988. "Neighborhood Changes in Ecology and Violence." *Criminology* 26: 553-589.

Taylor, R. and Harrell, A. 2000. "Physical Environment and Crime." In *Policing Communities*, edited by Glensor, R., Correia, M., and Peak, K. Los Angeles: Roxbury Publishing.

Walker, S. 1984. "Broken Windows and Fractured History: The Use and Misuse of History in Recent Police Patrol Analysis." *Justice Quarterly* 1: 57-90.

Weisburd, D. and Green, L. 1995. "Policing Drug Hot Spots: The Jersey City Drug Market Analysis Experiment." *Justice Quarterly* 12: 711-735.

Weiss, A. and Freels, S. 1996. "The Effects of Aggressive Policing: The Dayton Traffic Enforcement Experiment." *American Journal of Police* 15: 45-64.

Wilson, J.Q. and Boland, B. 1978. "The Effect of Police on Crime." *Law and Society Review* 12: 367-390.

Wilson, J.Q. and Kelling, G. 1982. "Broken Windows: The Police and Neighborhood Safety." *Atlantic Monthly*, 249 (March): 29-38.

Appendix 1: Zero-Order Transfer Function by Zone and Type of Crime (Abrupt, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Person										
α	6.814*	.194	1.518*	.091	1.475*	.062	1.991*	.067	1.851*	.064
ϕ_1	--	--	.077*	.028	--	--	--	--	--	--
ϕ_4	-.067*	.028	--	--	--	--	--	--	--	--
ϕ_8	--	--	.058*	.028	--	--	--	--	--	--
ϕ_{13}	.076*	.028	--	--	--	--	--	--	--	--
ϕ_7	.115*	.028	.065*	.028	--	--	--	--	--	--
ϕ_{14}	.108*	.028	.081*	.028	--	--	--	--	--	--
ω_2	-.185	.307	-.292	.260	-.386*	.197	.053	.164	-.029	.232
ω_3	-.487	.399	.017	.136	-.045	.096	-.176	.113	.022	.115
ω_4	-.060	.333	.069	.261	-.179	.199	-.591*	.223	.171	.232
ω_5	-.304	.275	-.022	.120	-.190*	.085	-.276*	.097	.213*	.101
χ^2	28.62 df=20		31.18 df=20		32.90 df=24		20.96 df=24		33.56 df=24	
Property										
α	10.658*	.252	2.247*	.093	2.124*	.106	3.745*	.123	2.583*	.083
ϕ_1	.164*	.028	.084*	.028	.083*	.028	.152*	.028	.085*	.028
ϕ_3	--	--	--	--	.066*	.028	--	--	--	--
ϕ_4	--	--	--	--	.067*	.028	--	--	--	--
ϕ_{19}	--	--	--	--	--	--	.071*	.028	--	--
ϕ_{23}	--	--	--	--	.071	.029	--	--	--	--
ϕ_7	.083*	.028	--	--	--	--	--	--	--	--
ω_2	.262	.403	-.483	.280	.143	.317	.163	.298	.087	.302
ω_3	.020	.528	.089	.139	.001	.164	-.000	.209	.201	.150
ω_4	.417	.435	-.047	.280	-.595	.322	-.180	.398	.640*	.302
ω_5	-.437	.357	-.239	.123	-.214	.146	-.314	.180	.554*	.132
χ^2	27.96 df=22		14.30 df=23		28.44 df=20		21.70 df=22		23.49 df=23	
Drug										
α	.798*	.058	.204*	.024	.206*	.025	.214*	.021	.152*	.017
ϕ_1	--	--	--	--	.083*	.028	--	--	--	--
ϕ_3	.075*	.028	--	--	--	--	--	--	--	--
ϕ_8	.093*	.028	--	--	--	--	--	--	--	--
ω_2	-.010	.092	-.071	.071	-.028	.079	.006	.053	.092	.063
ω_3	-.148	.120	-.034	.035	-.020	.038	.075*	.036	-.009	.031
ω_4	-.217	.099	-.048	.071	-.160*	.080	-.125	.072	.092	.063
ω_5	-.024	.082	-.017	.031	-.025	.034	-.032	.031	.014	.028
χ^2	26.05 df=22		25.74 df=24		23.88 df=23		16.43 df=24		18.13 df=24	
Suspicious Person										
α	3.892*	.116	.906*	.047	.768*	.042	1.410*	.061	.878*	.049
ϕ_1	.081*	.028	--	--	--	--	--	--	.129*	.028
ϕ_2	--	--	--	--	--	--	.064*	.028	--	--
ω_2	-.169	.186	-.195	.141	-.145	.133	-.256	.150	.173	.179
ω_3	-.078	.245	-.104	.070	-.101	.065	-.010	.104	.200*	.089
ω_4	.004	.201	-.151	.141	-.086	.134	.034	.204	-.010	.179
ω_5	-.269	.165	-.217*	.062	-.178*	.058	-.125	.089	.194*	.079
χ^2	33.24 df=23		25.59 df=24		18.06 df=24		23.24 df=23		19.40 df=23	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 1 Continued: Zero-Order Transfer Function by Zone and Type of Crime (Abrupt, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Assistance										
α	1.028*	.055	.237*	.027	.278*	.025	.297*	.023	.218*	.022
ϕ_1	--	--	--	--	--	--	-.071*	.028	--	--
ω_2	-.040	.087	.008	.081	.055	.081	.010	.056	.049	.080
ω_3	-.056	.115	-.012	.040	-.045	.040	-.058	.039	.045	.040
ω_4	.120	.094	.030	.081	.131	.082	-.119	.076	-.040	.080
ω_5	.039	.077	.078*	.035	-.044	.035	-.039	.033	.081*	.035
χ^2	31.72 df=24		21.89 df=24		14.11 df=24		29.30 df=23		21.13 df=24	
Public Morals										
α	.457*	.034	.121*	.015	.134*	.017	.122*	.015	.074*	.011
ϕ_1	.061*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	--	--	--	--	.065*	.029	--	--	--	--
ω_2	-.118*	.054	.012	.046	-.043	.054	-.001	.037	-.008	.040
ω_3	-.287*	.071	-.067*	.023	-.075*	.027	-.031	.026	-.050*	.020
ω_4	-.091	.058	-.032	.046	-.040	.054	.011	.050	.059	.040
ω_5	-.161*	.048	-.047*	.020	-.036	.024	-.046*	.022	-.008	.017
χ^2	28.82 df=23		27.58 df=24		25.88 df=23		23.28 df=24		25.44 df=24	
Physical Disorder										
α	.863*	.084	.152*	.028	.089*	.019	.331*	.036	.287*	.033
ϕ_1	--	--	--	--	--	--	--	--	--	--
ϕ_6	--	--	--	--	.065*	.028	--	--	--	--
ϕ_{23}	-.069*	.029	--	--	--	--	--	--	--	--
ϕ_7	.057*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	--	--	--	--	--	--	--	--	--	--
ϕ_{21}	.143*	.029	--	--	--	--	.081*	.029	--	--
ω_2	.177	.133	.026	.085	.066	.060	.162	.087	-.198	.122
ω_3	.699*	.174	.110*	.042	.072*	.029	.167*	.061	.217*	.060
ω_4	.476*	.144	.226*	.085	.091	.061	.209	.116	-.042	.122
ω_5	.244*	.119	.099*	.037	.004	.026	.087	.052	.084	.053
χ^2	28.24 df=21		22.29 df=24		23.11 df=23		29.01 df=23		25.98 df=24	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient (phase i)
χ^2 = Ljung-Box statistic

Appendix 1 Continued: Zero-Order Transfer Function by Zone and Type of Crime (Abrupt, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Nuisance										
α	-.026	.026	-.014	.009	-.008	.006	.002	.005	.001	.007
ϕ_1	--	--	.082*	.028	--	--	--	--	--	--
ϕ_8	.103*	.028	--	--	--	--	--	--	--	--
ϕ_{13}	.100*	.028	--	--	--	--	--	--	--	--
ϕ_{15}	.102*	.028	.098*	.028	--	--	--	--	--	--
ϕ_7	-.859*	.020	--	--	--	--	--	--	--	--
θ_1	-.157*	.028	--	--	-.078*	.028	--	--	-.081*	.028
θ_5	--	--	--	--	-.064*	.028	--	--	--	--
θ_{13}	--	--	--	--	-.091*	.028	--	--	--	--
θ_7	--	--	.894*	.013	.910*	.012	.913*	.012	.896*	.013
θ_{14}	.804*	.023	--	--	--	--	--	--	--	--
ω_2	.046	.047	-.035	.046	.002	.038	.022	.019	.041	.050
ω_3	.041	.070	.025	.013	.015	.010	-.010	.010	-.023	.015
ω_4	.005	.050	-.002	.043	-.035	.037	-.024	.034	.127*	.049
ω_5	.012	.038	.014	.011	.007	.009	-.004	.008	-.014	.012
χ^2	26.67 df=18		26.74 df=21		22.23 df=20		16.25 df=23		17.87 df=22	
Disorderly Conduct										
α	3.429*	.112	.909*	.050	.772*	.045	.963*	.045	.906*	.043
ϕ_6	.107*	.028	--	--	--	--	--	--	--	--
ϕ_8	.084*	.028	--	--	--	--	--	--	--	--
ϕ_{11}	-.065*	.028	--	--	--	--	--	--	--	--
ϕ_{18}	-.102*	.028	--	--	--	--	--	--	--	--
ϕ_7	--	--	--	--	.091*	.028	--	--	--	--
ϕ_{21}	.093*	.029	--	--	--	--	--	--	--	--
ω_2	.339	.178	.202	.150	.135	.142	.147	.110	.072	.158
ω_3	-.247	.234	-.059	.075	-.142*	.070	-.066	.076	.037	.078
ω_4	-.075	.193	.091	.150	-.344*	.143	-.074	.150	-.039	.158
ω_5	-.143	.158	-.142*	.066	-.083	.062	-.032	.065	.020	.069
χ^2	29.05 df=19		31.89 df=24		25.99 df=23		30.34 df=24		23.15 df=24	
Traffic										
α	4.138*	.143	.851*	.047	.637*	.042	1.542*	.072	1.000*	.044
ϕ_6	--	--	--	--	--	--	-.065*	.028	--	--
ϕ_8	.074*	.028	--	--	--	--	--	--	--	--
ϕ_{15}	--	--	--	--	--	--	.081*	.029	--	--
ϕ_{14}	.136*	.028	--	--	--	--	.123*	.028	--	--
ω_2	-.274	.227	.260	.141	.185	.133	.032	.171	.067	.161
ω_3	-.125	.296	-.161*	.070	.068	.065	.142	.121	-.152	.080
ω_4	-.359	.245	-.185	.141	-.114	.134	-.261	.227	.178	.161
ω_5	-.236	.203	-.188*	.062	-.032	.058	-.054	.105	.155*	.070
χ^2	31.02 df=22		27.93 df=24		26.22 df=24		25.60 df=21		21.69 df=24	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient (phase i)
χ^2 = Ljung-Box statistic

Appendix 2: First-Order Transfer Function Applied to a Step Series by Zone and Type of Crime (Gradual, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Person										
α	6.818*	.194	1.508*	.087	1.477*	.062	1.994*	.067	1.811*	.062
ϕ_1	--	--	.077*	.028	--	--	--	--	--	--
ϕ_4	-.067*	.028	--	--	--	--	--	--	--	--
ϕ_8	--	--	.057*	.028	--	--	--	--	--	--
ϕ_{13}	.076*	.029	--	--	--	--	--	--	--	--
ϕ_7	.115*	.028	.065*	.029	--	--	--	--	--	--
ϕ_{14}	.109*	.029	.082*	.029	--	--	--	--	--	--
ω_2	-.186	.307	-.281	.259	-.389*	.197	.050	.164	.012	.232
ω_3	-.111	.387	.108	.235	-.078	.463	-.265	.649	.002	.003
δ_3	.792	.725	-.981*	.110	-.556	8.923	-.464	3.520	.993*	.021
ω_4	-.051	.339	-.058	.260	-.182	.200	-.596*	.223	.013	.315
ω_5	-.563	.556	-.035	.261	-.211	1.237	-.257	1.412	.301	.820
δ_5	-.844	1.006	-.830	9.165	-.095	6.414	.076	5.059	-.570	3.798
χ^2	28.67 df=20		30.93 df=20		32.94 df=24		21.18 df=24		32.94 df=24	
Property										
α	10.633*	.232	2.266*	.093	2.151*	.090	3.708*	.120	2.580*	.075
ϕ_1	.164*	.028	.085*	.028	.085*	.028	.152*	.028	.088*	.028
ϕ_3	--	--	--	--	.067*	.028	--	--	--	--
ϕ_4	--	--	--	--	.066*	.028	--	--	--	--
ϕ_{19}	--	--	--	--	--	--	.071*	.028	--	--
ϕ_{23}	--	--	--	--	.074*	.029	--	--	--	--
ϕ_7	.083*	.029	--	--	--	--	--	--	--	--
ω_2	.288	.391	-.501	.281	.118	.313	.201	.296	.091	.301
ω_3	.272	.580	.063	1.153	-.128	.180	.185	.373	.385*	.183
δ_3	-.998*	.037	.118	16.158	-.998*	.006	-.962*	.208	-1.000*	.002
ω_4	.443	.424	-.066	.283	-.623*	.318	-.137	.397	.644*	.301
ω_5	-.370	3.692	-.518*	.235	-.148	1.196	-.221	1.997	1.093*	.243
δ_5	.118	8.804	-.917*	.269	.396	4.883	.207	7.166	-.923*	.131
χ^2	27.52 df=22		14.28 df=23		29.13 df=20		22.66 df=22		22.29 df=23	
Drug										
α	.761*	.052	.210*	.024	.221*	.023	.212*	.021	.153*	.017
ϕ_1	--	--	--	--	.085*	.028	--	--	--	--
ϕ_3	.078*	.028	--	--	--	--	--	--	--	--
ϕ_8	.093	.028	--	--	--	--	--	--	--	--
ω_2	.027	.089	-.077	.071	-.043	.078	.008	.052	.091	.063
ω_3	-.029	.172	-.015	.124	-.000*	.000	.157*	.067	-.019	.109
δ_3	.746	1.490	.650	2.931	.999*	.001	-.974*	.037	-.665	8.567
ω_4	-.178	.098	-.053	.075	-.058	.085	-.122	.072	.091	.063
ω_5	.105	.128	-.002	.012	.110	.080	-.048	.237	.023	.176
δ_5	-1.000	.008	.943*	.433	-.999*	.004	-.559	7.561	-.613	12.032
χ^2	27.40 df=22		25.66 df=24		21.69 df=23		16.20 df=24		18.19 df=24	
Suspicious Person										
α	3.919*	.114	.914*	.047	.770*	.042	1.409	.061	.870*	.049
ϕ_1	.081*	.028	--	--	--	--	--	--	.128*	.028
ϕ_2	--	--	--	--	--	--	.064*	.028	--	--
ω_2	-.195	.185	-.203	.141	-.148	.133	-.256	.150	.182	.179
ω_3	-.243	.434	-.030	.163	-.190	.155	-.005	.484	.371	.202
δ_3	-.942*	.335	.716	1.370	-.779	1.096	.546	45.796	-.747	.714
ω_4	-.022	.200	-.151	.152	-.089	.134	.035	.211	-.000	.179
ω_5	-.008	.019	-.340	.513	-.274	.482	-.150	1.136	.010	.022
δ_5	.975*	.056	-.509	2.260	-.513	2.636	-.206	9.137	.957*	.098
χ^2	32.98 df=23		25.58 df=24		18.15 df=24		23.06 df=23		19.43 df=23	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 2 Continued: First-Order Transfer Function Applied to a Step Series by Zone and Type of Crime (Gradual, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Assistance										
α	.994*	.049	.238*	.027	.280*	.025	.305*	.023	.211*	.021
ϕ_1	--	--	--	--	--	--	-.070*	.028	--	--
ω_2	-.007	.084	.006	.081	.053	.081	.001	.056	.055	.079
ω_3	-.086	.200	-.008	.257	-.021	.196	-.063	.367	.102	.073
δ_3	-.969*	.220	.421	17.554	.548	4.100	.055	5.514	-.955*	.138
ω_4	.153	.091	.029	.083	.130	.085	-.127	.077	-.033	.079
ω_5	.000	.000	.063	.483	-.056	.469	-.116	.064	.000	.000
δ_5	1.007*	.008	.177	6.309	-.221	10.184	-.987*	.031	1.001*	.006
χ^2	32.78 df=24		22.06 df=24		14.12 df=24		27.65 df=23		22.39 df=24	
Public Morals										
α	.456*	.034	.121*	.015	.134*	.017	.122*	.015	.075*	.011
ϕ_1	.061*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	--	--	--	--	.065*	.029	--	--	--	--
ω_2	-.117*	.054	.012	.046	-.043	.054	-.001	.037	-.008	.040
ω_3	-.214	.387	-.002	.002	-.054	.197	-.003	.015	-.004	.008
δ_3	.255	1.345	.973*	.030	.295	2.581	.912*	.420	.936*	.149
ω_4	-.089	.058	.010	.056	-.040	.055	.020	.066	.075	.055
ω_5	-.217	.447	-.064	.207	-.048	.275	-.067	.205	-.014	.099
δ_5	-.360	2.781	-.411	4.533	-.294	7.448	-.463	4.412	-.646	11.269
χ^2	29.86 df=23		27.22 df=24		25.85 df=23		25.02 df=24		25.64 df=24	
Physical Disorder										
α	.848*	.083	.149*	.025	.086*	.019	.328*	.036	.281*	.033
ϕ_6	--	--	--	--	.066*	.028	--	--	--	--
ϕ_{23}	-.074*	.029	--	--	--	--	--	--	--	--
ϕ_7	.059*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	--	--	--	--	--	--	--	--	--	--
ϕ_{21}	.142*	.029	--	--	--	--	.081*	.029	--	--
ω_2	.192	.132	.028	.084	.069	.060	.165	.087	-.192	.122
ω_3	1.391*	.309	.001	.001	.155*	.055	.329*	.114	.447*	.115
δ_3	-.839*	.155	.996*	.006	-.951*	.076	-.872*	.253	-.881*	.190
ω_4	.495*	.143	.049	.116	.095	.061	.214	.116	-.034	.122
ω_5	.077	.401	.019	.453	.003	.210	.043	.391	.032	.292
δ_5	.709	1.509	.301	16.906	.502	31.356	.522	4.306	.648	3.178
χ^2	28.84 df=21		22.30 df=24		22.96 df=23		29.04 df=23		25.65 df=24	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 2 Continued: First-Order Transfer Function Applied to a Step Series by Zone and Type of Crime (Gradual, Permanent Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Nuisance										
α	-.027	.027	-.014	.009	-.008	.006	.002	.005	.002	.007
ϕ_1	--	--	.082*	.028	--	--	--	--	--	--
ϕ_8	.103*	.028	--	--	--	--	--	--	--	--
ϕ_{13}	.100*	.028	--	--	--	--	--	--	--	--
ϕ_{15}	.101*	.028	.099*	.028	--	--	--	--	--	--
ϕ_7	-.859*	.020	--	--	--	--	--	--	--	--
θ_1	-.157*	.028	--	--	-.078*	.028	--	--	-.081*	.028
θ_5	--	--	--	--	-.064*	.028	--	--	--	--
θ_{13}	--	--	--	--	-.091*	.028	--	--	--	--
θ_7	--	--	.894*	.013	.910*	.012	.913*	.012	.896*	.013
θ_{14}	.803*	.023	--	--	--	--	--	--	--	--
ω_2	.047	.048	-.034	.046	.002	.038	.022	.019	.032	.051
ω_3	.003	.019	.025	.356	.030	.058	-.011	.331	-.001	.001
δ_3	.946*	.425	-.030	14.397	-.896	3.523	-.101	32.709	.980*	.047
ω_4	.001	.064	-.002	.044	-.034	.052	-.024	.035	.160	.084
ω_5	.013	.996	.024	.161	.001	.055	-.009	.016	-.023	.247
δ_5	-.089	81.287	-.747	11.451	.840	7.780	-1.001*	.075	-.671	17.742
χ^2	26.47 df=18		26.81 df=21		22.25 df=20		16.27 df=23		17.83 df=22	
Disorderly Conduct										
α	3.384*	.099	.915*	.049	.787*	.043	.983*	.039	.902*	.043
ϕ_6	.106*	.028	--	--	--	--	--	--	--	--
ϕ_8	.084*	.028	--	--	--	--	--	--	--	--
ϕ_{11}	-.064*	.028	--	--	--	--	--	--	--	--
ϕ_{18}	-.102*	.028	--	--	--	--	--	--	--	--
ϕ_7	--	--	--	--	.087	.028	--	--	--	--
ϕ_{21}	.094*	.029	--	--	--	--	--	--	--	--
ω_2	.383*	.171	.196	.150	.122	.140	.127	.108	.075	.158
ω_3	-.127	.950	-.004	.019	-.002	.002	-.029	.228	.032	.669
δ_3	.399	4.480	.953*	.254	.994*	.010	.688	2.407	.210	16.566
ω_4	-.030	.186	.115	.203	-.146	.185	-.089	.158	-.036	.160
ω_5	-.111	.234	-.049	.329	-.001	.010	-.000	.000	.056	.179
δ_5	-1.002*	.010	.678	2.145	.982*	.156	1.013*	.010	-.830	4.469
χ^2	29.13 df=19		32.39 df=24		24.96 df=23		29.71 df=24		22.95 df=24	
Traffic										
α	4.068*	.137	.864*	.047	.634*	.041	1.534*	.072	1.000*	.044
ϕ_6	--	--	--	--	--	--	-.065*	.029	--	--
ϕ_8	.074*	.029	--	--	--	--	--	--	--	--
ϕ_{15}	--	--	--	--	--	--	.080*	.029	--	--
ϕ_{14}	.135*	.029	--	--	--	--	.124*	.029	--	--
ω_2	-.204	.222	.247	.141	.188	.133	.040	.171	.067	.161
ω_3	.004	.005	-.024	.069	.157	.121	.297	.226	-.030	.131
δ_3	.998*	.012	.871*	.360	-.954*	.160	-.871	.534	.809	.825
ω_4	-.565	.600	-.169	.169	-.111	.135	-.251	.227	.193	.180
ω_5	-.135	1.101	-.283	.628	-.062	.111	-.036	1.195	.301*	.141
δ_5	.585	3.141	-.412	3.115	-.928	1.059	.218	26.071	-.901*	.401
χ^2	30.37 df=22		27.39 df=24		26.39 df=24		24.67 df=21		21.85 df=24	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 3: First-Order Transfer Function Applied to a Pulse Series by Zone and Type of Crime (Abrupt, Temporary Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Person										
α	6.655*	.137	1.516*	.051	1.393*	.037	1.853*	.043	1.952*	.046
ϕ_1	--	--	.077*	.028	--	--	--	--	--	--
ϕ_4	-.067*	.028	--	--	--	--	--	--	--	--
ϕ_8	--	--	.058*	.029	--	--	--	--	--	--
ϕ_{13}	.078*	.029	--	--	--	--	--	--	--	--
ϕ_7	.117*	.028	.063*	.029	--	--	--	--	--	--
ϕ_{14}	.107*	.029	.085*	.029	--	--	--	--	--	--
ω_2	-.037	.277	-.307	.250	-.304	.191	.191	.156	-.130	.228
ω_3	-.866	1.073	-1.419	1.286	-.891	1.075	-1.938	1.429	-1.315*	.550
δ_3	.969*	.060	.333	.779	.721	.470	-.234	.679	.964*	.022
ω_4	.117	.299	-.076	.250	-.098	.193	-.453*	.218	.071	.228
ω_5	.254	.337	-1.085	1.159	-.738	1.227	.124	.480	1.048	1.496
δ_5	-.997*	.009	-.619	.550	.473	1.165	-.971*	.163	.016	1.427
χ^2	28.49 df=20		31.10 df=20		33.27 df=24		24.47 df=24		33.79 df=24	
Property										
α	10.446*	.169	2.169*	.053	2.046*	.065	3.606*	.084	2.793*	.059
ϕ_1	.165*	.028	.094*	.028	.090*	.028	.153*	.028	.099*	.028
ϕ_3	--	--	--	--	.068*	.028	--	--	--	--
ϕ_4	--	--	--	--	.070*	.028	--	--	--	--
ϕ_{19}	--	--	--	--	--	--	.071*	.028	--	--
ϕ_{23}	--	--	--	--	.079*	.029	--	--	--	--
ϕ_7	.091*	.029	--	--	--	--	--	--	--	--
ω_2	.483	.359	-.406	.273	.172	.314	.308	.285	-.114	.302
ω_3	4.804	3.608	-1.070	1.164	-2.342	1.380	.665	.839	4.175*	1.795
δ_3	.563	.477	-.807*	.291	.703*	.264	.969*	.586	.098	.426
ω_4	.634	.394	.027	.273	-.487	.315	-.034	.387	.438	.303
ω_5	2.253	1.404	-1.888	1.154	2.307	1.492	.909	1.226	2.933	1.797
δ_5	-.944*	.048	-.812*	.160	-.426	.475	-.867*	.248	-.448	.559
χ^2	29.18 df=22		17.93 df=23		28.66 df=20		23.32 df=22		31.91 df=23	
Drug										
α	.780*	.040	.187*	.013	.200*	.017	.217*	.014	.160*	.013
ϕ_1	--	--	--	--	.081*	.028	--	--	--	--
ϕ_3	.071*	.028	--	--	--	--	--	--	--	--
ϕ_8	.096*	.028	--	--	--	--	--	--	--	--
ω_2	.007	.081	-.054	.068	-.022	.076	.003	.050	.085	.062
ω_3	-.409	.335	.817	.450	-.234	.455	1.827*	.456	-.154	.121
δ_3	.972*	.033	-.162	.530	.462	1.426	.275	.222	.976*	.027
ω_4	-.189*	.089	-.032	.068	-.154*	.077	-.128	.070	.085	.062
ω_5	5.186*	.900	-.313	.448	-.161	.127	-.302	.400	.844*	.407
δ_5	-.194	.164	-.320	1.224	.983*	.019	.695	.562	-.109	.473
χ^2	27.38 df=22		26.63 df=24		23.06 df=23		15.32 df=24		18.62 df=24	
Suspicious Person										
α	3.757*	.088	.786*	.026	.673*	.025	1.367*	.040	.980*	.034
ϕ_1	.080*	.028	--	--	--	--	--	--	.135*	.028
ϕ_2	.092*	.029	--	--	--	--	.061*	.028	--	--
ω_2	-.031	.181	-.074	.136	-.051	.129	-.214	.142	.078	.177
ω_3	1.380	1.917	.972	.838	-.721	.841	-.561	.405	1.505	.994
δ_3	.625	.738	.595	.478	-.382	.931	-.975*	.026	-.351	.528
ω_4	.132	.199	-.030	.136	.009	.131	.076	.198	-.117	.177
ω_5	.666	1.122	-.794	.897	-.694	.850	-.596	.733	-1.171	.941
δ_5	.922*	.193	-.135	1.099	-.180	1.167	.904*	.168	-.523	.500
χ^2	25.05 df=22		26.57 df=24		21.95 df=24		24.06 df=23			

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 3 Continued: First-Order Transfer Function Applied to a Pulse Series by Zone and Type of Crime (Abrupt, Temporary Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Assistance										
α	1.067*	.042	.267*	.015	.251*	.016	.278*	.016	.258*	.016
ϕ_1	--	--	--	--	--	--	-.074*	.028	--	--
ω_2	-.079	.080	-.023	.078	.082	.079	.028	.053	.009	.078
ω_3	-.217	1.035	.743	.515	.730	.517	-.254	.161	.752	.515
δ_3	-.326	4.048	-.219	.644	-.152	.657	.971*	.026	-.213	.640
ω_4	.081	.088	-.001	.078	.158*	.079	-.100	.074	-.080	.078
ω_5	-.423	.274	-.370	.513	-.189	.276	-.382	.507	-.214	.179
δ_5	.982*	.017	-.300	1.209	.919*	.167	.432	.972	.968*	.038
χ^2	31.45 df=24		23.21 df=24		13.17 df=24		29.91 df=23		20.80 df=24	
Public Morals										
α	.457*	.034	.087*	.009	.102*	.010	.099*	.010	.077*	.011
ϕ_1	.057*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	--	--	--	--	.070*	.029	--	--	--	--
ω_2	-.118*	.054	.046	.045	-.011	.052	.022	.035	-.010	.040
ω_3	-.358*	.078	-.399	.267	-.132	.299	-.394	.278	-.086*	.034
δ_3	.998*	.001	-.647*	.327	.635	1.143	-.710*	.286	.996*	.003
ω_4	.156*	.060	.002	.045	-.008	.053	.034	.049	.083*	.041
ω_5	-.336	.588	-.094	.094	-.139	.222	-.150	.176	-.083	.188
δ_5	.515	1.166	.973*	.038	.853*	.339	.914*	.143	.826	.568
χ^2	29.39 df=23		29.10 df=24		27.99 df=23		24.17 df=24		25.35 df=24	
Physical Disorder										
α	1.065*	.059	.223*	.016	.109*	.011	.399*	.023	.287*	.033
ϕ_6	--	--	--	--	.071*	.028	--	--	--	--
ϕ_{14}	--	--	--	--	--	--	--	--	--	--
ϕ_{22}	.062*	.029	--	--	--	--	--	--	--	--
ϕ_{23}	-.089*	.029	--	--	--	--	--	--	--	--
ϕ_7	.070*	.028	--	--	--	--	--	--	--	--
ϕ_{21}	.149*	.029	--	--	--	--	.089*	.029	--	--
ω_2	-.026	.124	-.046	.082	.045	.059	.095	.083	-.198	.122
ω_3	3.825*	1.294	-.299	.496	-.092	.361	1.687*	.709	.200*	.099
δ_3	-.552*	.207	.633	.837	.023	3.930	-.117	.412	1.001*	.003
ω_4	.251	.137	.154	.082	.071	.059	.132	.113	-.280	.172
ω_5	-1.275	1.300	-.228	.542	-.107	.358	-.344	.709	-.171	.163
δ_5	.518	.667	.039	2.375	.340	2.796	.212	1.922	1.001*	.006
χ^2	26.46 df=20		25.36 df=24		22.83 df=23		26.51 df=23		26.12 df=24	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 3 Continued: First-Order Transfer Function Applied to a Pulse Series by Zone and Type of Crime (Abrupt, Temporary Impact)

Type of Crime	All Zones		Zone I		Zone II		Zone III		Zone IV	
	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error	Coeff-icient	Standard Error
Disorderly Conduct										
α	3.315*	.075	.821*	.029	.705	.027	.929*	.029	.923*	.031
ϕ_6	.109*	.028	--	--	--	--	--	--	--	--
ϕ_8	.085	.028	--	--	--	--	--	--	--	--
ϕ_{11}	-.059	.028	--	--	--	--	--	--	--	--
ϕ_{18}	-.101	.028	--	--	--	--	--	--	--	--
ϕ_7	--	--	--	--	.094*	.028	--	--	--	--
ϕ_{21}	.095	.029	--	--	--	--	--	--	--	--
ω_2	.453*	.159	.291*	.143	.203	.138	.181	.104	.055	.154
ω_3	1.403	1.847	.280	.348	.511	.830	3.071*	.957	-.497	.427
δ_3	-.276	1.172	.963*	.065	-.317	1.394	.014	.311	.952*	.059
ω_4	.048	.175	.180	.143	-.278*	.139	-.040	.145	-.056	.154
ω_5	3.491*	1.571	5.190*	.941	-.670	.833	1.628*	.826	2.834*	.940
δ_5	.707*	.192	-.122	.177	.205	1.169	.710*	.205	.611*	.177
χ^2	29.30 df=19		31.46 df=24		28.48 df=23		29.62 df=24		23.85 df=24	
Traffic										
α	4.013*	.096	.733*	.027	.642*	.025	1.550*	.046	1.016*	.030
ϕ_6	--	--	--	--	--	--	-.062*	.029	--	--
ϕ_{15}	--	--	--	--	--	--	.082*	.029	--	--
ϕ_7	.081*	.028	--	--	--	--	--	--	--	--
ϕ_{14}	.133*	.029	--	--	--	--	.123*	.029	--	--
ω_2	-.146	.203	.378*	.135	.181	.129	.022	.163	.051	.158
ω_3	.679	2.114	3.306*	.824	1.398	.756	1.377	1.305	-1.551*	.704
δ_3	.484	2.150	-.610*	.134	-.673*	.246	-.407	.734	-.859*	.091
ω_4	-.227	.223	-.066	.135	-.119	.130	-.270	.219	.162	.158
ω_5	2.627	1.917	-.572	.5115	-.673	.808	1.270	1.316	.938	1.026
δ_5	-.694	.310	.902*	.125	-.552	.732	-.304	.902	.400	.852
χ^2	29.37 df=22		27.84 df=24		27.65 df=24		26.79 df=21		26.64 df=24	
Nuisance										
α	-.037	023	-.002	.005	-.005	.005	-.002	.004	-.009	.006
ϕ_1	--	--	.092*	.028	--	--	--	--	--	--
ϕ_8	.093*	.028	--	--	--	--	--	--	--	--
ϕ_{13}	.091*	.028	--	--	--	--	--	--	--	--
ϕ_{15}	.095*	.028	.106*	.028	--	--	--	--	--	--
ϕ_7	-.868*	.019	--	--	--	--	--	--	--	--
θ_1	-.151*	.028	--	--	-.078*	.028	--	--	-.080*	.028
θ_5	--	--	--	--	-.064*	.028	--	--	--	--
θ_{13}	--	--	--	--	-.091*	.028	--	--	--	--
θ_7	--	--	.888*	.013	.910*	.012	.911*	.012	.893*	.013
θ_{14}	.816*	.022	--	--	--	--	--	--	--	--
ω_2	.059	.044	-.047	.044	.013	.038	.021	.019	.005	.065
ω_3	.078	.117	.011	.031	-.056	.167	.502	.354	.383	.650
δ_3	.993*	.025	-1.005*	.006	-.996*	.023	-.792*	.321	.831*	.325
ω_4	-.058	.085	-.001	.045	-.050	.046	-.032	.034	.059	.066
ω_5	1.712	1.015	.449	.417	.042	.048	-.123	.318	.635	.663
δ_5	.908*	.064	-.603	.534	.990*	.013	-.970*	.198	.797	.257
χ^2	23.30 df=18		26.37 df=21		21.92 df=20		16.63 df=23		17.50 df=22	

α = Constant
ϕ_i = Autoregressive coefficient
θ_i = Moving Average coefficient
ω_i = Intervention coefficient – level of change (phase i)
δ_i = Intervention coefficient – rate of change (phase i)
χ^2 = Ljung-Box statistic

Appendix 4: Time Series for the Area Adjoining the Redevelopment District (Displacement and Diffusion Effects).

	Person	Property	Drug	Suspicious Person	Assistance	Public Morals	Physical Disorder	Nuisance	Disorderly Conduct	Traffic
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
α	.917*	2.394*	.091*	1.005*	.182*	.074*	.156*	.007	.466*	1.065
	(.051)	(.122)	(.021)	(.059)	(.026)	(.014)	(.034)	(.006)	(.038)	(.077
ϕ_1	--	.102*	.112*	.073*	--	--	.058*	--	--	--
		(.028)	(.028)	(.028)			(.028)			
ϕ_7	--	.058*	--	--	--	--	.062*	--	--	--
		(.028)					(.029)			
ϕ_9	--	--	--	--	--	--	--	--	--	.080
										(.029)
ϕ_{10}	--	--	--	--	--	--	--	.105*	--	--
								(.029)		
ϕ_{12}	--	--	.077*	--	--	--	--	--	--	--
			(.028)							
ϕ_{14}	--	.082*	--	--	--	--	--	--	--	--
		(.029)								
ϕ_{21}	--	--	--	--	--	--	--	--	--	.106
										(.029)
θ_1	--	--	--	--	--	--	--	-.056*	--	--
								(.029)		
θ_7	--	--	--	--	--	--	--	.931*	--	--
								(.029)		
θ_{14}	--	--	--	--	--	--	--	-.089*	--	--
								(.039)		
θ_{21}	--	--	--	--	--	--	--	.060*	--	--
								(.029)		
ω_2	-.046	.177	-.013	.175	.041	-.001	.149*	-.020	.084	-.005
	(.081)	(.194)	(.033)	(.094)	(.042)	(.022)	(.054)	(.012)	(.060)	(.122)
ω_3	-.021	-.257	-.026	-.044	.026	-.046	.412*	.010	.053	.350*
	(.107)	(.253)	(.044)	(.124)	(.055)	(.029)	(.071)	(.018)	(.080)	(.159)
ω_4	.143	-.099	.018	-.142	.075	-.003	.111	-.009	.048	.301*
	(.088)	(.210)	(.036)	(.102)	(.045)	(.024)	(.058)	(.012)	(.065)	(.133)
ω_5	-.028	-.034	.069*	.037	.090*	-.025	.150*	-.007	.022	.482*
	(.072)	(.173)	(.030)	(.083)	(.037)	(.019)	(.048)	(.009)	(.054)	(.109)
χ^2	25.90 df=24	23.35 df=21	18.82 df=22	21.17 df=23	24.06 df=24	29.84 df=24	21.95 df=22	24.12 df=19	24.52 df=24	21.92 df=22

* $p < .05$

α = Constant

ϕ_i = Autoregressive coefficient

θ_i = Moving Average coefficient

χ^2 = Ljung-Box statistic

ω_2 = Intervention 1 (compared to Pre-Intervention)

ω_3 = Intra-Intervention (compared to Pre-Intervention)

ω_4 = Intervention 2 (compared to Pre-Intervention)

ω_5 = Post-Intervention (compared to Pre-Intervention)

APPENDIX B

A Case Study of the Scottsdale Police Department's Crime Trends Process

A CASE STUDY OF THE SCOTTSDALE POLICE DEPARTMENT'S CRIME TRENDS PROCESS

Prepared for the
Scottsdale, Arizona Police Department

by

Robin N. Haarr, Ph.D.

Administration of Justice

ARIZONA STATE
UNIVERSITY WEST

August 2000

A CASE STUDY OF THE SCOTTSDALE POLICE DEPARTMENT'S CRIME TRENDS PROCESS

Prepared for the
Scottsdale, Arizona Police Department

by

Robin N. Haarr, Ph.D.[a]

Administration of Justice

This research was funded by grant no. 98-IJ-CX006 from the National Institute of Justice. The opinions expressed in this paper are those of the authors' and are not necessarily of the Department of Justice. The author would like to express special thanks to Executive Assistant Chief of Police Dee Taylor, Deputy Chief Kevin Mattingly, Paul Bentley, and Nancy Mitchell.

[a] Robin N. Haarr is an Associate Professor in the Administration of Justice Department at Arizona State University West. Her research interests include police behavior and culture, women and minority issues in the workplace, and women and crime.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Background

This report is based on a two-year study of the Scottsdale, Arizona Police Department's Crime Trends process. In 1996, police executives implemented Crime Trends, which was modeled after the New York City Police Department's Compstat; however, Crime was redesigned a bit to meet the information technology capabilities and organizational culture of the Scottsdale Police Department. Frustrated by the fact that Crime Trends was not practiced in the manner they had envisioned, Executive Assistant Chief of Police Dee Taylor commissioned the study for the purpose of evaluating the Crime Trends process. In particular, Executive Assistant Chief of Police Taylor was interested in understanding the various problems and shortcomings of the Crime Trends process so that police executives could work together and with police managers redesign the Crime Trends process.

Methodology

Primarily qualitative research methods, including observations and interviews, were used to generate detailed empirical and attitudinal data about Crime Trends from police executives, managers, and supervisors located in the Investigative Services and Uniformed Services Bureaus of the Scottsdale Police Department. The data were collected from September 1998 through July 2000. I examined the three important components of the Crime Trends process. First, crime analysts use computerized crime mapping software to analyze crime data and generate crime maps and bulletins that can be used by police personnel to identify "hot spots" and crime trends, as well as suppress and prevent crime. Second, patrol managers, sergeants and line officers are expected to use the crime maps and bulletins to identify "hot spots" and crime trends, and implement problem-solving and enforcement strategies to suppress and prevent crime. Third, police executives are expected to monitor monthly crime trends, inform proactive approaches to problem-solving and enforcement, and held police managers accountable for practicing Crime Trends at monthly crime trends management meetings.

Summary of the Major Findings

- Both patrol personnel and detectives resist engaging in the Crime Trends process of using the crime maps, spreadsheets and bulletins to identify offense-, location- and offender-specific crime and to develop enforcement and problem-solving strategies to control and/or prevent crime. Both detectives and patrol personnel avoid using the crime maps and spreadsheets largely because of the numerous shortcomings with them, but also because they were not trained on how to interpret or use the crime maps and data prior to their dissemination.

- Both patrol personnel and detectives have negative opinions of the Crime Trends process.

- Mid-level managers in the patrol bureau have pushed the responsibilities for using crime maps and bulletins to identify crime problems and develop enforcement and problem-solving strategies to control and prevent crime onto patrol sergeants.

- Patrol sergeants are aware that Crime Trends responsibilities are placed on them; however, at least half of the patrol sergeants interviewed revealed they rarely use the crime maps and bulletins to carry out their responsibilities.

- Despite officers' resistance to Crime Trends, officers do recognize its value. In particular, it has generated increased interaction among police executives, mid-level managers, and supervisors from different bureaus, units, and districts regarding issues of crime and crime control and prevention.

- The monthly crime trends management meetings have provided police executives and mid-level managers with the forum to interact, exchange information, and develop plans to coordinate activities across bureaus and units.

- Police personnel face few ramifications for failing to practice Crime Trends or reduce crime, and receive few rewards for practicing Crime Trends or reducing crime.

Recommendations

In the future, I suggest that the department redesign Crime Trends and develop new practices, training, and policy regarding crime analysis and mapping, the dissemination and use of crime maps and data, the flow of information regarding crime problems and policing strategies, and issues responsibility and accountability. For instance, I suggest that the CAU develop their capacity to disseminate "real time" or timely crime information, and move beyond simply identifying hot spots to providing police with a better understanding of the relationship between crime and geography (e.g., identifying contributing factors to crime) to aid the police department to be more efficient in carrying out its mission of controlling and preventing crime. I also suggest that police executives hire additional crime analysts and consider assigning a crime analyst to each of the three command areas to further the dissemination and use of crime analysis information. Another important recommendation is that police executives and training specialists need to explore both formal training and semi-formal train-the-trainer approaches for training police personnel in technology use and application. I also suggest that technology use and applications training be integrated into both the four-week post academy training curriculum and the field training process. Finally, I encourage community involvement in "work groups" with the police department to help police analyze and interpret crime maps and data, as well as develop and implement effective and long-lasting solutions to crime problems.

Conclusion

The findings presented here indicate that despite the numerous shortcoming of the Crime Trends process, Crime Trends has helped advance the Scottsdale Police Departments efforts to use geographic information systems and database technology to identify, reduce, and prevent crime. Crime Trends has also helped to focus police officers' efforts and resources, as well as increase the flow of information and communication between police personnel in different bureaus, units, and districts.

INTRODUCTION

Innovations in crime prevention theory and community policing philosophies have pushed the concepts of place and context of crime (i.e., the physical, organizational, and social environments that make crime possible) to the center of research and police efforts to control and prevent crime (Weisburd and McEwen, 1997; see also, Mazarolle, Bellucci and Gajewski, 1997). Weisburd and McEwen (1997) maintain that this shift in focus has been an important theoretical impetus that has impelled police administrators and scholars to seek out map-based crime analysis tools that would allow them to examine a wide array of police data (e.g., incidents, arrests, offender and victim data, calls for service, etc.), other criminal justice agency data (e.g., addresses of person released on probation or form correctional facilities), street and other landmark data (e.g., locations of liquor stores and bars, schools, city parks, public housing, community organizations), as well as population data to obtain a better understanding of criminal activity from a geographic perspective, to identify and understand the factors contributing to crime, and to identify emerging patterns of criminal activity or "hot spots" of crime.

Prior to the 1980s, law enforcement agencies had few, if any, resources or capabilities, for analyzing geographic information systems (GISs) or creating computerized crime maps. Over the last 10 years, however, advances in computer hardware and software, geographic data sources, and networking capabilities have made computerized crime analysis and mapping more available and easier for law enforcement agencies. Today, mapping software applications are being used to improve police departments efforts to effectively and efficiently allocate resources to proactively combat crime and social problems (see also Canter, 1997; Harries, 1999; Rich, 1995; Sherman and Weisburd, 1995; Mazarolle et al., 1997).

The National Institute of Justice (NIJ) has also been a catalyst in getting police agencies to use GISs and computer-based crime analysis and mapping software to better understand the nature and extent of criminal and social problems in the community, assess the efficacy of interventions, and improve the allocation of resources (Rich, 1996, 1999). In 1989, the National Institute of Justice (NIJ) had only one active grant involving computer mapping (Rich, 1999); however, by the mid- to late-1990s, NIJ was funding a wide array of studies that had state and local law enforcement practitioners using GISs and computer mapping software to analyze criminal activity, identify factors contributing to crime, and evaluate the effectiveness of apprehension and crime prevention strategies. During the mid-1990s, NIJ also established the Crime Mapping Research Center "to support the development of new analytical software and training curricula, evaluation of best practices, and assessment of the practical applications of mapping" (Rich 1999: 9; see also Block and Block, 1993; Harries, 1999; Maltz, Gorden and Friedman, 1989; Mazerolle et al., 1997; Rich, 1995, 1996; Weisburd, 1997).

The Use of Computerized Crime Mapping by Law Enforcement

In 1997, the NIJ Crime Mapping Research Center (CMRC) conducted a nationwide survey of 2,004 police agencies and found that only 13 percent of the police departments surveyed used computerized crime mapping systems (Mamalian and LaVigne, 1999). Data revealed larger departments (with more than 100 sworn officers) were more likely to use this technology, than were smaller departments. Findings also revealed that 75 percent of the departments that used crime mapping software reported that crime analysts were primarily responsible for performing computerized queries. In only nine percent of the departments patrol personnel were responsible for using crime mapping. The types of analysis crime analysts were conducting included primarily geocoding and mapping offense data, calls for service data,

vehicle recovery data, UCR Part I crimes (i.e., burglary, auto theft, robbery, rape, homicide, aggravated assault, and arson) and UCR Part II crimes (i.e., larceny theft and drug offenses). While 77 percent of the departments also conducted crime cluster or "hot spot" analyses, only 25 percent used a computer program that identified "hot spots." Finally, departments that use crime mapping, typically use such systems to inform officers and investigators of crime incident locations, as well as to make resource allocation decisions, identify repeat calls-for-service, evaluate interventions, and inform residents about criminal activity and changes in their community (Mamalian and LaVigne, 1999; see also Rich, 1995).

In a study conducted by the Police Foundation (2000), they surveyed 51 police departments that had received funding from the Office of Community Oriented Policing Services (COPS) for the development of computer mapping technologies in support of community and problem-oriented policing. They found that 27 of the departments were involved in mapping and more than 75 percent reported that both management and line personnel were using crime maps. In the majority of these departments, crime maps were used to analyze crime problems, map locations of offenses, hot spot identification, resource allocation and decision-making. Less than half of the departments use maps for data presentation of police reports, public information or presenting maps to the community, focusing neighborhood strategies, problem-solving, program evaluation, or traffic or accident analysis. Approximately 26 percent were using crime maps to practice CompStat. Many of the departments surveyed wanted to get line officers involved in mapping, however, only 28 percent of the departments provided line officers with access to computers with mapping software. In the majority of the departments (68 percent), line officers had to request maps from a crime analysis unit.

The Police Foundation concluded that the majority of police departments have been engaged in computerized crime mapping for only a short time (with only seven percent of the departments using crime mapping software for more than two years) and are generally engaged in little or limited crime mapping efforts. One reason for the limited use of crime mapping is that police departments begin the process of mapping crime, but are quickly frustrated by the difficulties that arise when attempting to implement and integrate computer mapping into departmental routines. Many departments also fail to develop a plan for implementing and integrating crime mapping into departmental routines. A second reason for the limited use of crime mapping is that many police departments underestimate the learning curve for using crime mapping and getting rank and file officers involved the use of crime maps (Police Foundation, 2000).

A review of the literature reveals numerous other problems police departments have encountered in their attempts to integrate crime analysis and mapping technology into police operations and practices (Mazerolle et al., 1997; Weisburd and McEwen, 1997). Rich (1995) maintained obstacles to the increased use of mapping software are directly related to hardware and software costs, user expertise, data acquisition costs (e.g., the expense of moving data from one system or organization to another system), and data quality (see Rich, 1995). Other particular obstacles include: having to double enter data (i.e., first into the CAD system and then into the mapping system; Rich, 1995); ability to develop systems in which there is access to "real time" or timely crime information (Mazerolle et al., 1997; Weisburd and McEwen, 1997); failure to identify the primary "end-users" of crime maps and generate crime maps needed by the "end-users" (Mazerolle et al., 1997); and ability to show three dimensional spaces (e.g., mapping crime data for multistory buildings and public housing buildings; Rich 1995). Mazerolle et al.

(1997:133) contends that "such obstacles can result in less valuable data, as well as lead officers to develop negative opinions of crime mapping systems and perceptions that the systems cannot assist in problem-solving activities or operational decision-making."

New York City Police Department's CompStat Process

A review of the literature further reveals numerous examples of how computerized crime mapping software have been and can be used by police departments, community organizations, and multi-agency task forces to control and prevent crime (Canter, 1997; Greene, Rich and Ward, 1999; Rich, 1995, 1996, 1999; LaBeau and Vincent, 1997; Mazerolle et al., 1997; Weisburd and Green, 1995; Weisburd and McEwen, 1997). One particular model for using computer-based crime mapping software that has been duplicated by numerous police departments across the United States is the New York City Police Department's (NYPD) CompStat process. Developed in 1994, CompStat, a system of electronic computer mapping of weekly crime statistics within precincts and larger police commands that allows police to track crime incidents, was designed to increase the flow of information regarding criminal activity and crime control and prevention strategies between police executives and commanders of operational units, but also as a management tool to enforce accountability and evaluate performance of police commanders (Harries, 1999).[1]

Harries (1999:79) outlines the four main crime reduction principles that embody the CompStat process. One is the distribution of accurate and timely intelligence information that describes how and where crimes are committed, as well as who are the criminals. A second crime reduction principle is the need to design comprehensive, flexible, and adaptable tactics that effectively respond directly to the shifting crime trends and information that is revealed through the intelligence gathering process. A third principle is the need for rapid and effective

deployment of police personnel and resources, as well as the need for patrol and specialized units to work together in teams to effectively deploy enforcement plans. For instance, precinct commanders are expected to show that they are cooperating with each other to address issues of mutual concern, such as crime patterns that overlap precincts. The fourth and final crime reduction principle is the need for follow-up and assessment to ensure that sought after outcomes occur.

An important part of the CompStat process is the weekly CompStat reports that are prepared by the CompStat unit. These weekly reports include precinct maps depicting crime and arrest locations, crime hot spots, shooting incidents, and other relevant information that are then the focal point of discussion at the weekly crime strategy meetings that are attended by department executives and precinct and detective squad commanders (Rich 1999).[2] During the three-hour weekly crime strategy meetings, precinct commanders and detective squad commanders are held accountable for crime statistics in their jurisdictions by higher ranking officials who question them and require them to report on the current crime trends and identify steps they have or are taking to address crime trends. In the four-week CompStat cycle, monitoring the latest crime numbers assesses the effectiveness of every tactic and program; successful tactics and program are often replicated in other precincts.[3] Failure to perform and reduce crime could result in demotion. This method of accountability, it is asserted, gives precinct commanders a strong incentive to devise and implement effective and localized crime fighting tactics to reduce crime (Silverman, 1999).[4]

Higher ranking officials also use the weekly crime strategy meetings as the forum to propose solutions and offer assistance to local commanders, help coordinate efforts, and encourage the sharing of information. Building on the department's community policing

program, a variety of interested parties including representatives from the District Attorney's office, probation and parole officials, school officials, neighborhood groups, and local business leaders are invited to the weekly crime strategy meetings to share information and help construct comprehensive responses that will reduce crime in areas (Harries, 1999; Silverman, 1999).

Since the inception of CompStat in 1994, the CompStat style of mapping and accountability has been credited as key components to the departments' success in reducing crime. As a result, over the last five years, both large- and mid-size police agencies that started using GISs and computer-based crime mapping software to enhance their mission of crime control and prevention have attempted to imitate the New York City Police Department's (NYPD) CompStat process (see Rich, 1999; Harries, 1999). This is largely because the NYPD has aggressively promoted and marketed the use of map-based crime analysis systems to analyze criminal activity and develop crime control and prevention strategies, but also as a management tool to enforce accountability and evaluate performance of police commanders.[5] In many police departments, however, police executives have struggle to make the CompStat model fit with their own managerial styles and organizational cultures (Swope, 1999). As a result, police executives have implemented what Swope (1999) refers to as a "kinder, gender approach" and eliminated the intensive interrogations and demotions of commanders/captains for failing to show results. This, in part, is because in many mid-size police departments, police executives recognized it is neither necessary, nor practical to interrogate and/or demote captains for failing to show results.[6] Many departments have also struggled to make CompStat, which tends to focus on hard numbers and placing the responsibility and authority in the hands of precinct commanders/captains in an executive board room, fit with their community policing philosophies

to empower street-level officers to work hand-in-hand with community groups to come up with solutions to neighborhood crime problems (see Swope, 1999).

THE PURPOSE OF THE STUDY

In 1996, after Scottsdale police executives attended a Compstat Demonstration Conference in New York City, they implemented their own version of Compstat in the Scottsdale Police Department, called "Crime Trends." Scottsdale's Crime Trends Process, although modeled after NYPDs Compstat, was redesigned to meet the information technology capabilities and organizational culture of the Scottsdale Police Department. There are three important components to the Crime Trends Process. First, crime analysts use computerized crime mapping software to analyze crime data and generate crime maps and bulletins that can be used by police personnel to identify "hot spots" and crime trends, as well as suppress and prevent crime. Second, patrol managers, sergeants and line officers are expected to use the crime maps and bulletins to identify "hot spots" and crime trends, and implement problem-solving and enforcement strategies to suppress and prevent crime. Third, police executives are expected to monitor monthly crime trends, inform proactive approaches to problem-solving and enforcement, and held police managers accountable for practicing Crime Trends at monthly crime trends management meetings.

One rationale for the creation of Crime Trends was that Scottsdale police executives wanted to make sure the police department was up to date in their use of geographic information systems (GIS), database technology, and crime mapping.[7] Another rational for the creative of Crime Trends was that police executives wanted line-level officers, supervisors, and mid-level mangers to be more proactive about identifying crime trends and using problem-solving techniques to address or respond to crime. They also wanted district captains to be held more

accountable for reducing crime in their districts. Finally, they felt the regular distribution of crime maps and statistics would help police officers identify crime trends and use problem-solving techniques to address or respond to crime. Crime Trends has been envisioned as just one more effort to advance community-oriented and problem solving activities in the department.

Despite police executives' strong commitment to Crime Trends, within the organization, commitment varies from one bureau to another, one beat to another, as well as between command, supervisory, and line staff. A few beats and officers are actively involved in using the crime maps and bulletins to identify crime trends and patterns and initiate problem solving activities; while others insistently speak out against Crime Trends, avoid using the crime maps and bulletins, and engage in few problem solving activities. Police executives point out that the commitment to Crime Trends depends largely upon the district captains and patrol lieutenants.

Frustrated by the fact that Crime Trends was not practiced in the manner they had envisioned, police executives requested that the present study be designed to evaluate the Crime Trends Process. Thus, this study was designed to examine the three main components of the Crime Trends Process: one, the crime maps and bulletins generated by the CAU that can be used by police personnel; two, street-level officers and detectives use of crime maps and bulletins to identify hot spots of criminal activity and crime trends and develop strategies to suppress and prevent crime; and three, mid-level managers and police executives role in monitoring monthly crime trends and informing proactive approaches to problem-solving and enforcement, as well as being held accountable at monthly crime trends management meetings. This study extends previous research on the use of computerized crime mapping systems by police departments and adds to the limit research on police agencies efforts to duplicate or adopt the Compstat Process.

METHODOLOGY

Primarily qualitative research methods, including observations and interviews, were used to generate detailed empirical and attitudinal data about Crime Trends from police executives, managers, and supervisors located in the Investigative Services and Uniformed Services Bureaus of the Scottsdale Police Department. This approach is consistent with a sociological traditional that emphasizes the need to understand organizational life through firsthand contact with the actors who constitute it (Ericson, 1982:33; also see Glaser and Strauss, 1967; Manning, 1977; Rubenstein, 1972).

Study Site: Scottsdale Police Department

Size, Organization, Crime Levels and Trends. The Scottsdale Police Department serves a city of 211,160 residents and encompasses an area of 185 square miles. There are 345 sworn officers in the Scottsdale Police Department. The department is organized into four organizational units: Uniformed Services Bureau (USB), Investigative Services Bureau (ISB), Administrative Services Bureau (ASB), and the Professional Standards Division (PSD). Deputy chiefs of police head the USB, ISB and PSD, and a civilian director heads the ASB. Geographically, the department is organized into two patrol divisions, District I South and District II North, each headed by a district captain. District I South covers 12 square miles and is broken down into seven beat areas; and District II North covers 173 square miles and is broken down into ten beat areas. District III is currently underdevelopment and will include beats 14 and 15, which are currently part of District II.

Scottsdale is considered one of the most affluent communities in the Phoenix metropolitan area. In 1995, the median household income was $48,319, 28.6 percent higher than the $37,583 median household income for Maricopa County. The city is also known as one of

America's leading resort communities, known for attracting tourists to its many golf resorts/spas/hotels, shops, and businesses. In spite of its reputation as an affluent community, Scottsdale is quite diverse and has the crime and disorder problems experienced by other Phoenix metropolitan area communities. In 1999, the police department received more than 850,000 calls for service. The most frequent calls for service were burglary alarm calls (22.66%), suspicious activity calls (9.68%), welfare check (6.96%), and burglary report (5.16%). There were 8,588 Part I crimes in 1999. These included 2 homicides, 31 forcible rapes, 126 robberies, and 233 aggravated assaults, 1,670 burglaries, 5,469 larcenies, and 1,057 motor vehicle thefts (FBI UCR Report, 1999). Since the inception of Crime Trends in 1996, Part I index crimes have decreased, with most of the decrease in the area of larceny theft and modest decreased in burglary crimes.

Community Policing and Problem-Solving Policing. Since the early 1990s, the Scottsdale Police Department has maintained an ongoing commitment to community policing. Similar to other police agencies, the Scottsdale Police Department's approach to COP is multi-faceted. For one, every officer is expected to be committed to community policing philosophies and initiatives. Patrol officers, in particular, are responsible for managing and addressing problems in their beat area of responsibility. In an effort to encourage beat integrity and support community policing, patrol officers are geographically assigned to one of the 17 beat areas for at least two years. Patrol sergeants are also geographically assigned to one of the beat areas and are responsible for supervising and coordinating the activities of the beat team of patrol officers.[8] Beat teams are also required to work together on one or more beat projects, which generally entail a strong emphasis on problem solving and interface with the community through meetings.

Problem-oriented policing is embedded into the departments' commitment to community policing. Beat teams are expected to use the crime maps and bulletins distributed by the Crime Analysis Unit to assist them in identifying hot spots and crime trends within their beat area of responsibility and develop a response. Beat teams are also expected to create a beat folder in which patrol officers complete a form documenting each step of the S.A.R.A. Model and log their problem-solving activities, including contacts made, action taken, information obtained, time spent accomplishing the tasks, and assistance sought from other officers or civilians. The beat folders were designed as a tool to help beat teams coordinate problem-solving efforts across shifts and squads.

Another facet of the departments commitment to community policing and problem-oriented policing is evidenced in the department's commitment to crime prevention through environmental design (CPTED), promotion of the crime-free multi-housing program, and production of newsletters and bulletins that promote crime prevention. The Community Affairs Unit also offers several community-involved programs designed to address crime and fear of crime issues. Included among these programs are citizen volunteers (who directly support police services), citizen and teen police academies, self-awareness classes, and the neighborhood block watch program.

Scottsdale Police Department's Crime Analysis Unit. In the early 1990s, a planning analyst for the Scottsdale Police Department created the Crime Analysis Unit (CAU). In the beginning, the CAU was staffed by six volunteers who did not have access to a records management system, computer aided dispatch (CAD) data, statistical software tools, or a database manager. Without a records management system, volunteers were used to enter burglary data from police reports into an ACCESS database from which monthly burglary

bulletins were created and published. The monthly bulletins were nothing more than a list of all the burglaries (e.g., date, time, location, and point of entry and method of entry) by beat (Bentley, 2000).

In 1995, department administrators hired a full-time civilian crime analyst to head up the CAU. This individual was responsible for working with the city's GIS team to build an infrastructure of technology and information necessary for geographic analysis of crime data, provide information needed to improve the departments efforts to efficiently allocate resources to proactively combat crime problems, and evaluate the effectiveness of crime prevention and suppression strategies. A crime analysis users committee made up of the crime analyst and a representative from patrol, investigations, communications, and special operations was formed. The committee helped to formulate the CAU Action Plan and create formats for crime bulletins, determine which crimes to map, and determine priorities for requests.

Today, the CAU is staffed by a unit supervisor, a crime analyst, and two support services specialists, and two part time interns.

Sample and Interviews

Interviews. The two bureaus held responsible for practicing Crime Trends are the Investigative Services Bureau (ISB) and the Uniformed Services Bureau (USB). The ISB is divided into Crimes Against Persons, Crime Against Property, and Special Investigations. The Crimes against Persons division includes the Violent Crimes Unit, the Gang/Youth Intervention Unit, and the School Resource Unit. The Crimes Against Property division is decentralized across Districts I and II. District I has a Property and Auto Theft Unit, and District II has a Property and Fraud Unit. The Warrants Unit, which is also part of the Crimes Against Property division, covers both Districts I and II.

The USB includes the Patrol Bureau, which is currently divided between Districts I and II. Each district has three patrol shifts and seven squads of patrol officers, each of which is overseen by a patrol sergeant. Each patrol sergeant is assigned a beat area of responsibility, as are patrol officers across shifts and squads. The USB also embodies the Special Operations Division (includes the Bike Unit, Park Unit, Canine Unit, and the H.E.A.T. Unit), the Patrol Support Section (includes the Special Operations Unit and the Mounted Unit), and the Traffic Enforcement Division (includes the Traffic Unit and the Accident Investigation Unit).

Table 1: Police Demographics and Final Sample of Police Personnel

Bureau/Rank	Total % (n)	Sample % (n)
Chief of Police	2.1% (1)	0.0% (0)
Assistant Chief of Police	2.1% (1)	3.2% (1)
Investigative Services		
Deputy Chief	2.1% (1)	3.2% (1)
Captain	0.0% (0)	0.0% (0)
Lieutenant	8.3% (4)	12.9% (4)
Sergeant	12.5% (6)	9.7% (3)
Uniformed Services		
Deputy Chief	2.1% (1)	3.2% (1)
Captain	6.3% (3)	9.7% (3)
Lieutenant	18.8% (9)	16.2% (5)
Sergeant	45.8% (22)	41.9% (13)
Total	100.0% (48)	100.0% (31)

Interviews were conducted with 32 ranking officers from both the ISB and USB; this sample represents 64.6 percent of the total population of 48 ranking officers (see Table 1). Data were collected via a 23-item survey instrument developed to tap eleven different component areas (see Appendix A), including:

- Assignment Information (e.g., rank, assignment, area of responsibility)
- Form in which crime maps and data comes to officers.
- Officers' ability to understand and interpret crime maps and bulletins.
- Use of crime maps and data to identify beat/district crime problems.

- Use of crime maps and data to develop problem-solving or enforcement strategies.
- Perceived value in using crime maps and data to monitor crime trends.
- Attitude toward being held accountable for crime.
- Coworker attitudes toward Crime Trends.
- Process of communication among the ranks regarding crime problems.
- Rewards and ramifications for addressing crime problems.
- How Crime Trends should be practiced in the department.

Each item consisted of an open-ended question related to a particular aspect of one of the ten component areas.

Fourteen of the interviews were conducted in a face-to-face setting with officers. The other eighteen interviews were administered, at the request of officers and as a result of scheduling difficulties, in the form a survey via e-mail. Generally, each interview conducted in a face-to-face setting took 20 to 30 minutes. Interview responses were entered into Microsoft Word and were subsequently analyzed for content and separately for each bureau and rank, to see whether differences or similarities emerged in responses to the questions.[9]

Observations

To document the Crime Trends process, observations were made at the monthly crime trends management meetings. Eight meetings were attended over the course of two years. Observations were made of the interactions between and among police executives and mid-level managers from each of the bureaus and units. Observations were used to document the manner in which crime maps and data are used and presented by district captains, detectives, and executives to discuss crime problems. Also documented was how district captains and detectives report on the activities of supervisors and line officers under their chain of command, the various methods

of problems-solving or policing that are used to address crime problems, and how, if so, police responses were monitored, evaluated, and updated over time. Finally, observations were used to document how police executives hold mid-level managers publicly accountable for crime.

Collection of Documentation

Crime maps and bulletins distributed by the CAU were collected from time-to-time during the course of the study in an effort to document the manner in which crime data is analyzed, mapped, and presented to police personnel.

FINDINGS

Analyzing and Mapping the Crime Data

The Geographic Information Systems (GIS) software used by the Crime Analysis Unit (CAU) is MapInfo.[10] The CAU uses MapInfo to prepare a variety of maps, reports and bulletins that can help the police department more effectively and efficiently carry out its mission to prevent and suppress crime. For the purpose of Crime Trends, on a monthly basis, the CAU analyzes the previous months' police reports and prepares 17 beat crime maps and bulletins that are then distributed to all police personnel in the organization.[11] Each crime map features the geographic location of commercial and residential burglaries, burglaries from vehicles, attempted auto thefts and auto thefts occurred. In addition to the crime maps, the CAU distributes four different excel spreadsheets that provides more detailed information contained in the police reports, including: beat, offense, specific/estimated date and time of occurrence, address and location, vehicle make/year and type, vehicle plate, point of entry, method of entry, and property taken. The assumption is that officers will sort through the information in the spreadsheets and identify patterns or commonalties in crimes within their beat area of responsibility, as well as across beats.

The CAU also distributes a burglary bulletin that graphs the total number of burglaries, attempted auto thefts, and auto thefts that occurred in each beat for the previous month and each month of the past year. This bulletin also includes a table that reports the number of commercial and residential burglaries, within each beat, that are forced entry and no force/unknown entry.

Finally, for each of the 17 beats, the CAU distributes a calls for service bulletin that identifies the top five addresses for calls-for-service and the number of calls for service at each of the addresses. If officers want more information, such as type of call for service occurring at the address, they have to go back to the CAU and request more information.

Use of Crime Maps, Spreadsheets and Bulletins among Police Personnel

Interview data was analyzed to determine how police personnel use the crime maps and bulletins to practice Crime Trends. What emerged is variation among the ranks, as well as between patrol and investigations, in regards to how officers use crime maps and bulletins and their attitudes toward practicing Crime Trends. The data is presented in a manner that allows the variations across ranks and bureaus to emerge.

Police Executives. Police executives, including the assistant chief of police and deputy chiefs in charge of ISB and USB, typically use the crime maps, spreadsheets, and bulletins on a monthly basis to facilitate the monthly crime trends management meetings. At the monthly meetings, district captains are responsible for using the crime maps and spreadsheets to report on the crime trends that have occurred in their district. They are also expected to report on the law enforcement and problem-solving strategies that beat teams are planning on or have deployed to respond to the hot spots or crime problems, and what impact, if any, such efforts have had on reducing or eliminating the problem.

Despite police executives' recognition that the crime maps and bulletins are not always useful or easy to interpret, they continue to use them to practice Crime Trends. This, in part, is due to their lack of understanding of GISs, computer-based crime mapping software capabilities, and appropriate methods of data analysis. On occasion, police executives have requested that the CAU make changes to the crime maps, spreadsheets, and bulletins in an effort to make them easier to interpret. These requests have typically come after police executives attended a police conference, such as the International Association of Chiefs of Police, where they were exposed to other police agency's methods of mapping crime. The requests made have typically been integrated by the CAU and are part of the current method of mapping crime evaluated in this study.

Investigators. Police detectives maintain they do not typically rely on the crime maps, spreadsheets and bulletins distributed by the CAU to track hot spots or trends in criminal activity; instead, they rely on police reports and their own information on crimes, on-going investigations, and modus operandi's to identify crime patterns within the city and solve crimes. One detective explained, "I see the crime data as a nice tool, but not as reliable as some detectives." Some detectives contend that if the CAU could analyze modus operandi's, the data would be more useful to them and they could more easily draw connections between crimes that are occurring throughout the city.

Detectives were more likely to identify the shortcomings of the crime maps, spreadsheets and bulletins, than they were to report using them. For instance, they maintain the crime maps, spreadsheets and bulletins are based on "cold data," data that is at least one month old at the time of distribution; and as one detective explained, "We don't place too much stock in cold data." Furthermore, the monthly crime trends management meetings occur one month after the data is

distributed, which makes the data almost 60 days old by the time it is discussed. One detective revealed, " . . . [as a result,] the monthly crime trends meetings are a waste of time because they are not timely."

Another shortcoming is that the spreadsheets for burglaries, auto thefts, and attempted auto thefts contain a lot of raw data that is difficult to sort through. Also, the charts and graphs included in the bulletins are not useful because they cannot be used to analyze crime problems or hot spots. Last, detectives contend that crimes against persons are neither mapped nor analyzed. Detectives maintain it would be useful if the CAU would produce a crime map and bulletin on crimes against persons; in particular, one that includes an analysis of the modus operandi's, so that detectives can begin to link these crimes.

In general, because detectives did not find the crime maps, spreadsheets and bulletins useful in helping them link crimes, solve crimes, or predict where future crimes would occur, they did not use them. They did assert, however, that if the CAU would provide more timely crime data and identify and analyze the hot spots and patterns of modus operandi, the data would be more useful to them.

Patrol. Unlike detectives, mid-level managers (i.e., district captains and lieutenants) and sergeants assigned to Patrol Services are held accountable by police executives for reviewing the crime maps, spreadsheets and bulletins on a monthly basis, identifying hot spots of criminal activity, and developing appropriate police responses. Both mid-level managers and sergeants maintain they dislike the Crime Trends process because they struggle to interpret the crime maps, spreadsheets, and bulletins. Since mid-level managers do not want to be held responsible for analyzing the crime maps and spreadsheets on a monthly basis, they push the responsibility down and on to patrol sergeants. Thus, it has become the patrol sergeants' responsibility to

identify "hot spots" for property crimes and develop appropriate police responses. In fact, Crime Trends has become just another means by which mid-level managers can hold sergeants responsible for crime in their beat areas of responsibility and evaluate their job performance.

Concomitantly, according to mid-level managers, it is the patrol sergeants' responsibility to look at the crime maps, spreadsheets and bulletins every month and then hold a monthly beat meeting with the beat officers to discuss the crime problems, decide which crime problems they are going to focus on, and develop problem-solving or enforcement strategies to address the crime problems. Sergeants are than expected to prepare a monthly report that documents what crime problems beat officers are working on and what impact they are having. Sergeants pass their monthly report onto the patrol lieutenant, and then the lieutenant passes the reports on to the district captain.[12] The district captains present the sergeants monthly reports to police executives at the monthly crime trends management meetings.

> The statistics are just regurgitated up the ranks. I don't actually use the data because it is not useful to me. It is just another detail that I am responsible for. (Mid-level manager, USB)

In fact, several patrol managers and supervisors insisted that Crime Trends, as it's currently practiced, is little more than "a bureaucratic exercise of futility."

Since, many of the Crime Trends responsibilities are placed on patrol sergeants, it was not surprising that patrol sergeants were more likely to report using the crime maps and spreadsheets, than were mid-level managers. Still, however, only half of the sergeants maintain they actually use the crime maps and spreadsheets to identify crime problems and hot spots of criminal activity in their beat areas, and to create the monthly reports that they pass on to the lieutenants.

> I look through the data on a monthly basis to see the top crimes and than I use this information to prioritize the activities of my unit. I try to see what we can do to address

> the problem . . . maybe increased patrol, place unmarked cars in the area, or whatever. (Sergeant, USB)

The other half of the patrol sergeants revealed that they rarely rely on the crime maps and spreadsheets to identify crime problems because crime appears to be either random in frequency and location or the number of crimes within their beat area are so small that it is hard to identify a hot spot. Several sergeants assert that it is easier to rely on officers' observations and citizen complaints to identify beat crime problems, than it is to rely on crime maps and data, because officers and citizens know what crime problems are occurring before the crime data even comes out.

Patrol sergeants also maintain that it is frustrating to look at the crime maps and find that hot spots of criminal activity do not appear to change from month-to-month, despite their enforcement or problem solving activities.

> For years, the department has worked to reduce the number of auto thefts and car burglaries at the Scottsdale Fashion Square Mall; however, almost every month the auto theft problem at the mall shows up on the crime maps and bulletins. Due to the sheer size of the mall and the numbers of cars and people that frequent it on a daily basis, trying to reduce the number of auto thefts and car burglaries is near impossible. We accept that the problem will continue because officers are not able to come up with any new or innovative ways to combat the auto thefts at the mall. (Sergeant, USB)

> You can see a decrease in the pattern of residential burglaries for maybe a month after you develop your response (e.g., placing flyers on open garages); however, it typically goes right back up after a month. (Sergeant, USB)

Many mid-level managers and patrol sergeants have come to accept such reoccurring hot spots or patterns of criminal activity to be out of their control, since they have not been able to develop effective problem-solving or law enforcement strategies that reduce or eliminate the problem.

Patrol sergeants have developed strategies to satisfy police executives and mid-level managers' expectations that they will use the crime data to identify and address crime in their beat area. One strategy has been to focus on eliminating or reducing calls-for-service at the top

five "hot spot" addresses identified in the calls for service bulletin. For instance, sergeants have found that if they focus on the calls-for-service bulletin, they can successfully reduce the number of false alarm calls at specific locations in their beat area. Police executives take false alarm calls seriously because it is estimated that 90 percent of the alarm calls the department responds to are false alarms, and this translates into a significant drain on manpower and other resources. This has become an easy way to practice Crime Trends and keep the mid-level managers "off their backs." As one sergeant explained,

> I assign patrol officers to monitor certain addresses as dictated by the calls for service bulletin. They make a monthly report to me, which I review and pass along up the chain of command. (USB)

Despite sergeants' success with using the calls-for-service bulletin, they expressed frustration with the bulletin because it does not contain all of the necessary information needed to immediately address the problem. They still have to contact the CAU and ask for more information about the type of calls-for-service at a specific address; if it is an apartment or commercial complex, determining which unit in the complex the calls are coming from is difficult or near impossible. Sergeants complained, "[The] CAU should know what we need."

Similar to detectives, patrol sergeants identified numerous shortcomings with the crime maps, spreadsheets, and bulletins that impact their ability to use them in the manner police executives had envisioned. One of the main problems with the data is that there is often a six-week time delay between when the crime occurs, the crime maps and spreadsheets are distributed, and sergeants read the maps and spreadsheets and hold a beat meeting to discuss the crime problems. Sergeants contend the crime maps and spreadsheets would be more useful if patrol officers received it on a more frequent basis.

> The cyclical nature of crime in an urban environment is such that the trend we might observe changes before we can really work it. More prompt data will allow enforcement strategies to succeed on a more frequent basis. (Sergeant, USB)

> The trends occurred and could be or are typically gone by the time I see them. It would be more useful or helpful to get the data on a daily basis or every 48 hours so that we can see what areas are being hit. (Sergeant, USB)

Sergeants also complained that the CAU does not map and report data on crimes against persons or identify the location of drug houses, which means that patrol is getting only one dimension of the overall crime problem. As one police executive explained,

> We know that crimes tend to occur around drug houses, and the detectives know where those drug houses are. Patrol only knows that there are crime trends and calls for service in these areas. The issue is that the narcotics unit keeps the location of known drug houses a secret; because they don't want to tell which houses they are working on. I never thought that was a problem before, but crimes such as burglaries and auto thefts are related to the drug houses.

Under such circumstances, it is not surprising that some sergeants contend it is often easier to rely on officers' knowledge of the beat areas and citizen complaints about problems within the beat areas, than it is to rely on the CAU data to identify hot spots of criminal activity.

Finally, both mid-level managers and sergeants complained that the spreadsheets and bulletins contain too much raw data and not enough identification and descriptive analysis of the hot spots. Crime analysts assert, however, it is the responsibility of patrol personnel to identify the crime trends within their beat area and inform the CAU of what analysis they want done on the data to help them understand the nature of the crime problem they have identified. While patrol sergeants accept responsibility for their beat areas and the crimes that occur within the beat, they argue it is not their responsibility to identify the hot spots, decipher the data, and tell the crime analysts what analysis needs to be conducted on the data. In concurrence, one mid-level manager stated, "we don't need to look for each problem in each beat ourselves...CAU is not doing the analysis and turning it into useful information for patrol."

Perceived Value in Using Crime Maps and Bulletins

Despite the numerous shortcoming of the crime maps, spreadsheets and bulletins, at least half (n = 15) of the police personnel interviewed contend there is value in using crime maps to monitor hot spots of criminal activity. Officers' recognize the value of mapping criminal activity, largely because they have seen it reveal trends in property crimes that would have otherwise gone unnoticed. For instance, both detectives and patrol personnel maintain the crime maps and spreadsheets provide an overview of the property crimes that are occurring in each of the beats. As one detective explained,

> Detectives do not always communicate with each other and certain crime types may go to different detectives; therefore, a single detective may not have a complete picture of the overall crime problem . . . In fact, there have been crime problems identified and successfully addressed by using crime statistics. For example, commercial burglaries involving the theft of computers have been perpetrated by a relatively small group of thieves in Scottsdale. So when the statistics go up, we know they are active again and usually have a good starting point in the investigation. (ISB)

Patrol sergeants also recognized value in the calls-for-service bulletins; they can easily use them to instruct beat officers to find out why there are so many calls-for-service at one address and to monitor, reduce, or eliminate the calls for service at that location. Over time, beat sergeants and district captains realized it is easier to show a reduction or elimination in calls-for-service at a specific address, than to identify hot spots or crime trends and develop effective problem-solving strategies. As a result, patrol sergeants tended to shift their focus to the calls-for-service bulletins versus the crime maps and spreadsheets.

The value in using crime maps and spreadsheets is limited by officers' lack of understanding of how to read, interpret, and use the information. Even among those officers that have figured out how to read and interpret the crime maps and spreadsheets, they maintain it is time consuming to identify the hot spots and figure out the commonalties between crimes within

and across beats or at the district level. As one patrol sergeant explained, "Since the data is limited to specific beat areas, a pattern that crosses arbitrary beat boundaries may not be detected; therefore, there would be more value in receiving data on a district or citywide basis."

Observations from the Monthly Crime Trends Management Meetings

The monthly crime trends management meetings would occur one month after the distribution of the crime maps and bulletins, and at least two weeks after beat sergeants held their beat meetings. The meetings provided police executives and mid-level managers from different bureaus, units, and districts with a forum to communicate and discuss offense-, location-, and offender-specific crime problems, and the problem-solving and law enforcement strategies used to address them. The information exchanged in these meetings tended to focus exclusively on property crimes (i.e., auto thefts, thefts from vehicles, and residential and commercial burglaries); on occasion, however, street robberies were discussed.

Observations of the monthly crime trends management meetings revealed that district captains usually took the first one to two hours of the three hour meeting to report on the various offense- and location-specific crime problems, the hot spots for call-for-service, and the enforcement and problem-solving strategies that each of the 17 beat sergeants and beat officers are utilizing to reduce or eliminate the problems. Police executives maintain that district captains are supposed to report on only the top four crime problems in their district area, but recognize that because the crime maps and spreadsheets are presented at the beat level only the tendency is to look at and report on crime problems at the beat level.

Detectives rarely led the discussion on crime problems and were required to regularly report the status of their criminal investigations; instead, they took a more passive role of sharing intelligence-related information related to crime problems district captains reported on.

Normally, detectives would spend ten to fifteen minutes providing intelligence-related information (e.g., possible suspects, modus operandi, or vehicle descriptions) related mainly to property crimes, and occasionally robberies. Covert investigative activities, such as investigation of known drug houses, were never discussed or revealed in the crime trends management meetings.

On occasion, community policing specialists would offer information on community policing efforts occurring in the area(s) experiencing crime problems. It was apparent that district captains, detectives, and police executives were often unaware of the community policing activities occurring across the city. From time-to-time, the sergeant in charge of the High Enforcement Action Team (H.E.A.T.), a proactive problem-solving enforcement team, would also provide a brief report on the activities of H.E.A.T. officers. Despite the proactive problem-solving function of the H.E.A.T. Unit, it was not evident from the observations at the monthly crime trends management meetings that H.E.A.T. officers were proactively involved in reading and interpreting crime maps and spreadsheet data and developing enforcement and problem-solving strategies to address the problems. More often than not, it seemed the H.E.A.T. Unit was functioning in a reactive mode, waiting for patrol sergeants to identify the hot spots and crime trends and contact the H.E.A.T. Unit when they need help or manpower.

Near the end of the study period, blockwatch advisory council members were invited to attend the monthly crime trends management meetings. Typically, only one or two of the ten council members would attend the meetings, yet they would remain silent. The council members maintain they attended the meetings in an effort to make police personnel aware of the blockwatch program and their activities, as well as to close the gap between police and citizens.

Finally, although crime analysts from the CAU attended the monthly crime trends management meetings, they did not take an active role in presenting, interpreting, or discussing the crime maps or data. More importantly, crime analysts did not identify clusters or hot spots of criminal activity and did analyze hot spots or try to analyze links between crimes to support police personnel in the Crime Trends process.

As stated above, the crime data discussed at the monthly crime trends management meetings were typically two months old, yet police executives would react and respond to the data as though it were timely. For instance, police executives would direct district captains to focus attention on particular location- and offense-specific crime problems that appeared in the crime maps and spreadsheets, and would provide possible problem-solving strategies that should be used to address the crime problems. They also let district captains know that they wanted to see a decrease in the number of crimes (e.g., auto theft, residential burglaries, etc.) from month-to-month. District captains found this demand unrealistic, in light of the fact that the data they are reacting to is two months old and it would be impossible to link a problem-solving or enforcement strategy to a decrease in crime from month-to-month. Despite this limitations, the value of the monthly crime trends meeting is the interaction among police executives and mid-level managers from different bureaus, units and districts, regarding order maintenance and crime problems, as well as crime control and prevention efforts.

Officers' Perceptions of Being Held Accountable for Crime

Police executives originally envisioned that Crime Trends would allow them to hold district captains accountable for crime in their district areas of responsibility, and the monthly crime trends management meetings was to be the forum where they would hold district captains publicly accountable for discussing crime problems and enforcement and problem-solving

strategies. Police executives also envisioned Crime Trends would require patrol lieutenants and sergeants to use the crime maps and data to identify hot spots of criminal activity and crime trends in their beat area(s) of responsibility, and work with beat officers to develop and implement enforcement and problem-solving strategies designed to control and prevent crime.

Mid-level managers in the Patrol Bureau, however, virtually agreed that they are not held accountable for crime problems or problem-solving activities in their district and/or beat areas of responsibility. They insisted their jobs are not even threatened or in jeopardy if they do not practice Crime Trends or fail to address crime problems.

> At this level, I am not held accountable for crime in the district and my job is not in jeopardy. I hold my managers responsible. I ask my [mid-level managers], 'what are you doing about it?' . . . The lieutenant passes it down to the sergeant . . . Crime trends are suppose to foster groups working together, they are not supposed to be telling the sergeant to solve it. (USB)

> I should not be held responsible for the rise or fall in the crime rate . . . There are many factors that affect the crime rate, many of which I have absolutely no control over. It would not be appropriate in this organization, or legally defensible, to have managers live in fear of a rise or fall in the crime rate. That may work in a different culture, like New York City, but would be very ineffective here. (Mid-level manager, USB)

Mid-level managers contend it is their responsibility to make sure that patrol sergeants are managing and addressing crime problems in the beats. For instance, one mid-level manager explained, "I will not be reassigned or disciplined as a result of increasing crime in my district. My responsibility is to ensure my sergeants have plans in place to address crime trends. If crime trends continue regardless of our efforts I will not suffer the consequences."

Patrol sergeants were well aware that Crime Trends responsibilities were placed on them, however, they insisted they are not held accountable for crime in their beat areas or are they disciplined if they fail to reduce crime. In fact, 40 percent (n=5) of the sergeants contend it is

unreasonable to hold sergeants responsible for crime because there are many crimes that cannot be eliminated.

> I'll accept responsibility if I make no effort to address a clear-cut crime trend, however, if we make a legitimate effort, we should not be held responsible. The victim is often more responsible than anyone . . . Leaving your garage door open so a suspect can steal your golf clubs is whose fault? Leaving your laptop computer on the passenger seat of your car in plain view with your windows down is whose fault? (Sergeant, USB)

Patrol sergeants did acknowledged that they are held accountable for holding beat meetings, getting information on problems out to the patrol officers, and addressing crime problems that arise in their beat area of responsibility. As one sergeant said, "The beat officers and I are jointly responsible for trying to come up with viable methods to reduce crime, but we are not blamed for direct numbers as related to crime increases." When asked, "What happens if you fail to address a crime problem?" Patrol sergeants explained they simply have to provide the lieutenant with an explanation as to why they failed to address a crime problem, and the lieutenant will pass that on to the district captain.

Since the inception of Crime Trends, police executives have held mid-level managers and supervisors within the Patrol Bureau accountable for practicing Crime Trends; little attention has been given to defining the role of police detectives in the Crime Trends process. Thus, it was not surprising when detectives were asked, "Too what degree are you held accountable for crime?" that mid-level managers in ISB reported they are not held accountable for crime. They did acknowledge, however, that when it comes to Crime Trends, they are responsible for attending the crime trends management meetings and being prepared to answer any questions related to criminal investigations that are under their command.

Sergeants in ISB declared they are held accountable for ensuring that criminal cases and crime problems are investigated in a professional and proficient manner for the purpose of

prosecuting offenders. When it comes to Crime Trends, sergeants in ISB maintain they are simply responsible for communicating any patterns or trends they identify or are investigating to their lieutenant, than the lieutenant will pass that information on to the Deputy Chief of ISB for the monthly crime trends management meetings. Sergeants recognize that if they fail to do their job they may receive a poor performance rating and may be required to go through retraining or be removed from the ISB.

Rewards and Ramifications for Addressing/Not Addressing Crime Trends

In general, police personnel maintain there are few, if any, formal rewards for practicing Crime Trends, because addressing crime problems is part of the job. Officers maintain they are more likely to receive intangible rewards for practicing Crime Trends. Intangible rewards include: personal satisfaction and pats on the back for a job well done, citizens may call in or write in with positive comments when they receive individualized attention, and officers who do a good job at Crime Trends and problem-oriented policing are often promoted at an accelerated rate. The only formal award given to police personnel for addressing crime trends in a creative or innovative manner is the Superior Performance Award (SPA). SPAs are typically handed out when a patrol sergeant writes up his or her squad of officers for reducing a crime trend with any innovative problem-solving approach. Officers can receive between $150 and $250 or up to three percent of their annual salary during one year in awards. Patrol managers contend the monetary rewards or time off incentives for practicing Crime Trends should be used more often.

Although few differences emerged between detectives and patrol personnel in regards to rewards for Crime Trends, differences did emerge in an analysis of the ramifications. Interviews revealed that when Crime Trends was first implemented in 1996, district captains were reprimanded by police executives if they went to the crime trends management meetings

unprepared or if the crime problems and hot spots they identified or reported on were wrong. By the time this study was conducted, police executives had quit this practice. As one police executive explained, "One miss I don't kill them, two or more misses and there are ramifications in performance evaluations. They are not allowed to not play, that is the expectation of the job."

Patrol lieutenants revealed they are not held accountable for practicing Crime Trends, as are district captains and sergeants; therefore, they face few ramifications for refusing or failing to practice Crime Trends. Lieutenants disclosed the worst that may happen is that they receive a verbal or written reprimand from the district captain for failing to practice Crime Trends.

Patrol sergeants also contend they are not held accountable for crime, yet they are held accountable for coordinating crime control and problem-solving strategies to address crime problems.

> As a beat coordinator I'm responsible for making a plan and contacting other police bureaus if necessary. If I don't do my job I won't be a sergeant much longer. The results, however, are not as important as the effort. (Sergeant, USB)

> I am accountable to my chain of command for addressing these crime problems, and I hold the officers assigned to my beat team accountable for responding to crime problems and reporting on their actions. (Sergeant, USB)

Patrol sergeants were more likely than mid-level managers to report that failure to practice Crime Trends could result in poor performance ratings, supervisory counseling, or more education on how to deal with crime problems. In contrast, one-third (n = 4) of the patrol sergeants reported they do not face any ramifications for failing to practice Crime Trends. When asked, "What kind of ramification do you fact if you fail to practice Crime Trends in your beat?", one sergeant explained,

> I guess the captain would tell the lieutenant to tell you again. And if you still didn't do it, they would tell you again. Some of your peers would make a joke about it and everyone would have a good laugh, then they would tell you again to do it. (USB)

Similar to patrol personnel, detectives revealed they face few ramifications for failing to practice Crime Trends. The only ramifications mid-level managers in ISB reported they face is embarrassment in the monthly crime trends management meetings and possibly a poor performance evaluation.

CONCLUSIONS AND POLICY IMPLICATIONS

The present study examined the Scottsdale Police Departments' attempt to implement "Crime Trends," their own version of the New York City Police Department's Compstat process. Since the inception of Crime Trends in 1996, Scottsdale's police executives have struggled to get police personnel to practice it in the manner they had envisioned. Officers, in particular patrol personnel and detectives, have resisted engaging in the Crime Trends process; in particular, using the crime maps, spreadsheets and bulletins to identify offense-, location-, and offender-specific crimes and develop enforcement and problem-solving strategies to control and prevent crime. Both detectives and patrol personnel avoid using the crime maps and spreadsheets largely because of the numerous shortcomings with them, but also because they were not trained on how to interpret or use the crime maps and data prior to their dissemination. Then, by the time officers were trained (i.e., at least a year and a half after the implementation of Crime Trends), they had already had negative opinions of the crime maps and the Crime Trends process.

To further avoid practicing Crime Trends, mid-level managers in the patrol bureau have pushed the responsibilities of using crime maps and crime data to identify crime problems and developing enforcement and problem-solving strategies to control and prevent crime down and onto patrol sergeants. Patrol sergeants are aware that Crime Trends responsibilities are placed on them and they acknowledge that they are held accountable for holding beat meetings, getting information on crime problems out to the patrol officers, and addressing crime problems that

arise in their beat area of responsibility. At the same time, half of the patrol sergeants interviewed revealed they rarely use the crime maps and spreadsheets to carrying out their responsibilities. One reason officers have been able to informally shape how Crime Trends is practiced in the department is because Crime Trends was implemented with no formal guidelines, policies or procedures that outline issues of responsibility, practice or process (e.g., the dissemination and use of crime maps and data, the flow of information regarding crime problems and problem-solving activities, and accountability). Still today, four years after the implementation of Crime Trends, there are no formal guidelines, policies or procedures and Crime Trends is practiced inconsistently from district-to-district, bureau-to-bureau, and across units/squads.

Another important point is that because police executives have assigned Crime Trends responsibilities mainly to the patrol bureau, little attention has been given to defining the role of specialized units in the Crime Trends process. Thus, specialized units such as detective units, the community relations unit, and the H.E.A.T. unit have managed to avoid being held accountable for practicing Crime Trends.

Despite officers' resistance to Crime Trends, they do recognize that has value. In particular, it has generated increased interaction among police executives, mid-level managers, and supervisors from different bureaus, units, and districts regarding issues of crime and crime control and prevention. For instance, the monthly crime trends management meetings have provided police executives and mid-level managers with the forum to interact, exchange information, and develop plans to coordinate activities across bureaus and units.

A final reason that police officers resist Crime Trends is because police executives implemented it with little to no input from mid-level managers and supervisors. In fact,

numerous mid-level managers and supervisors criticized police executives for "trying to implement a New York City program in the Scottsdale Police Department." Likewise, one police executive acknowledged, "The problem is we didn't sell it right to the line officers . . . I thought it would be good for the organization and we talked it up as a New York City program."

Implications of the Study

This research has specific implications for redesigning the Crime Trends and developing new practices, training, and policy regarding crime analysis and mapping, the dissemination and use of crime maps and data, the flow of information regarding crime problems and policing strategies, and issues responsibility and accountability.

Crime Analysis, Mapping, Distribution. One of the most important components of the Crime Trends process is crime analysis, mapping, and distribution. The computerized crime maps, spreadsheets, and bulletins distributed by the CAU do provide police personnel with a means to examine the locations of crimes; however, the mapping of crime data at the beat level made it very difficult to identify clusters of criminal activity and the presentation of crime data in spreadsheets made the information hard to digest, understand, and use. In addition, the crime bulletins contain tables and graphs that are of little use to street-level officers and cannot be used to enhance either tactical or strategic police interventions. Finally, the distribution of crime maps and spreadsheets on a monthly basis was not timely enough for street-level officers to use a tactical or strategic tool. These findings have important implications for future efforts to analyze and map crime and the distribution of crime maps and bulletins.

The most important outcome of this evaluation research is that police executives and crime analysts have used the findings to redesign how crime data is analyzed and mapped, what information that is contained in the bulletins, and the timeline for distribution. These changes are

being made with the primary "end-users," patrol supervisors and beat officers, in mind. For instance, crime analysts have started using CrimeStat (a software program that builds crime clusters by analyzing geographic locations linked by distance) to analyze and map crime data at the district level versus the beat level. They have also begun to identify and analyze crime clusters or hot spots of criminal activity for patrol personnel. In addition, crime analysts have added car jacking, criminal trespass, incident exposure, public sexual indecency, sexual abuse, sexual assault, and robberies to the list of crimes being mapped; in the future, drug houses may also be mapped. The end product is three crime maps, one for each district (including District III that is scheduled to open by January 2001) with cluster of criminal activity clearly marked as "hot spots."[13] Also distributed are "hot spot analysis" bulletins, one for each hot spot, that includes information such as time of day and day of week that incidents are occurring, type of crimes, location type (e.g., condo/house, apartment complex, bar, commercial building, restaurant), and more specific information from each of the DRs in the hot spot (e.g., DR#, address, crime, method of entry, point of entry, property taken, make of vehicle). The advantage of the new crime maps and "hot spot analysis" bulletins are that they clearly reveal "hot spots," including those that cross beat boundaries, and they are easy to interpret and use to determine where and when to deploy patrol resources and engage in problem-solving.

Another important decision has been to distribute the crime maps and bulletins on a weekly basis, in an effort to keep data timely and make it a tactical tool that can be easily used by street-level officers. Beginning in June 2000, the CAU began to disseminate weekly crime maps and "hot spot analysis" bulletins. An examination of one months worth of crime maps and bulletins revealed that on the date of distribution the data is already one to two weeks old.[14] This means that police personnel are still receiving and reacting to "cold data." This finding suggests

that the CAU struggles to maintain timely transfer of data because they are not electronically transmitting mappable data from the CAD system to the mapping system, but instead are hand entering data from police reports into the mapping system. This is a significant drawback for the operational dimension of the Crime Trends process. To overcome this shortcoming, crime analysts need to develop a method of electronically transmitting mappable data from police reports or the CAD system to the mapping system and/or they need more resources to hire several part-time crime analysis assistants and student interns to help with data input.

In addition to the weekly dissemination of crime data, at the end of each month the CAU now distributes three crime maps, one for each district, that reflect four weeks worth of crime data. Clusters of crime activity marked as "problem-solving spots," geographic locations that have shown to be "hot spots" repeatedly over the past month, are identified and analyzed by the CAU. Essentially, patrol personnel are expected to use the monthly crime maps and "problem-solving analysis" bulletins to identify locations that require more long-term proactive tactical responses, problem-solving efforts (e.g., concentrated patrol, surveillance, added resources from the H.E.A.T. Unit), and/or community policing activities.

Crime analysts have also developed their capacity to analyze crime data for the purpose of identifying crime-suspect correlations. Using the Automated Tactical Analysis of Crime (ATAC) software package, crime analysts are regularly analyzing crime data for the purpose of identifying person-specific series of crime incidents or crime-suspect correlations. When a series of crime incidents is linked to an individual or group of individuals, the CAU distributes a "crime suspect" bulletin that provides information such as modus operandi, suspect description, and vehicle description.

Despite the advances the CAU has made to develop their capacity to analyze and map crime, they still tend to rely on the most basic crime analysis application, referred to as forward mapping (i.e., mapping the location of crimes and shading areas that reflect the presence of a hot spot; see Canter, 1997). Forward crime mapping has been useful for identifying hot spots of criminal activity and determining where and when to deploy patrol resources and engage in problem-solving activities to address a particular crime problem. If data were mapped on a more timely basis, forward mapping could be used to determine the effects that a particular intervention had on the number and location of crimes observed over time (see Canter, 1997). Nonetheless, the CAU needs to move beyond simply identifying hot spots and where police resources should be focused to providing police with a better understanding of the relationship between crime and geography. For instance, the CAU needs to develop their ability to measure spatial proximity and examine the relationship between crime and geographic features such as bars, liquor stores, schools, parks, transit stations, arterial roads, and drug houses (see Canter, 1997; Rich, 1999). Spatial proximity statistics can also be used in conjunction with temporal dimensions to quantify the extent to which spatial distributions between crime and geographic features change over time as a result of interventions, season, and time of day (Rich, 1999). Finally, crime analysts need to develop their capacity to identify crime patterns and determine whether these patterns are randomly distributed or if there are common attributes that exist among a group of crimes that would enable them to show they are connected (see Canter, 1997; Eck, 1997). In other words, the CAU needs to continue to develop their analytical and mapping capacities to aid the police department to be more efficient in carrying out its mission of controlling and preventing crime.

Finally, crime analysts need to play a more active role in the monthly crime trends management meetings and the newly created monthly uniformed services management meetings. For instance, crime analysts should project a visual image of the weekly and monthly crime maps and bulletins at the meetings and be prepared to answer questions and offer additional information regarding each of the hot spots, the problem-solving spots, and crime-suspect correlations.

Decentralizing the Crime Analysis Unit. The Scottsdale Police Department is currently divided into two command areas: District I South and District II North. By the year 2001, District III North will open and there will be three command areas. Currently, the CAU and crime analysts are centralized in the Administrative Services Bureau (ASB) in District II. One of the two crime analysts assigned to CAU is responsible for conducting strategic and tactical analysis of crime data and generating crime maps and bulletins, as well as attending beat meetings from time-to-time to interact with patrol officers and sergeants.

The second issue raised by this research is that police executives should consider assigning a crime analyst to each of the three command areas. This would require hiring additional full- and/or part-time analysis assistants. Prior research has revealed that the physical location of crime analysts within each of the patrol districts has important implications for the demand, flow, and use of crime analysis information (Greene et al., 1999). For instance, locating crime analysts next to the patrol assembly area would generate considerable interaction between crime analysts and patrol officers and their sergeants, as well as requests for information from patrol managers.

Crime Trends: Practice and Process. The third implication for policy stems from the finding that Crime Trends was implemented with no formal guidelines, policies or procedures

regarding issues of practice, process, responsibility and accountability. As a result, overtime, practices and process were informally defined and shaped mainly by patrol managers and supervisors, as well as detectives who resisted the use of crime maps and bulletins and being held responsible for crime problems and practicing problem-oriented policing. For instance, district captains and patrol lieutenants pushed Crime Trends responsibilities down and onto patrol sergeants in an effort to avoid having to read and interpret the crime maps and spreadsheets and get involved in the problem-solving process. As a result, patrol sergeants are responsible and held accountable for holding monthly beat meetings, getting information on crime problems out to patrol officers, and addressing crime problems that arise in their beat areas of responsibility. At least half of the patrol sergeants, however, managed to perform these functions without using the crime maps and bulletins. On the other hand, detectives, community relations officers, and the HEAT Unit have managed to remain largely detached from the practices related to Crime Trends. These findings were interpreted to mean that police executives need to develop formal policies and procedures that clearly outline issues of practice, process, responsibility and accountability.

Recent changes to the manner in which crime data is analyzed, mapped and distributed provides police executives with the opportunity to redesign the Crime Trends process and clearly define issues of responsibility, practice, accountability, and process. It is important that police executives include mid-level managers and supervisors from different bureaus, units, and districts in the planning process, in an effort to encourage their investment in Crime Trends (see Geller and Swanger, 1995). Moreover, if efforts to redesign the Crime Trends process are to be successful, numerous core questions need to answered and addressed. These include:

- How are district captains, patrol lieutenants, patrol sergeants, and patrol officers expected to use the weekly crime maps and bulletins? How are they expected to use the monthly crime maps and bulletins?
- What is the role of district captains, patrol lieutenants, and patrol sergeants in coordinating and managing police resources and problem-solving activities to address the weekly "hot spots?" And monthly "problem-solving spots?"
- How will patrol sergeants and beat officers coordinate and communicate patrol and problem-solving efforts for weekly "hot spots" and monthly "problem-solving spots" that cross beat boundaries?"
- Will beat teams continue to exist or should they be eliminated?
- Will beat teams continue to hold monthly beat meetings? Or should beat meetings be held more often or eliminated altogether? What data (i.e., the weekly data, the monthly data, or all of it) should be discussed at the meetings?
- What is the role of the beat teams in monitoring crime maps and bulletins and proactively coordinating police resources and problem-solving activities to address crime problems?
- What is the role of the H.E.A.T. Unit in monitoring crime maps and bulletins and proactively coordinating problem-solving activities to address crime problems?
- What is the role of the Community Relations officers in monitoring crime maps and bulletins and proactively coordinating community policing activities to address crime problems?
- What is the role of detectives in the Crime Trends process?
- What is the purpose of the monthly crime trends management meetings? Should there be an agenda for the monthly crime trends management meetings?

- What data (i.e., the weekly data, the monthly data, or all of it) should be discussed at the monthly crime trends management meetings? What is the role of the crime analysts at the beat meetings? At the management meetings?
- How will police executives and managers assure that mid-level managers and supervisors are held accountable for practicing Crime Trends? Should performance evaluations for each ranking position be changed to reflect their responsibilities for practicing Crime Trends?
- How is Crime Trends expected to affect the quality and output of police work? How will these changes be measured? How will the successes and failures of interventions be measured and assessed?
- What is the role of the community and blockwatch groups in Crime Trends?
- How will the Crime Trends process continue to be assessed and reframed as technology changes and the police agency's needs and capacity to use technology increase over time?

Answers to these questions and others should be made part of the formal policies and procedures for Crime Trends.

Most important is to develop a process that will be accepted and practiced by the majority of police personnel and that will help the police department be more efficient in fulfilling its mission of suppressing and preventing crime.

Training for Technology Applications: Changing the Culture of Resistance. A fourth issue raised by this research is the need to explore alternative methods of training police personnel to change the organizational culture of resistance to Crime Trends. Police executives and training specialists need to explore both formal training and semi-formal train-the-trainer approaches for training police personnel in technology use and applications (Greene et al., 1999). For instance, one approach is to recruit interested officers to volunteer to be trained in how to

interpret crime maps and bulletins, how to ask questions and get additional information or data from the CAU regarding crime problems, how to use the crime maps and bulletins to shape tactical and problem-oriented policing efforts, and how to and monitor, measure, and document the impact of policing efforts on the crime problem.

Another approach is to integrate technology use and applications training into both the four-week post academy training curriculum and the field training process (see Greene et al., 1999; Haarr, 2000). The field training phase, in particular, represents the first real opportunity for new recruits to do real police work, and it represents an important training opportunity for reinforcing and further developing officers' skills at interpreting and using crime maps and bulletins and engaging in both tactical and problem-oriented policing efforts to address offense-, location- and offender-specific series of crime incidents. At this time, the department has no formal or systematic approach to incorporate technology use and applications training or problem-oriented training into the post academy training curriculum or the field training process. Certainly, both the post academy training and the field training phases are extremely busy skills building periods; however, it makes sense to expand or restructure both of these so that there is ample time to train recruits in traditional policing skills, as well as technology use and applications, problem-solving techniques, and the Crime Trends process (see Haarr, 2000).

The added dimension of including such training to the field training process is that Field Training Officers (FTOs) would need to receive formal train-the-trainer training in how to interpret crime maps and bulletins, how to ask questions and get additional information or data from crime analysts regarding crime problems, how to use the crime maps and bulletins to shape tactical and problem-oriented policing efforts, and how to monitor, measure, and document the impact of the policing efforts on the crime problem.

Involvement of Community Organizations. The final issue raised by this research is the need to emphasize community involvement in "work groups" with the police department. These work groups should be able to help police analyze and interpret crime maps and data, as well as develop and implement effective and long-lasting solutions to crime problems (see Taxman and McEwen, 1997). This policy implication is based upon the finding (Rich, 1995, 1999; Taxman and McEwen, 1997; Weisburd and McEwen, 1997) that people who live and work in a community have unique insight and knowledge through their own experiences in the neighborhood and should be able to help police understand clustering of points on a map. In addition, citizen groups, such as blockwatch groups, should be able to augment police crime data with data on street-specific problems. Therefore, bringing crime maps to those who are closest to the crime problems and problem-solving efforts should enhance police efforts to identify, understand and respond to crime problems (see Weisburd and McEwen, 1997).

Endnotes

[1] The CompStat system is an intelligence-based approach to target police efforts.
[2] The maps are displayed during crime strategy meetings on the large overhead computer screens of the command and control center.
[3] Crime statistics have become the NYPDs bottom line and the best indicator of how the police are doing, precinct-by-precinct and citywide.
[4] Commanders are provided the discretion and resources necessary to properly manage their commands.
[5] NYPD CompStat consultants have promoted and marketed the CompStat process through the NYPD annual conference on CompStat, the annual meetings of the International Association of Chiefs of Police, and by consulting one-on-one with police departments across the United States (Swope, 1999).
[6] In large police departments it is harder for police executives to keep tabs on middle management, than it is in mid-size and smaller departments.
[7] Police executives hired a crime analyst with the expectation that the crime analysts know what they are doing and without fully knowing the capabilities of a CAU. It became the responsibility of the analyst to guide the department, rather than for the department to guide the analyst.
[8] Beat officers vary by shift and squad/days off.
[9] Field notes were first coded by theme, rank, and bureau and then analyzed to see whether general patterns or unique differences emerged.
[10] GIS applications are limited to the use of crime and calls-for-service (CFS) data.
[11] Crime maps were developed using MapInfo.
[12] Patrol lieutenants have become little more than the middle person or the paper pusher in the Crime Trends process.
[13] In keeping with the departments philosophy of that crime patterns or series can be three or more crimes in a geographic location or committed by the same person, crime clusters or "hot spots" on the weekly maps are created when three or more crimes occur in a geographic location, linked by distance.
[14] Crime maps and bulletins distributed on June 21, 2000 were for crime data from June 7 through June 13, 2000.

REFERENCES

Bentley, P.C. (2000). Crime Mapping: The Scottsdale Police Department Experience. Scottsdale Police Department Document.

Block, C.R. and R. Block (1993). Street Gang Crime in Chicago. *Research in Brief.* Washington, DC: U.S. National Institute of Justice.

Canter, P.R. (1997). Geographic Information Systems and Crime Analysis in Baltimore County, Maryland. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 157-190). Monsey, NY: Willow Tree Press.

Eck, J.E. (1997). What do Those Dots Mean? Mapping Theories with Data. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 379-406). Monsey, NY: Willow Tree Press.

Ericson, R.V. (1982). *Reproducing Order: A Study of Police Patrol Work.* Toronto: University of Toronto Press.

Federal Bureau of Investigations (1999). *Uniform Crime Reports, 1999.* Washington, DC: U.S. Department of Justice.

Geller, W.A. and G. Swanger (1995). Managing Innovation in Policing: The Untapped Potential of the Middle Manager. *Research Preview.* Washington, DC: U.S. National Institute of Justice.

Glaser, B.G. and A.L. Strauss (1967). *The Discovery of Grounded Theory.* Chicago, IL: Aldine.

Greene, J., T. Rich and S. Ward (1999). *Information Systems Technology Enhancement Project: Cross-Site Report.* Washington, DC: Office of Community Oriented Policing Services.

Haarr, R.N. (2000). The Implications of Community Policing Training and Program Implementation on Police Personnel: Final Report. Washington, DC: U.S. Department of Justice.

Harries, K. (1999). *Mapping Crime: Principle and Practice.* Washington, DC: U.S. National Institute of Justice.

LaBeau, J.L. and K.L. Vincent (1997). Mapping It Out: Repeat-Address Burglar Alarms and Burglaries. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 289-310). Monsey, NY: Willow Tree Press.

Maltz, M.D., A.C. Gorden and W. Friedman (1989). *Mapping Crime in Its Community Setting: Event Geography Analysis.* New York: Springer-Verlag.

Mamalian, C.A. and N.G. LaVigne (1999). The Use of Computerized Crime Mapping by Law Enforcement: Survey Results. *Research Preview*. Washington, DC: U.S. National Institute of Justice.

Manning, P.K. (1977). *Police Work*. Cambridge, MA: MIT Press.

Mazarolle, L.G., C. Bellucci and F. Gajewski (1997). Crime Mapping in Police Departments: The Challenge of Building a Mapping System. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 131-155). Monsey, NY: Willow Tree Press.

Police Foundation (2000). *Integrating Policing and Computer Mapping: Assessing Issues and Needs Among COPS Office Grantees*. Washington, DC: US Department of Justice.

Rich, T. (1995). The Use of Computerized Mapping in Crime Control and Prevention Programs. *Research in Action*. Washington, DC: U.S. National Institute of Justice.

Rich, T. (1996). The Chicago Police Department's Information Collection for Automated Mapping (ICAM) Program. *Program Focus*. Washington, DC: U.S. National Institute of Justice.

Rich, T. (1999). *Mapping the Path to Problem Solving*. Washington, DC: U.S. National Institute of Justice.

Rubenstein, J. (1972). *City Police*. New York, NY: Farrar, Straus, and Giroux.

Sherman, L.W. and D. Weisburd (1995). General Deterrent Effects of Police Patrol in Crime 'Hot Spots': A Randomized, Controlled Trial. *Justice Quarterly*, 12: 625-648.

Silverman, E.B. (1999). *NYPD Battles Crime: Innovative Strategies in Policing*. Boston, MA: Northeastern University Press.

Swope, C. (1999). The Comstat Craze. *Governing Magazine*, September, 40-43.

Taxman, F.S. and T. McEwen (1997). Using Geographical Tools with Intraagency Work Groups to Develop and Implement Crime Control Strategies. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 83-111). Monsey, NY: Willow Tree Press.

Weisburd, D. (1997). *Reorienting Crime Prevention Research and Policy: From the Causes of Criminality to the Context of Crime*. Washington, DC: U.S. National Institute of Justice.

Weisburd, D. and L. Green (1995). Measuring Immediate Spatial Displacement: Methodological Issues and Problems. In J.E. Eck and D. Weisburd (Eds.), *Crime and Place* (pp. 349-361). Monsey, NY: Criminal Justice Press; and Washington, DC: Police Executive Research Forum.

Weisburd, D. and T. McEwen (1997). Introduction: Crime Mapping and Crime Prevention. In R.V. Clarke (Ed.), *Crime Prevention Studies* (pp. 1-23). Monsey, NY: Willow Tree Press.

Appendix A: Officer Interviews

Assignment Information
Rank:
Assignment:
In Charge of:

Use of crime trend data to do one's job

1. Do you use crime trend data to do your job? In what way?
2. Do you feel that you have enough information on crime trends for your area of assignment?

Form in which crime maps and data comes to officers

3. What are the current sources of crime trend data for your beat?
4. What kind of information do you get (e.g., location of crime incidents, time of day, day of week, month, etc)?
5. What form does this information take (e.g., memos/bulletins, data tables, graphs/charts, pinmaps, etc)
6. Who is responsible for providing you with this information? How often do you get this information?

Frequency by which officers request crime data from CAU

7. In the past month, how often have you requested crime trend data from CAU?
8. Is your request for data processed in a timely manner? How long does it take you to get the data from your request?

Ability to understand and interpret crime maps, spreadsheets and bulletins

9. Do you find the crime data that you receive easy to understand or interpret? Is the data useful?
10. In what form would you like to see the crime data come to you?

Use of crime maps and data to identify beat/district crime problems

11. Too what degree do you use the crime trend data to identify beat/district crime problems? Can you explain?

Use of crime maps and data to develop problem-solving or enforcement strategies

12. Too what degree do you use crime trend data to develop problem-solving or enforcement strategies in your beat or district?
13. To what degree does the crime trend data impact the policing that occurs in your beat or district?

Perceived value in using crime maps and data to monitor crime problems

14. Do you see value in using crime data to monitor crime trends in your beat or district?
15. Have you seen positive or negative effects from using crime data to monitor crime trends in your beat or district? Can you explain?

Attitude toward being held accountable for crime

16. Too what degree are you, as an officer/supervisor/executive, held accountable for the crime in your beat or district? Can you explain?
17. How do you feel about being held responsible for crime in your beat or district?
18. How do your coworkers feel about using crime trend data?
19. How do your coworkers feel about being held responsible for crime in their beat or district?

Process of communication among the ranks regarding crime problems and enforcement efforts

20. What is the process of communication among the ranks regarding crime trends and enforcement efforts?
21. Does the information flow smoothly among the ranks?
22. Do you face any obstacles in your efforts to communicate information related to crime patterns among the ranks?

Rewards and ramifications for addressing or failing to address to crime

23. What kind of rewards do you receive for addressing crime trends in your beat or district?
24. (If they do not receive any rewards)...What kind of rewards do you think should be handed out?
25. What kind of ramification do you face if you fail to address crime trends in your beat or district?

How Crime Trends should be practiced in the police department

How do you think crime trends should be practiced in the Scottsdale Police Department?