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Managing a Prosecutor's Domestic Violence Caseload[*†]

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This paper summarizes a single case study design of a prosecutor's office from 1998 to 2001 using a system dynamics modeling approach. Data sources for the model building included numerical time series from the prosecutor's office Violence Against Women (VAW) database, key informant interviews, and police reports. The specific problem modeled was how could the prosecutor's office balance two competing goals: managing caseloads and resources while trying to increase accountability. The study proceeded in three distinct stages: preliminary models of the relationship between caseload and dispositions, baseline model of the case flows, and a revised model based on key informant interviews. The main results included finding support for the hypothesis that case dispositions were being affected by caseloads and the existence of a feedback loop explaining the increase in female victims being arrested.

Keywords: domestic violence, criminal justice, public policy, prosecution, caseloads

With 25% of women reported having been raped or physically assaulted by an intimate partner during their lifetime (Tjaden and Thoennes 1998), woman abuse continues to be a major social problem in the United States. Battering[1] involves a constellation of tactics, including emotional abuse, isolating the victim from resources, preventing her from getting or keeping a job, coercion and threats of violence, rape, and murder. "Battering is far more than a single event, even for the woman who is hit once, because it teaches a profound lesson about who controls a relationship and how that control will be exercised" (Schechter 1982, p.17). Abusers use battering tactics to keep or delay a woman from leaving an abusive relationship, with violence continuing and often escalating after she leaves. In a Michigan study, 37.4% of the women with one or more violent partners said that the violence continued after separation and

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45.6% indicated that the violence increased (Largo et al. 1999). Adding to the assailant's behaviors are economic, social, and institutional barriers such as no alternative housing, lack of support from friends or family, difficulty finding a job and coordinating childcare, and risk of losing child custody to the assailant.

Before the modern battered women's movement, the State colluded with assailants by failing to extend the criminal law to domestic violence (Fagen 1996; Mullender 1996; Schechter 1982). Police used their discretion to avoid making arrests and prosecutors did not pursue cases where the victim-offender had an intimate relationship. With no legal protection and no shelters until the 1970's, many women who did leave had no option but to return to the abuser. Police, social workers, and other professionals judged a woman's decision to return to the abuser as an indication that she did not really want to leave. It was a "laissez-fair approach that dominated police and court response" (Pence and McDonnell 1999, p. 14). Feminists pioneered the battered women shelters as a way to increase victim safety and initiated system reform efforts focused on the criminal justice system's response to domestic violence and holding the assailant accountable. Today, many communities have implemented a coordinated response to responding to domestic violence (Mullender 1996; Schechter 1982). People working to end domestic violence often speak of reform in terms of enhancing victim safety and increasing assailant accountability. "Determining whether the coordinated community response enhances victim safety and increases offender accountability is central to the impact evaluation of a community intervention project" (Shepared 1999, p. 183).

The criminal justice system remains the primary mechanism for holding assailants accountable. Where law enforcement historically refused to intervene in domestic disputes, all states now have legislation allowing for the warrantless arrest in cases of domestic violence.[2] Warrantless arrest legislation has allowed police departments across the United States to adopt pro or mandatory arrest policies. Pro-arrest policies encourage police officers to make an arrest when there is evidence of a domestic abuse, while mandatory arrest policies require offices to make an arrest.

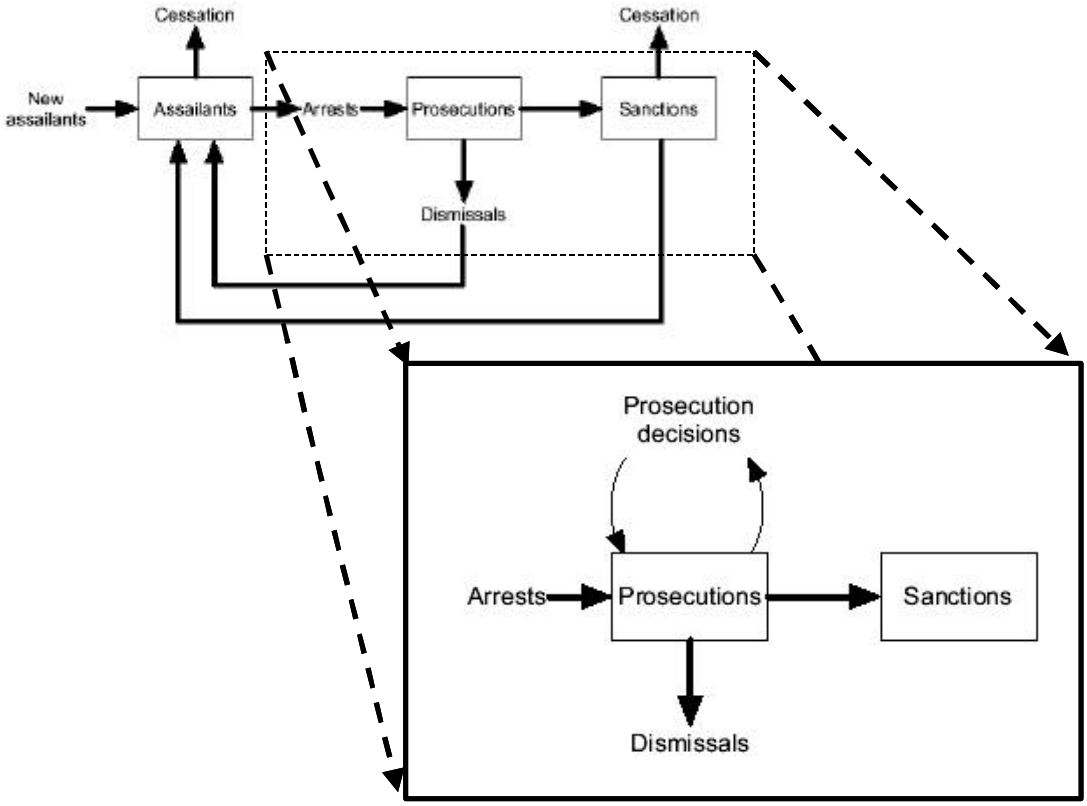
Prosecution policies have also changed. Recognizing that batterers often coerce their victims to drop charges, prosecutor’s offices have adopted “no-drop” or evidence-based prosecution policies. With no-drop policies, prosecutors do not drop charges of domestic assault at the victims’ requests. In evidence-based prosecutions, cases are pursued without involving the victim’s testimony in court based on the evidence. Reforms in arrest and prosecution policies have in turn led to increased referrals to court mandated batterer intervention programs. This has led to the criminalization of domestic violence (Danis 2003; Mullender 1996; Fagen 1996).

Recent debates have focused on being able to empirically demonstrate the effectiveness of policies. Most studies have focused on the relationship between individual components of a community response (arrest, prosecution, batterer intervention programs, personal protection orders, etc.) and their impact on one or more dependent variables. Without a more systemic analysis, advocates, policy makers, and researchers have been forced to make oversimplifying assumptions that improvements in one part of the system would translate into improvements in other parts. Moreover, community members have often blamed specific individuals for unintended consequences of failed policies.[3]

Instead of focusing on individuals, some started asking how roles were being institutionally structured and called for an understanding of how the various components of the criminal justice system response interacted at the community level (Pence and McDonnell 1999; Gondolf 2002). Building off previous experiences in trying to develop batterer intervention

programs and system dynamics modeling (Hovmand 2000), this study considered the question of how the domestic violence caseload of a prosecutor's office was dynamically related to holding assailants accountable. The specific problem modeled was how the prosecutor's office could balance two competing goals: managing caseloads and resources while trying to increase accountability. Hence, this research sought to develop a better understanding of the feedback mechanisms between arrests, the prosecutor's office domestic violence caseload, dispositions (dismissals and sanctions), and prosecutor decision-making (see Figure 1) within the larger context of a criminal justice system response to batterers.

Figure 1 Prosecution of Domestic Violence Cases as a Component of the Criminal Justice System Response



1. Background

Previous modeling work on the criminal justice response to domestic violence focused on understanding the specific problem of batterer intervention programs not appearing to have any measurable effect at the community level despite increases in court mandated referrals (Hovmand 2000). One explanation by service providers for the lack of impact was that as referrals increased, more agencies entered the batterer intervention market, which increased competition and lowered standards of accountability.[4] Specifically, programs with large groups could afford to hold participants accountable and risk losing a group member whereas programs with small groups could not. The model generously assumed that all batterer intervention programs had a positive effect size and that every arrest resulted in some type of intervention.

Analysis of the model indicated that the problem was not caused by market competition or deteriorating standards, but policies where the chances of being referred to a batterer intervention program after an arrest were proportional to the severity of criminal behavior. Specifically, the intervention programs were most effective when the least criminally severe assailants had the highest chances of being arrested and referred to the batterer intervention program, for two reasons. First, removing assailants at the lowest levels of criminal behavior reduced the number who would escalate to higher levels of criminal behavior. Second, assailants at the lowest level of criminal behavior were also closest to the desired state of not battering and hence had a better chance of stopping violence, versus just reducing the severity of violence. The key finding was that the effectiveness of the criminal justice system response to assailants was sensitive to how the probability of an arrest and mandated referral varied by the severity of criminal behavior, that is, the link between Assailants and Sanctions in Figure 1—the prosecutor's office.

1.1. Prosecution

The increase in arrests moved more assailants into the prosecution caseflow. However, relatively few studies have focused on the prosecution of domestic violence (Cahn 1992). This should be alarming for two reasons. First, the prosecution caseflow has consistently been found to have a large attrition rate or "sieve effect" attributed to the exercise of prosecutor discretion (Moyer 1982). Prosecutors use their discretion to make decisions about the number and kinds of charges, whether to prosecute, what to offer and negotiate in plea-bargaining, and what to recommend for a sentence. The second reason is that it is unclear what happens when there is an increase in domestic violence cases referred to the prosecutor's office. Presumably, there is an increase in convictions and referrals, but what about the number of cases denied for prosecution, dismissed, or diverted to something other than batterer intervention programs?

The next four sections review some of the existing research on prosecutor decision-making: charging decisions, decision to prosecute, plea-bargaining, and effect of case deposition on future behavior. While discussed separately, these decisions and their effects are not necessarily distinct. For example, plea-bargaining can easily include decisions to reduce charges. The decision to prosecute might rely on information about the effectiveness of prosecution on a given type of case. And charging decisions might be made expecting a subsequent reduction of charges during the plea-bargaining.

1.1.1. Charging Decision

The first decision prosecutors normally make is whether or not to charge the defendant and on which charge(s). Prosecutors can decide to not charge a defendant at all, *nolle prosequi*, or add to, remove, or change the charge at arrest. Charging decisions typically determine the court that the case will be heard in and prosecutors might lower the charges in order to get a more favorable judge or avoid constraints on sentencing or plea agreements.

Schmidt and Steury (1989) found that prosecutors were more likely to issue criminal charges when the victim was injured, a weapon was used, defendant failed to appear at the charging conference or had a prior record. But, prosecutors were less likely to file charges when the victim and defendant continued to have a sexual relationship, were living together, the defendant was employed, and there were no indications of alcohol or drugs at the incident. While Schmidt and Steury's (1989) study has been the only one focusing on charging decisions in domestic violence cases, other researchers have looked at prosecutorial discretion for other types

of crime. Albonetti (1992), for example, considered prosecutorial discretion to reduce burglary and robbery charges, finding that seriousness of the case and indicators of the defendant's character (having a prior record, young, habitual offender) lowered the chances of charges being reduced. Albonetti tested and did not find race or gender to be factors in the decision to reduce charges, which might be due to reliance on regression models. Logistic regression models estimate the probability of an outcome from a set of explanatory variables. One major limitation of such approaches is the risk of oversimplifying complex decisions processes that involve feedback loops into open loop cause-effect models.

For example, prosecutors often negotiate the charge with the possible sentences in mind. Hence, the charging and sentencing decision are not independent, but interact across time. Prosecutors might also charge cases as misdemeanors or felonies as a way to get a judge considered more favorable for the prosecution. Similarly, mandatory sentencing guidelines and other constraints on criminal behavior for certain types of crimes may influence prosecutors' charging decisions. For example, McCoy (1984) argued that California's Determinant Sentencing Law, which was intended to reduce judges' sentencing discretion, resulted in prosecutors reducing their initial charges in order to avoid the constraints on plea bargaining in felony cases. And in a more recent analysis, Taha (2001) found that the impact of Sentencing Reform Act of 1984 on federal prosecutors was an increase in more precharge bargaining which resulted in defendants pleading guilty faster and to lesser charges.

There has also been some suggestion that organizational factors between police and prosecutors play a role in charge decisions. For example, police agencies monitor prosecutor's charging decisions as a guide for determining standards for a viable criminal case (Schmidt and Steury 1989). And McCoy (1984) described other effects in the context of a hydraulic theory of discretion in the criminal justice system, whereby efforts to limit discretion in one part of the system resulted in increases in another part. That is, instead of limiting discretion, discretion was simply displaced from one part of the criminal justice system's response to another. Her point is important in the context of domestic violence because as communities limit police discretion to arrest and restrict judicial discretion, an unintended consequence might be the displacement and concentration of discretion in the prosecutor's office.

Decision to Prosecute

Once charges have been filed, the prosecutor can decide whether to go forward or delay prosecution, usually for up to a year with misdemeanor cases. Albonetti (1987) considered the effects of uncertainty on prosecutor discretion, looking at variables such as the types of evidence, defendant-victim relationship, defendant arrested at scene, gender, race, defendant's prior record, offense type, use of weapon, type of victim, victim provocation, and statutory severity. Albonetti hypothesized that a prosecutor's uncertainty about winning a case would decrease the likelihood of prosecuting the case. Albonetti found support for and concluded that uncertainty about winning a case at initial stages of prosecution guided the decision to prosecute. Albonetti also noted that warrantless arrests[5] were less likely to be prosecuted. This would imply that the decision to prosecute cases might be determined by the strength of case attributes since most misdemeanor domestic violence cases involve warrantless arrests.

Prosecutors do make decisions based on the strength of a case attributes, and stronger cases are more winnable by definition, but this is not the same thing as the uncertainty of the case. A prosecutor can have a strong case in terms of evidence, victim credibility, use of a weapon, and still be uncertain as to whether or not a jury would find the batterer guilty if the case

went to trial. Conversely, a prosecutor and defense attorney's assessments might be certain of what would happen if a case with little or no evidence went to trial. Their certainty in that assessment would have a major influence over the plea bargaining process and the decision to prosecute. Thus, the uncertainty lies not in the strength of the case per se, but in assessing the "going rate" for a case with a given set of attributes.

The key point here is that the going rate is a state variable and subject to both misperception and adjustment as the outcomes of similar cases change over time. For example, if the prosecutor offers pleas below the going rate, the going rate will eventually drop. Likewise, if the prosecutor manages to secure convictions above the going rate, the going rate will gradually increase. But what the real going rate is at any point in time is uncertain. If there is an argument to be made about the relationship between uncertainty and prosecutor decision-making, then it is in the prosecutor's estimation of the going rate for a particular case, and less so in trying to determine the predictability of a conviction from case attributes.

Martin (1994) looked specifically at the decision to prosecute domestic violence cases and found that prosecution was more likely when defendants committed more serious offenses, had prior arrests for domestic violence, if the charge was criminal trespassing or harassment, or either victim or defendant was using alcohol or other drugs during the incident. Martin did not find that victim injury predicted prosecution. In contrast to Martin, Hirschel and Hutchinson (2001) could only find two explanatory variables that were significant in their model of the decision to prosecute: victim injury and the victim arguing with police against a citation/arrest. And, Dawson and Dinovitzer's (2001) model of the decision to prosecute contained only one statistically significant explanatory variable, namely, a victim's willingness to cooperate.

Albonetti and Hepburn (1996) looked at the decision to defer prosecution in felony drug possession cases and found that older males with prior arrest records or multiple charges were less likely to have prosecution deferred in lieu of drug treatment, while defendants arrested for marijuana possession were more likely. Albonetti and Hepburn (1996) did not find support for a direct relationship between the defendant's minority status and the prosecutor's diversion decision, but they did find support for a more complicated interaction between prior record, age, and minority status. Specifically, Albonetti and Hepburn (1996) argued that (a) defendants with prior contact with the criminal justice system were more likely to know how to negotiate a deferred prosecution, and (b) defendants with minority status were more likely to have increased contact with the criminal justice system, which would be the direct consequence of such practices as racial profiling.

This last argument is significant because it points to an unintended consequence of a suspect's contact with the criminal justice system that has an impact on future dispositions. Specifically, one usually thinks of criminal history as something that accumulates. As suspects accumulate prior convictions, subsequent sentences are enhanced. But Albonetti and Hepburn's (1996) argument points to a second, compensating mechanism, whereby increased contact with the criminal justice system contributes to the accumulation of experience manipulating the system, and might as Albonetti and Hepburn point out, actually lead to lessening of sanctions relative to the arrest charge. The possibility of this second mechanism has major implications in the context of domestic violence and arrest policies. If there is such a mechanism, then it means that an unintended consequence of pro and mandatory arrest will be batterers who become more sophisticated in manipulating the criminal justice system and controlling victims. This is similar to the concern that some have with batterer intervention programs, namely, that these groups

effectively provide batterers with an opportunity to share battering tactics and become more effective at manipulating victims and services providers.

Plea-bargaining Decisions

Plea bargaining is a loose term for negotiations between the prosecutor and defense attorney, and can include everything from how the defendant will be charged to sentencing, pretrial release, and victim restitution (Dawson, Smith, and DeFrances 1993). For the prosecutor, the main advantage of plea agreements is having the guilty verdict without having to invest the resources needed to prepare a case for trial. For the defense attorney, plea agreements can obviously result in more favorable sanctions, but not always. Hollander-Blumoff (1997) argues, for example, that the private defense attorney is likely to pursue the interests of their client, but a public defender or court appointed attorney might have other interests in mind since they are repeat players in their negotiations with the prosecutor. Consequently, public defenders might encourage their client to accept a guilty plea at least in part as a way to build credit with the prosecutor for another case.

Plea agreements are controversial from a victim's rights perspective because advocates and the public tend to see the results as the criminal justice system being soft on crime (McCoy 1993). Independent of how one feels about plea agreements they have become an essential part of the business of disposing cases in a timely manner with limited resources. Even small reductions in the number of plea agreements can result in large increases in the number of cases going to trial. This has led to the popular hypothesis that prosecutors seek guilty pleas in an effort to reduce the caseload pressure, i.e. their decisions are governed by the economics of a disposition assembly line (for a discussion of this, see McCoy, 1993). The caseload pressure hypothesis is unappealing in the sense that justice being served might vary for reasons outside the principles of justice. In contrast, the professional norms hypothesis states that decisions to seek a guilty plea are better understood as a function of shared professional norms about fairness, legal standards, and punishment (McCoy 1993). McCoy argues that prosecutors and defense attorneys share common views about the "going rate" for a "normal crime" and plea bargaining becomes simply an efficient way of handling cases with predictable outcomes. Cases are expedited without compromising the principles of justice.

In one of the earliest studies, Heuman (1975) considered the impact of caseload pressure on plea bargaining by studying trial dispositions from 1880 through 1954 in Connecticut Superior Courts. Heuman was responding to criticisms of plea-bargaining that argued that its use was a recent phenomenon brought on by expanding caseloads. Heuman found that trial verdicts represented between 10 and 20% of all dispositions from 1880 through 1954, and hence plea bargains had always been a part of the criminal justice process and remained relatively stable. Heuman's conclusion about the existence and stability of plea-bargaining in the criminal justice system is popular, but not without disagreement. For example, Alschuler (1979) argues that plea bargaining was infrequent and discouraged, and only started during the 1920's with the expansion of prosecutor offices and bureaucratization, reaching its present form during the due process revolution of the 1950's and 1960's. Heuman (1975) then compared dispositions and caseloads between low and high volume superior courts and found no evidence for a direct relationship between caseload pressure and plea bargaining, but qualified the results, saying that caseload pressure might have indirect effects, namely:

> The prosecutor may nolle[6] the marginal case which he might have pursued for a plea earlier. He may offer to reduce more charges and recommend lighter sentences, or he may simply demand more severe sentences after trial. (p. 527)

Rhodes (1976) considered the impact of caseload pressure in terms of delays and applied William Landes's model of plea bargaining as a market transaction. In this model,

> The plea bargaining process, which is of central importance to modern jurisprudence, can be characterized as a market transaction in which the prosecutor "buys" guilty pleas in exchange for promises of sentence leniency (Rhodes 1976, p. 311).

Rhodes assumed that prosecutors would be interested in maximizing the total mean number of years in punishment and derived an expression that optimized years in punishment with prosecutor resources. His results suggested that (a) the rate that prosecutors use plea bargaining could be understood as a combination of legal strengths of the case and court delay, and (b) plea bargaining was essentially a market clearing mechanism.

McDonald (1985) took a more comprehensive view with interviews and hypothetical cases, and found caseloads to be general determinants of the need to plea bargain, but did not actually predict which cases were plead or the terms of the plea agreement. McDonald did find that with greater caseloads, less attention was given to less serious crimes, increasing the likelihood that plea-bargains for less serious cases would become more generous. In ranking prosecutors' information cues to a range of hypothetical cases, McDonald observed that the participants did not pay much attention to court caseload in their plea bargaining decision. Instead, they focused on the strength of the case, seriousness of the offender, and seriousness of the offense.

These studies relating caseload to prosecutor decision making (McDonald 1985; Heuman 1975; Rhodes 1976) all suffer from two problems. First, they focused on felony cases. Most criminal domestic violence cases are misdemeanors, and misdemeanors are generally considered less serious offenses. The second major problem with these studies is that they focused on court caseloads, not prosecutor caseloads. Court caseloads and prosecutor caseloads are arguably related, but prosecutor caseloads are more likely to have a direct impact on the prosecutors' day-to-day decision making. This impact could either be direct if prosecutors decided to deny warrants or dismiss cases based on their current caseload. Or there could be indirect effects as higher caseloads might mean less time to investigate and prepare cases, which might lead to more dismissals.

McAllister and Bregman (1986) also studied plea bargaining and found that as the probability of conviction and length of sentence increased, prosecutors were less willing to offer plea agreements while defense attorneys were more willing to accept plea agreements. McAllister and Bregman concluded that there was no evidence of a bias by prosecutors and defense attorneys toward plea bargains. However, there were two major problems in McAllister and Bregman's experimental design. First, they assumed that prosecutors and defense attorneys would be trying to optimize some utility function, specifically, the difference between (a) current plea offer, and (b) the product of the likelihood of conviction and sentence if convicted at trial. Thus from McAllister and Bregman's argument, for example, if the chances of a conviction were 50% and the average sentence 2 years, defense attorneys would be looking for a plea offer of 1

year or less while prosecutors would be looking for a plea offer of 1 year or more. But, this is essentially a rational model of decision making with full information. One might object to this criticism by pointing out that there are still guesses involved. For example, participants were only provided with the probability of conviction or the average sentence. But, knowing the probability of conviction or average sentence is to know a real parameter value, not an estimate of it. In reality, we can only statistically estimate parameter values. The real decisions that prosecutors face is one with uncertain information, which is what Albonetti (1987) was trying to get at.

The second major problem in McAllister and Bregman's (1986) study is their use of hypothetical situations to draw inferences about real-world decision making. Such studies have been successful at showing that decision making frequently does not conform to the classical model of rational choice. But, these types of experiments simply need to demonstrate that people do not follow the rational choice model in some situations. If, for example, people generally followed the rational choice model in making decisions, then one would expect people to use that model in both real situations and hypothetical situations. And a corollary, if people do not follow the rational choice model in hypothetical situations, then it is unlikely that they follow the rational choice model in real situations. There has been much experimental research showing that people do not follow the rational choice model in hypothetical situations. But having shown that people do not follow a particular decision model in a hypothetical situation is not the same as showing what they actually do in real situations. Specifically, generalizing claims about prosecutor and attorney decision making from hypothetical situations into the real world introduces a major external validity problem, especially if one considers the role of heuristics in the theory of bounded rationality. Ebbesen and Konecni (1980) conducted an experiment illustrating this external validity problem. They compared the results of judges' sentencing decisions in hypothetical cases and real court cases. While they were able to identify a model of the information cues used in judges' decisions in both situations, they found that the models differed. That is, the associations between information cues and sentencing decisions from hypothetical decisions did not correspond to what they actually observed the same judges to be doing in the courtroom with real cases. Ebbesen and Konecni's point is that one would not know this unless one observed and tested decision models in real situations.

Effects of Case Disposition Decision

One reason for even wanting to understand prosecutor decision-making is the perceived impact of these decisions on defendants' future behavior. Two studies have considered the effect of prosecuting domestic violence cases on defendants' rearrest rates. Ford and Regoli (1992) evaluated no-drop versus drop permitted prosecution policies. In no-drop policies, victims are not allowed to drop the charges and the prosecutor pursues the case seeking a finding of guilty, often using other forms of evidence such as photos, medical reports, police reports, 911 transcripts, and other witnesses. Ford and Regoli did not find an overall difference between no-drop versus drop permitted prosecution in terms of subsequent reports of abuse. However, they did find that women in the drop-permitted group who elected to proceed with prosecution were less likely to report subsequent abuse than women assigned no-drop prosecution, whereas women in the drop-permitted group who dropped charges were the most likely to report subsequent violence. Ford and Regoli called for more studies to understand these results, but speculated that one explanation might be that victims were empowered by a combination of their ability to drop charges and alliance with the criminal justice agencies. Davis et al. (1998) also

studied the effect of court disposition (dismissal, probation with treatment, and jail) on six-month rearrest rates. Davis et al. did not find evidence of a deterrence effect from prosecutor outcomes.

1.2. Discussion

The current state research on prosecutor decision-making does not address the general issue of how prosecutor discretion with domestic violence cases is affected by the prosecutor's caseload size. The published studies each have one or more of the following shortcomings. First, many studies on prosecutor's decision making simply did not consider the prosecutor's caseload size as a factor. Second, the studies that did consider the relationship between caseload size and decision-making focused on felony cases and studied the court's caseload, not the prosecutor's. The vast majority of criminal domestic violence cases are charged as misdemeanors, not felonies. A large portion of these cases are simply not prosecuted and handled informally outside the court's docket. So it is likely that the caseloads of prosecutors and courts differ in size and that court caseloads are not a good proxy for prosecutor caseloads when it comes to studying decision behavior. Third, while a number of studies suggested that there might be a more complicated and indirect relationship between prosecutor caseload size and decision-making, most simply treated each decision as statistically independent of previous decisions. However, both the caseload pressure hypothesis and professional norms hypothesis suggest feedback mechanisms that involve information about previous decisions. In the caseload pressure hypothesis, for example, previous decisions to file criminal charges would increase the caseload and in turn discourage charges being filed in new cases. And in the professional norms hypothesis, defense attorneys and prosecutors would be using previous case dispositions to determine the likely outcome or going rate for a current case. In both hypotheses, the determinants of the current decision facing a prosecutor would include state variables indicating outcomes of previous decisions. Both caseloads and the going rate are likely to vary over time, making the determinants of prosecutor decision making dynamic and not static.

1.2.1. Caseload Pressure and Caseload Management

The question about whether caseload size affects prosecutor decision-making is essentially equivalent to asking whether prosecutors have ways of managing the size of their caseload. Prosecutor decisions affect their caseload. Arrests contribute to the caseload while dispositions remove cases from the caseload. The net effect of referrals and dispositions depends on how fast prosecutors can dispose of cases relative to the arrest rate. Denying prosecutions will have an immediate effect on the caseload, whereas taking a case to trial will delay the disposition. If the prosecutor's caseload size affects prosecutor disposition decisions, then caseload size and decision-making will exist within a feedback loop, specifically, a caseload adjustment mechanism. Conversely, if prosecutors try to manage their caseload, they will have to monitor the size of their caseload and use that information in the decisions that affect the caseload.

The major consequence of this extension is that considering caseload as a potential determinant of prosecutor decision-making implies the existence of one or more feedback loops. Feedback loops are generally difficult to identify and understand using linear methods like regression. The relationship between *Prosecutions* and *Prosecution decisions* in Figure 1 is reciprocal in that one variable affects the other and visa versa. Linear methods estimate parameters by fitting some observed data to a hypothesized model, which is generally assumed

to be open loop in nature in order to satisfy the mathematics for finding a solution. Reciprocal relationships violate this assumption and result in misleading estimates. Methods like regression and structural equation modeling do have ways of representing time variant, nonlinear variables, usually through the creation of dummy variables, but they simply represent descriptions of the time variant behavior, not the underlying mechanisms generating that behavior (Hedström and Swedberg 1998). By analogy, it would be like modeling a plant's growth over time curve instead of the things that affect its growth. While potentially helpful, one is not using a quantitative model to specify and test hypotheses about growth, but instead using a model to simply describe the observations. What is needed is an account of how the underlying feedback mechanisms generate the observed behavior. The problem of understanding the link between *Arrests* and *Sanctions* in Figure 1 posed at the beginning of this paper can thus be re-conceptualized in terms of identifying the underlying mechanisms regulating and adjusting *Prosecutions*.

1.2.2. Structure of Prosecutor Decision-Making

Until now, most of the discussion on prosecutors and their caseloads has been at the individual level. Individuals do display patterns in decision-making, but what is often of more interest is the structuring of that decision-making. That is, there is clearly some variation in how individual prosecutors make decisions. For example, some prosecutors refuse to prosecute cases unless the victim cooperates while others take a much more aggressive stance against domestic violence and proceed with evidence based prosecutions that do not rely on the victim's cooperation in the process. But, understanding the structure that constrains all prosecutors in their decision making, whether they take domestic violence seriously or not, is just as important because it ultimately represents the main limiting condition on developing an effective criminal justice system response for holding assailants accountable. The structure of individual prosecutor decision-making is arguably at the level the prosecutor's office, where one or more assistant prosecuting attorneys are involved in criminal domestic violence cases. So the question becomes, how does a prosecutor's office manage its domestic violence caseloads?

Thinking of the prosecutor's office response to domestic violence in terms of a caseload management problem has several advantages. First, it has immediate relevance to prosecutor's office in terms of day-to-day operations, which both motivates individual participation in a study and is likely lead to real-world application. Second, understanding the problem in terms of caseload management helps us understand not only how to improve the criminal justice response, but also understand its limits, i.e. what are the theoretical potentials of various caseflow management policies? It might turn out, for example, that there is only a marginal potential for improving the criminal justice response to domestic violence in terms of holding assailants accountable. This would suggest (1) that communities should find alternative ways of holding the majority of assailants accountable, and (2) resources for improving the criminal justice system should be focused more on improving victim safety as opposed to increasing assailant accountability.

Finally, viewing the prosecutor's role in terms of caseload management helps relate the issue to a class of more general problems in social science. For example, caseload management problems are really a subset of resource allocation problems. In the context of service delivery systems, a resource allocation problem concerns how one allocates resources to provide services. When resources are fixed, the resource allocation problem reduces to a caseload management problem because caseload is the only variable that can be manipulated to balance resources with services. But this poses a question: What if prosecutor's office resources are increased, for

example, through a grant to fund a domestic violence prosecution unit? Will the increase improve the response? The answer depends on the nature of the resource allocation problem. If services are proportional to resources, then the answer is probably yes. But if the resource allocation problem is dynamic, more resources might actually create new demands that cancel any potential benefits. Understanding the nature of the resource allocation problem (and hence the caseload management problem) helps identify and explain the unintended consequences of various policies that a prosecutor's office might have with respect to prosecuting domestic violence cases.

2. Method

Although prosecutor's offices in the United States generally operate under the same state laws with respect to domestic violence, each office is largely autonomous with respect to state oversight and the demands of their jurisdictions vary in terms of demographics, resources, and community norms. Thus, mechanisms that prosecutors use to dynamically manage their caseloads are therefore also likely to vary from office to office. One way to assess the extent of variation would be to consider each office as an independent case, from which one could subsequently abstract commonalties and try to identify generic structures. Such an approach would presuppose, however, that one has a reliable and general method for identifying and assessing hypotheses about how a prosecutor's office manages its domestic violence caseload. Thus, this research focused on developing a robust method for identifying and assessing hypotheses on caseload dynamics using a single case study research design (Yin 1994) of a single prosecutor's office.

The model building strategy in this study differed somewhat from a more typical system dynamics study. In a typical system dynamics study, one would work closely with stakeholders around a specific problem, and involve their participation early in the research process in both defining the purpose of the research and informing the development of the model. This would lead to an iterative process between modeling, key informant interviews, and data analysis. There would also be a quick push toward focusing on identifying the main feedback loops and developing a dynamic hypothesis.

In this research, however, one of the major goals was to understand exactly what was gained at each stage of model building in relation to the use of data. Thus, the model building process was somewhat artificially segmented into discrete phases, with each phase being exhausted before moving on the next phase. This strategy led two phases of simulation model building. The first phase focused on simply testing to what extent it made sense to model case dispositions in terms of caseloads as opposed to case attributes. This resulted in three very simple preliminary models: (1) modeling dispositions in terms of case attributes, (2) modeling dispositions in terms of case attributes and caseloads, and (3) modeling dispositions in terms of only caseloads (see Figure 4). The second phase focused on building a model of the case flows from arrest to case disposition (see Figure 5). The resulting model was then used to motivate questions for key informants interviews whose responses were then used to propose a revised model (see Figure 6).

2.1. Data Sources

Both numerical data and qualitative key informant data sources were used in the modeling process. Working with numerical domestic violence data poses some special difficulties. First, there are major challenges in terms of both the reliability and validity of domestic violence suspects' prior records. Indicators of whether or not a suspect has prior domestic violence offenses are notoriously unreliable. Criminal history databases are often incomplete with respect to misdemeanor arrests and convictions, and assailants will often move from one jurisdiction to another to avoid accumulating a record. Domestic violence related offenses often include a wide range of criminal behaviors, from stalking to destruction of property and disturbing the peace. However, most criminal record systems do not reliably record whether or not a crime is related to domestic violence. To the extent that some record keeping systems now make it possible to indicate whether or not any crime is domestic violence, their implementation has been slow and the availability of longitudinal data limited.

Second, working with domestic violence data from a small rural county introduces a technical problem, namely, the temporal aggregation problem. Specifically, aggregating a small number of events over small units of time results in sparse or essentially discrete time series. Modeling such time series requires some form of density estimation. However, this introduces questions about which features of a continuous time series might be artifacts of the smoothing kernel.

There are also difficulties with conducting key informant interviews in a small community on a topic that can be controversial. First, there is the challenge of maintaining confidentiality. In a small community, key informants and their views are well known. In order to protect the confidentiality of participants, it is therefore necessary to be less specific about who said what than if one had multiple participants from each group of stakeholders. Second, the extent that one can triangulate between respondents is limited, which makes it difficult to assess for effects such as social desirability where a key informant wanting to be perceived as doing the right thing.

2.1.1. Numerical data

Data sources included both numerical data from the prosecutor’s office violence against women (VAW) database and key informant interviews. The VAW database (n=6358) contained a subset of the prosecutor’s office cases, including records of personal protection orders (n=1029), 911 calls involving violence against women for the county (n=2821), warrant requests (n=1993), and 48-hour reports from police departments (n=474) covering offenses from approximately January 1, 1994 through June 10, 2002. However frequency distributions of types of cases by year suggested a pattern of inconsistent data entry before January 1, 1998 (see Table 1). The primary focus in this research was on the prosecution of domestic violence cases, which start with the prosecutor’s office authorizing the arrest warrants. The initial subset of cases (n=1457) included warrant requests with valid dates of offense on or between January 1, 1998 and December 31, 2001 (the bold numbers in Table 1).

The VAW database contained first names, last names, and middle initials along with sex, date of birth, and address for both suspects and victims. A unique list of individuals was generated with each row assigned a unique personal identification (PID) number. Victim and suspect names were then replaced with corresponding PID numbers (n=2050 for 1457 records of warrant requests). Two records were eliminated because names were missing (leaving a total of

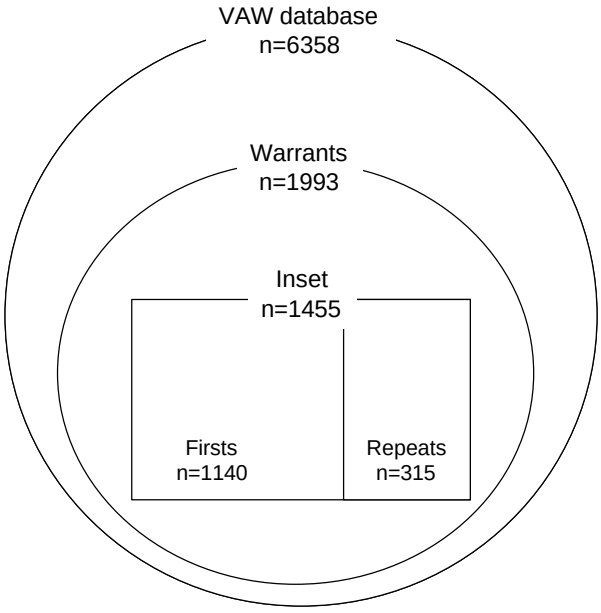
1455 warrant request records). Cases were then identified as either first appearances within the database or repeat cases within the database (see Figure 2).

Table 1 Distribution of Records by Year and Type of File in Violence Against Women (VAW) Database

Year	48HR	911	PPO[‡]	WARRANT
< 1995	0	0	0	2
1995	0	444	0	168
1996	0	535	0	46
1997	5	257	2	33
1998	113	0	152	**229**
1999	85	994	193	**235**
2000	123	588	162	**240**
2001	95	0	121	**200**
2002[§]	49	0	63	82

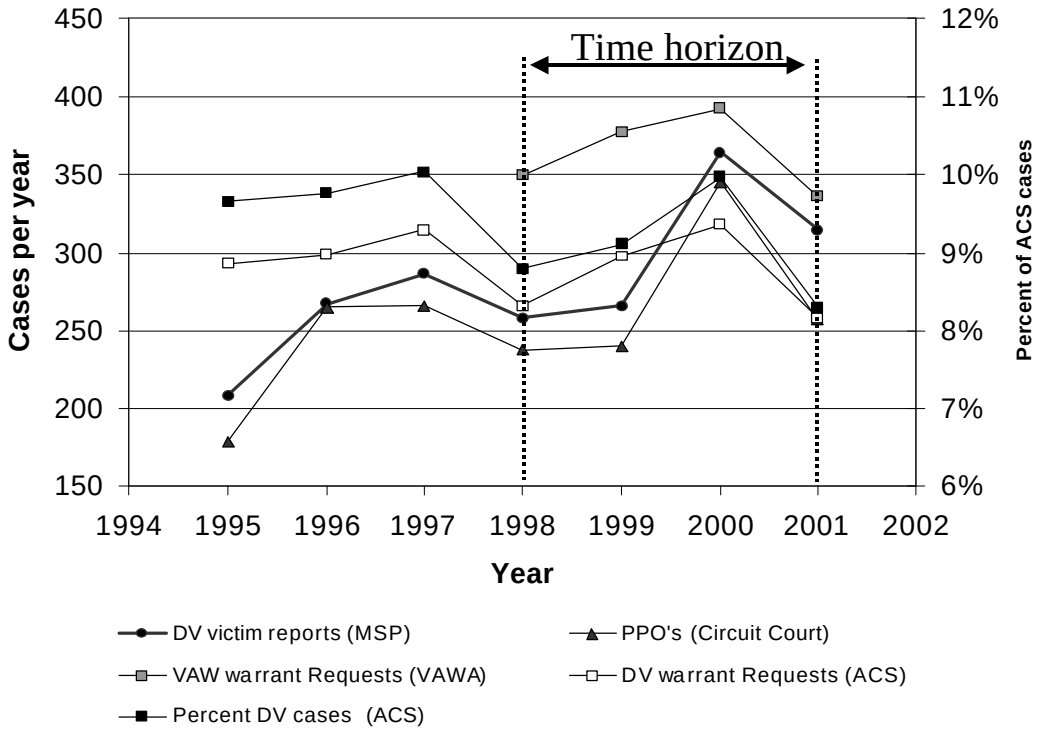
Figure 3 compares indicators of domestic violence related reports from the warrant requests in the VAW database (VAWA), domestic violence victim reports from Michigan State Police (MSP), domestic violence related warrant requests from the adult case tracking system (ACS), and domestic violence related warrants in the ACS requests as a percentage of all ACS cases. Personal protection order (PPO) cases from the circuit court are also shown for comparison purposes, but one should note that the PPOs include cases other than domestic violence. The main features to note in Figure 3 are that (1) the resulting set of cases selected from the VAW database appears to closely follow the shape of the ACS, and (2) all five time series have a peak in 2000 and then decline in 2001.

Figure 2 Subsets of Violence Against Women Database



[‡] Based on date that PPO was authorized.
[§] Limited to records through June 10, 2002.

Figure 3 Comparison of Various County Indicators for Domestic Violence



2.1.2. Key informants

The second phase of model building generated many questions about realistic values for certain parameters and additional feedback relationships between variables. A snowball sampling procedure was used to identify key community informants, who were selected on the basis of their expertise with domestic violence and prosecution of domestic violence cases. Two initial contacts were made to a domestic violence coalition coordinator and assistant prosecuting attorney. These key informants suggested other potential participants. A total of five key informants from the community were then interviewed, which included victim advocates, domestic violence coalition coordinators, assistant prosecuting attorneys, and legal assistants. All five key informants had extensive experience working with victims of domestic violence and had attended training workshops specific to domestic violence. Responses from key informants were then used to develop the revised model in Figure 6.

2.2. Modeling

The numerical data from the VAW database were used to develop a series of simulation models (three preliminary models and one baseline model) using a system dynamics approach. After calibrating the models to numerical data, models were tested to see to what extent

variations in constants and smoothing parameters affected the qualitative behavior of the model. The best way to evaluate how well the model performs behaviorally is to visually compare the simulated data against the real data (Sterman 2000). Traditional fit statistics alone do not say very much about how well the model reproduces the observed behavior because they focus on point-by-point fit, which can be very misleading. What one generally wants to do in assessing fit is not just know how much error there is, but the nature of the error. Theil inequality statistics (Sterman 2000; Theil 1966) were therefore used to assess the distribution of errors between the numerical time series and simulated time series.

In system dynamics, the relationship between the structure of feedback loops and behavior can be formally described in terms of feedback loop dominance (Richardson 1995). To answer the question about the relationship between caseload management mechanisms and accountability, Ford's (1999) behavioral approach was used to identify and help interpret patterns of feedback loop dominance.

3. Results

This section provides a brief overview of the models resulting from the three phases: preliminary models, baseline model, and revised model. The purpose of the preliminary models was simply to see to what extent it made sense to model case dispositions as a function of caseloads as opposed to case attributes. The purpose of the baseline model was to develop a robust representation of the case flows, which could be used as a starting point for modeling the more speculative information feedback mechanisms in the revised model. And, the purpose of the revised model (currently under development) was to represent the information from key informant interviews as a starting point for future research.

3.1. Preliminary Models

This first stage involved developing preliminary models capable of reproducing the general trend in the prosecutor's office domestic violence caseload. That is, these models simply attempted to reproduce the behavior pattern as opposed to describing the underlying mechanisms generating the behavior pattern. This was essentially analogous to a large family of statistical modeling approaches where the goal is to develop a mathematical representation of the data. All of the descriptive models were driven with real time series data of warrant requests that had been smoothed using a 120-day delay third order exponential smoothing algorithm.[7]

Each model was then calibrated to *Caseload*. There were several reasons for only calibrating on *Caseload* (as opposed to also including *Plea offers accepted* and *Dismissals*). First, such simple models will be unable to replicate higher order dynamics such as oscillations that are endogenous to the system. This means that there will be a significant amount of error between the actual and simulated time series. So one can either (a) try to optimize the fit on one observed variable and distribute the error to remaining observed variables, or (b) optimize the fit on all observed variables and spread the error across all of them. The second reason for only calibrating on *Caseloads* is that it is a stock variable and the hypothesized determinant of the dispositions *Plea offers accepted* and *Dismissals*, which are rates. That is, the question in this study is focused on understanding whether or to what extent caseloads affect dispositions. If one has distributed the error between both caseloads and dispositions, then one is likely to

underestimate the possible effects that caseload has on dismissals and plea offers being accepted. Moreover stocks are generally more reliable than rates as observable measures. Thus, calibration was restricted to optimizing the fit to *Caseloads*.

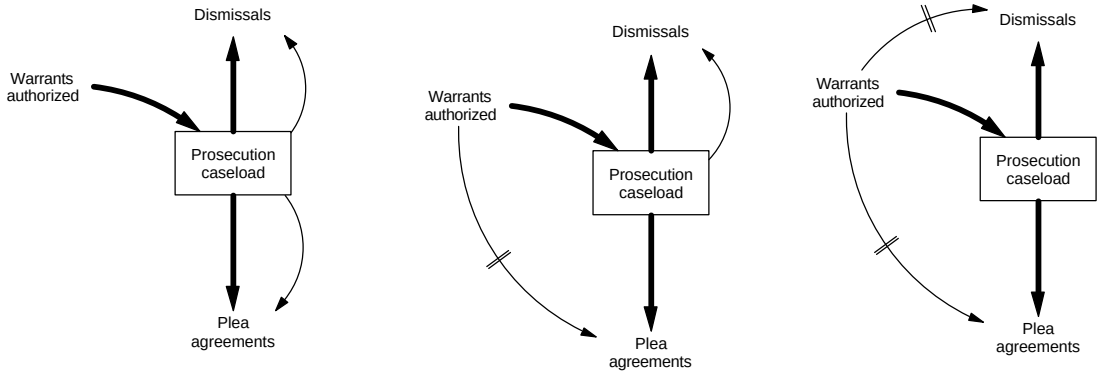
Calibration was achieved by optimizing the fit between the actual smoothed time series of *Caseload* and each descriptive model's simulated time series of *Caseload* using the Powell optimization procedure in Vensim with the original values as the starting point. This procedure tries to optimize the fit between two or more time series by varying the constants over a given range. The degree of fit or payoff function, *P*, is calculated as the sum squared differences between actual and model values:

$$P = \sum_{i=1}^{n} -\left[W_i(M_i(t) - A_i(t))\right]^2$$

where *n* is the number of variables to fit to, W_i is the weight for the *i*-th variable, $M_i(t)$ is the models value for the *i*-th variable at time *t*, and $A_i(t)$ is the actual value for the *i*-th variable at time *t*. Weighting the differences between the model and actual values has no impact on the fit when there is only one variable in the payoff function *P* (i.e., when n=1). However, when the payoff function *P* is written in terms of more than one variable ($n>1$), one might decide to assign different weights to each difference because one either wants to (a) weight more reliable measurements of the actual values more heavily than less reliable measurements, or (b) adjust for differences in the scaling of variables.

The three descriptive models are shown in Figure 4, and include a model with (a) plea agreements and dismissals both written as functions of prosecution caseload, (b) plea agreements as a function of case attributes and dismissals as a function of prosecution caseload, and (c) dispositions as a function of case attributes. The relationships between case attributes and disposition decisions were modeled as fixed information delays, depicted as thin lines with delay markings (the double arrows) in Figure 4a and Figure 4b.

Figure 4 Preliminary Models



a. Dispositions as Functions of Caseload Only

b. Dispositions as Functions of Attributes and Caseload

c. Dispositions as Functions of Attributes Only

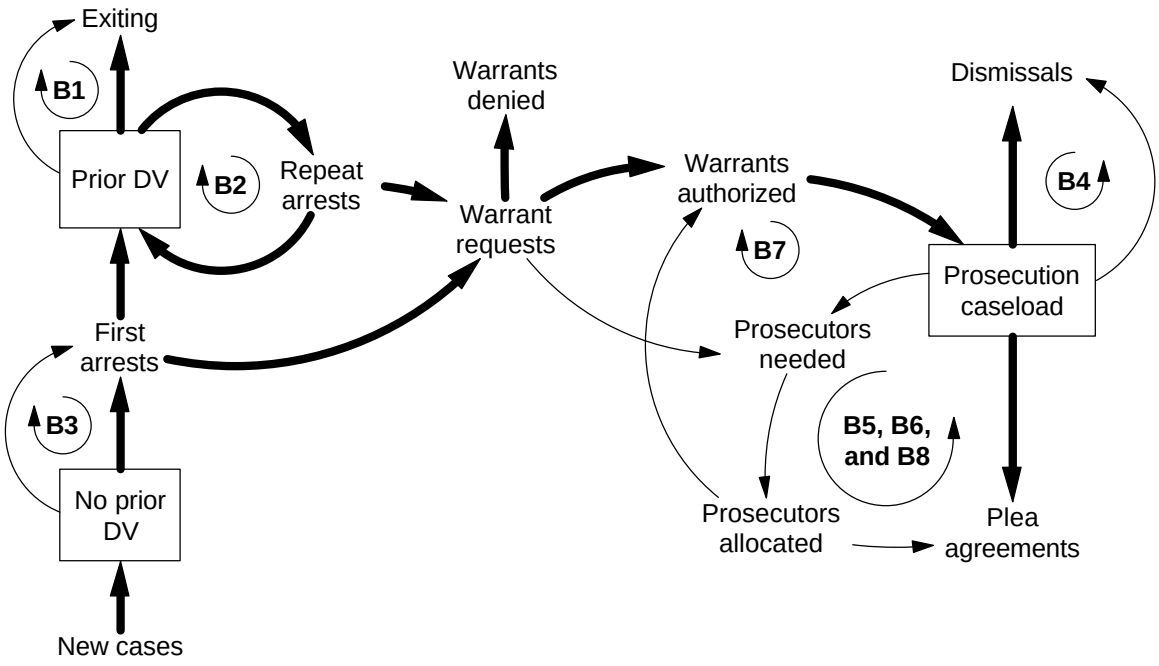
Each preliminary model was calibrated and tested against the numerical data. Testing consisted of graphically and statistically (using Theil inequality statistics) comparing the *Prosecution Caseload* of the simulated data against the real data. While the graphical comparisons did not suggest any noticeable differences between the three descriptive models,

Theil inequality statistics revealed that modeling case dispositions as a function of prosecution caseload (Figure 4a) outperformed the two other models (Figure 4c and Figure 4b). This provided justification for modeling case dispositions in terms of caseloads (as opposed to case attributes). The comparisons are shown in Figure 7, Figure 8, and Figure 9 starting on page 28 in Appendix A.

3.2. Baseline Model

The purpose of the baseline model was to develop a simple and robust model of the flow of cases in terms of caseloads. Figure 5 shows an overview of the baseline model along with the major feedback loops labeled in Figure 5 as "B1", "B2", and so on. The baseline model disaggregates first time arrests from repeat arrests.

Figure 5 Baseline Model



New cases come into the system as cases that are "at risk" of being arrested for domestic violence with no prior domestic violence by entering the stock *No Prior DV*. Cases in *No Prior DV* are arrested via *First Arrests* at a rate described by the balancing feedback loop B3. *First Arrests* then flow into the stock of *Prior DV*, where cases are at risk of a repeat arrest and exiting the system. Cases exit the system by no longer being at risk of a domestic violence arrest, that is, when criminal domestic violence behaviors desist or individuals migrate out of the jurisdiction of the prosecutor's office. This mechanism is described by the balancing feedback loop B1. The balancing feedback loop B2 describes the repeat arrest of cases with a prior domestic violence arrest.

Arrests result in warrant requests, which are disaggregated by first time and repeat cases. Some of these warrants are denied while others are authorized. Authorized warrants flow into the

Table 2 Major Feedback Loops in Baseline Model

Loop	Description	Variables
B1	Cases leaving the system because they are no longer at risk of a DV arrest, e.g., moving out of the jurisdiction or no longer committing criminal domestic violence	Prior DV arrest, Exiting
B2	Repeat arrests	Prior DV arrest, Repeat arrests
B3	First time arrests	No prior DV arrest, First time arrests
B4	Dismissals	Prosecutions, Dismissals
B5	Disposition of cases through plea agreements when there are enough prosecutor resources to pursue all cases	Prosecutions, Prosecutors needed for prosecuting cases, Prosecutors allocated, Plea offers accepted
B6	Disposition of cases through plea agreements when there are insufficient resources to pursue all cases, e.g., dumping cases by offering lighter sentences	Prosecutions, Prosecutors needed for prosecuting cases, Prosecutors assigned to cases, Prosecutors allocated, Plea offers accepted
B7	Allocation of prosecutors to authorizing warrants	Prosecutions, Prosecutors needed for prosecuting cases, Total prosecutors needed, Prosecutors assigned to warrant review, Effect of being short staffed on warrant reviews, Warrants that can be reviewed, Authorizations
B8	Allocation of prosecutors to prosecuting cases	Prosecutions, Prosecutors needed for prosecuting cases, Total prosecutors needed, Prosecutors assigned to cases, Prosecutors allocated, Plea offers accepted

Prosecution caseload, where cases are disposed via *Dismissals* and *Plea agreements* being accepted. Balancing feedback loop B4 describes the rate that cases are dismissed, while balancing feedback loops B5, B6 and B8 describe the mechanisms controlling plea agreements being accepted.

The prosecution caseload and warrant requests establish the number of prosecutors that are needed to complete warrant reviews and case prosecutions within a given time frame. The number of prosecutors needed and the number of prosecutors available determine how prosecutors are allocated between authorizing warrants and prosecuting cases. Balancing feedback loops B5, B6, B7, and B8 control how the demand for prosecutors and available number of prosecutors determine warrant authorization and plea agreements being accepted. Thus, additional arrests do not necessarily lead increased caseloads if there are not enough resources to prosecute all the cases and review all the warrants. In particular, having too many warrants to authorize results in warrants being denied. Table 2 summarizes the feedback loops, their description, and the specific variables included. The resulting baseline model motivated questions for the key informant interviews.

3.3. Revised model

The purpose of the revised model (Figure 6) (which has not yet been implemented as a running simulation) was to incorporate the information from the key informant interviews. Collectively, key informants identified four major sectors that would need to be included in a more accurate model of domestic violence prosecution caseloads: community awareness, going rate, meetings with victims, and domestic violence unit funding. These four sectors are identified as stocks in Figure 6 along with their relationships to variables in the baseline model.

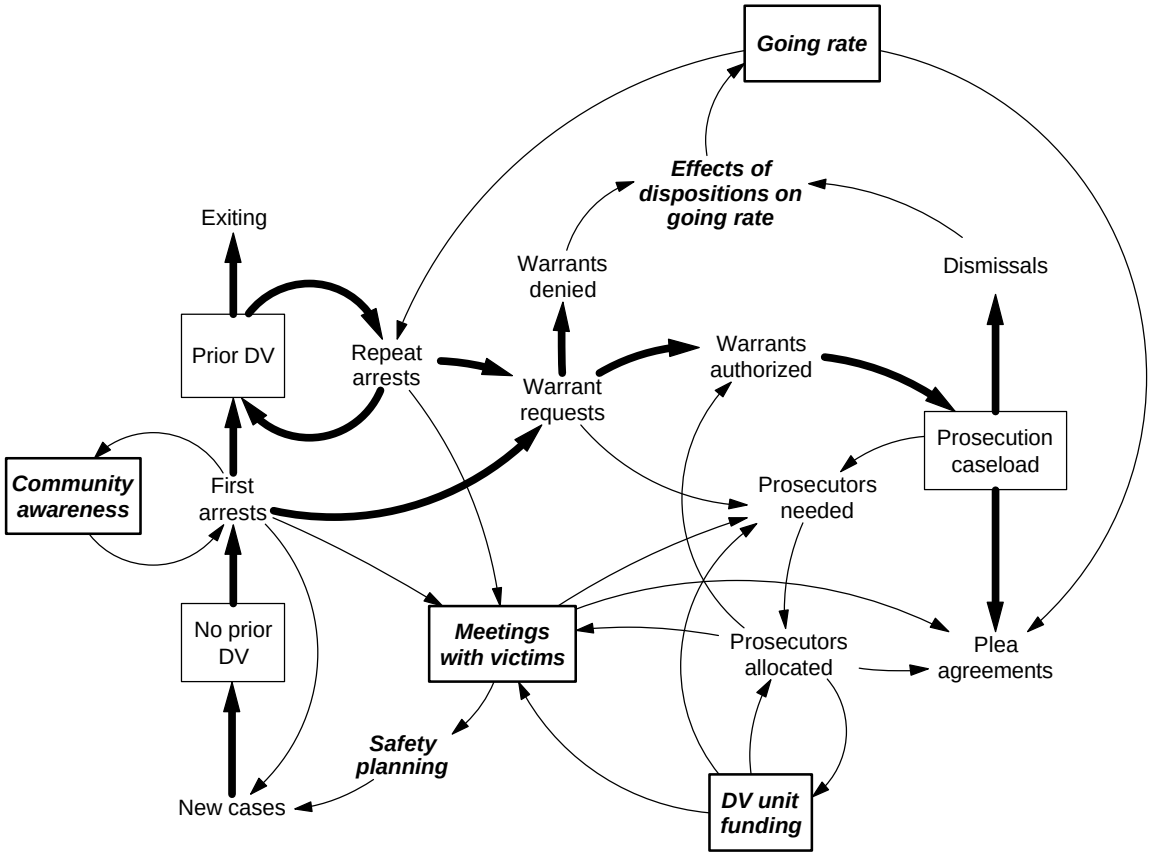
Several key informants suggested that community awareness was an important stock that affected overall reporting and demand for services. The funding of domestic violence services and coordinated community response efforts raised awareness of services, which persisted even after reductions in funding led to limited services. First arrests would have the effect of contributing to community awareness, which would in turn increase reporting and lead to additional first time arrests (a positive feedback loop), and more demand on already under funded services.

Cases going to trial were excluded from the baseline model because of low frequency. However, key informants talked about how taking cases to trial set the standard for negotiating plea agreements. This has been described in the literature as the establishing the “going rate” for a particular crime. The higher the going rate for a particular crime, the greater the specific deterrence effect on repeat arrests and incentive for defendants to accept a plea offer.

Key informants reported that the meetings with victims involving the assistant prosecuting attorney and victim advocate were critical aspects to the effective prosecution of cases and planning of victim safety. Specifically, victims coming into the criminal justice system were more likely than victims seeking services from a domestic violence shelter to see the assailants’ behaviors as isolated incidents. Meetings with the victim provided opportunities for advocates to help the victim with assessing the assailant and safety planning. This was especially important in cases involving more sophisticated forms of manipulation, e.g., using the criminal justice system to get victims arrested or threatening victims with losing their children by manipulating protective services. It is important to note that the prosecutor’s office used evidenced based prosecutions, and the assistant prosecutors used meetings with victims as a way

to assess both the nature of the domestic violence and clues for additional evidence collection, that is, not as a way to coerce victims to testify in their own cases.

Figure 6 Revised Model



Key informants talked at length about the relationship between dynamics of funding the domestic violence unit and its effectiveness. For example, key informants explained how reductions in funding of the domestic violence unit resulted in dramatic reductions in the availability of advocates for meetings with victims. Key informants also talked about how the instability of funding often resulted in less time to meet with victims and prepare cases for trials. Hence, both level and instability of funding affected the quality of services and degree to which the prosecutor's office could hold assailants accountable.

4. Discussion

This results from analyzing the preliminary models, baseline model, and key informants feedback for the revised model supported a number of findings. First, based on the analysis of the preliminary models, there is some empirical support for the caseload pressure hypothesis and it makes sense to at least consider models where dispositions are functions of caseload. Second, the primary effect of reducing prosecutor resources was on changing the dynamics of denying warrants, not case dispositions. In contrast, warrant review decisions and dispositions seemed unaffected by increasing the number of arrests reductions in prosecutors. This is somewhat

surprising since one might expect changes in arrests and reductions in resources to have a similar effect on the dynamics. The explanation for this is that cutting resources has an immediate effect on resource allocation and warrant reviews because *Prosecution caseload* cannot adjust instantaneously to balance resource allocation. Hence, prosecutors needed for disposing cases in the *Prosecution caseload* remains constant while resources needed for warrant reviews drops, increasing the relative priority of prosecuting cases. In contrast, increases the number of arrests does not create a resource allocation issue because the rate that additional cases are added to the caseload is constrained by the process of warrant reviews.

Third, analysis of the feedback loop dominance patterns in the baseline model indicated that accountability and prosecution caseload involving first arrests had a common dominating feedback loop, allocation of prosecutors to authorizing warrants, but only when the model was in equilibrium. The implication of this would be that changes during steady state to increase accountability could have the unintended consequence of changing the dynamics of caseloads.

Fourth, analysis of the longitudinal data and arrest sector in the baseline model provided strong support that the first arrest of male assailants had the unintended consequence of putting female victims at risk of arrest—a positive feedback loop. Victim advocacy and safety planning with female victims at the prosecutor's office were both potentially vital interventions. The main implication would be that female domestic violence arrests represented female victims being arrested, not female perpetrators of domestic violence.

4.1. Limitations

There are five major limitations of this study: community racial/ethnic demographics, lack of replication, use of sparse time series, uncertainty in validity of identifying first time arrests, and peripheral role of stakeholders. The last four stem from an original decision to focus on understanding and developing methods for subsequent studies. This design decision was partly motivated by the possible availability of additional data from an ongoing evaluation study of the county's coordinated community response effort to domestic violence. However, the funding for the evaluation study was extended by six months, which effectively postponed the availability of additional data sets until April 2003. This limited the numerical data available for this study to the existing prosecutor's office VAW database, which increased the importance on being able to extract and evaluate time series data from an otherwise messy database, and this eventually led to the postponement of the initial key informant interviews.

Limitation 1: The population was mostly white non-Hispanic. Race/ethnicity, as a case attribute of victims and offenders, was thus less likely to have a measurable effect on the disposition of cases. In turn, this would increase the effects of caseloads on case dispositions relative to case attributes. Case attributes could well play an equal if not larger role than caseload on case dispositions in more diverse communities.

Limitation 2: This was a single case study design. Single case study designs are inherently limited in their lack of replication and the results cannot be generalized beyond the single case. Note, however, that the decision to focus on a single case of a prosecutor's office was originally motivated by a desire to understand and develop methods that might be subsequently applied in a multiple case study design.

Limitation 3: Deciding that it was important to handle sparse time series introduced major problems in terms of both representing the real data and evaluating the final results of the model. The use of a smoothing algorithm distorts the time series, which makes it more difficult to interpret the simulation results.

Limitation 4: First time arrests were identified according to their first appearance in the Violence Against Women (VAW) database starting January 1, 1998. Anyone with an arrest prior to January 1, 1998 would have the first arrest after that date count as a first arrest as opposed to an actual repeat arrest. This would have the effect of elevating the number of cases appearing as first time arrests. The distortion would be the highest immediately after January 1, 1998, and then gradually decline as one considered more recent offenses. This introduced a question about the validity of the identification of first time arrests in this study. Additional prosecution, police data, and shelter data might have helped answer this question.

Limitation 5: This study had stakeholders in a peripheral role at the end of the model building. The prosecutor's office was, in fact, much more concerned about victim safety and supporting the critical role of the victim advocate. Ideally, stakeholders should be included at the beginning of a project in defining the problem, the purpose of the model, and the criteria for evaluating the model. Deciding to involve stakeholders late in the modeling effort was part of the trade-off between focusing on methods and problem solving. But future system dynamics studies should, unless purely concerned with method, begin by meeting with potential stakeholders and identifying the problem to be solved.

4.2. Policy implications

As a single case study design, any policy implications are provisional. The main policy implication of this study concerns the positive feedback loop from first arrest of male assailants to female victims being arrested, which represents an unintended consequence of mandatory arrest policies. That is, one unintended consequence of mandatory arrest policies might be that some assailants learn, through their first contact with the criminal justice system the criteria for an arrest, and begin using that knowledge in their manipulation of the criminal justice system to get victims arrested as a battering tactic. Key informants pointed out that this also happened with child protective services (CPS), where the assailant would learn the CPS worker's criteria, and use that knowledge to manipulate CPS to gain custody over children, and thereby use the children as a battering tactic to manipulate their mothers. Experienced victim advocates understood these risks and would work aggressively with victims in terms of safety planning. This was especially critical in criminal cases, where victims might not identify themselves as being in a domestic violence relationship and minimize the severity of the pattern of abuse. Information about patterns of domestic violence, helping the victim assess her own safety, and providing resources such as shelter and legal advocacy appeared to counteract the effects of some assailants using the criminal justice system and CPS against the victim. But this required victim advocates with significant experience working with victims in the area of domestic violence. Thus, the main policy recommendation would be for more stable funding of domestic violence victim advocates.

4.3. Directions for future research

The immediate next step is developing the revised model and formulating the feedback relationships described by key informants. The key informant interviews provided a basis for identifying several dynamic problems. Thus, the revised model can be better oriented toward solving a specific problem. It should also be possible to calibrate and test the revised model with the availability of additional numerical data from police departments and domestic violence shelters.

A major limitation of this study was the lack of replication. So an obvious next step is to consider several diverse prosecutor's offices, and compare the results of specifically calibrating the revised model to each county's prosecutor's office. Qualitative differences between the fit should indicate structural differences between the counties in terms of feedback loops. This would lead to further refinement and understanding of how accountability and prosecutor's office caseloads are related.

Finally, a general model should also be able to, with proper parameterization, reproduce related phenomena. One possibility would be to extend the model to the arrest and prosecution of driving under the influence (DUI) cases, which also result in a high volume of referrals to diversion or counseling type interventions programs. This would be a good test for both the baseline and revised model, although it might ultimately be more difficult to successfully adapt the revised model to the prosecution of DUI cases. Differences in performance between the two domains would indicate either similar structures that had been excluded from the model or structural differences between domestic violence and DUI cases.

5. Conclusion

One of the challenges for this study was to develop methods for studying community responses to domestic violence that paid attention to problem of modeling small populations. The emphasis on developing skills and a method for applying system dynamics to the general problem of increasing assailant accountability led to a disproportionate effort being spent on a variety of technical issues as opposed to problem formulation, model building, and involvement of stakeholders. A more productive path toward solving the problem of managing caseloads would have been to involve stakeholders earlier in the process, but not without sacrificing understanding the value of information at different stages.

Specifically, paying attention to issues such as working with sparse time series and differences between descriptive and mechanistic accounts of the data led to theoretical insights that had real consequences in terms of how one might evaluate claims involving complex systems. For example, it is common in statistical model building to focus on estimating various parameters as if these parameters are inherently meaningful. But there are, in fact, many possible formulations that can describe the same set of behaviors. To develop a sense of what a parameter means, one must have a sense of what it does not mean and why. This is not something that can simply be done through an operational definition. It requires a familiarity with the field of possible meanings. And to achieve that, one must not look narrowly at fitting one model, but develop and consider a variety of models that all claim to account for a similar concept.

Accounting for feedback loops and analyzing the relationship between their structure and resulting behavior is critical if one is going to try and understand the interactions and behaviors of complex systems. System dynamics is a promising method for doing this, especially when one can use both numerical time series and involve stakeholders in defining the purpose of modeling and as key informants. However, more work needs to be done in relating the structure of feedback loops to understanding the system's behavior in terms of patterns of feedback loop dominance. Otherwise, fully analyzing system dynamics models of complex and emerging social problems will have limited application in social work and the social sciences.

Notes

[1] In order to make the distinction between the single event and pattern within this paper, abuse will refer to a specific behavior while battering will refer to a pattern of abusive behaviors over time. Abusive behaviors include physical abuse, sexual abuse, emotional abuse, economic abuse, destruction of property, coercion, and threats; battering refers to a pattern of abusive behaviors. Domestic violence includes both abuse and battering. Men who batter will refer to men who use tactics of abuse and battering against their intimate partners (Pennsylvania Coalition Against Domestic Assault 1992, Section K. Definitions). Hence, the terms 'male batterers', 'batterers', 'abusers', and 'assailant' will be used interchangeably to refer to adult men (ages 18 and over) who batter women.

[2] Generally speaking, police officers must either observe a crime being committed or have a warrant approved by a justice of the peace in order to take someone into custody. This has posed a problem for enforcing laws against driving under the influence (DUI) of drugs and alcohol and domestic violence. For example, not being able to take an intoxicated driver into custody would pose a risk to public safety. This has led to the warrantless arrest where police officers can make the arrest, with the probable cause being determined *after* the arrest.

[3] In the author's community, for example, changes in arrest policies led to more assailants being arrested, but also increases in the number of cases being denied or dismissed by the prosecutor's office. Moreover, women were now being arrested for domestic violence. It would seem that instead of increasing assailant accountability, batterers were learning that there were no real consequences while victims were punished and placed in greater danger. Advocates blamed the prosecutors for incompetence and laziness. Prosecutors blamed the police for failing to collect the evidence. Police blamed the advocates for creating reporting policies that essentially discouraged them from dealing with the serious issues. Similar types of experiences led a number of scholars and researchers in the United States to asking different questions.

[4] Based on the author's personal experience in developing batterer intervention programs and personal conversations with other batterer intervention program facilitators.

[5] In warrantless arrest, police officers make the initial screening decision, and prosecutors review that decision with the result of either authorizing or denying the arrest warrant. In contrast, prosecutors are more likely to prosecute cases when they make the initial screening decision.

[6] For a prosecutor's office to *nolle* or *nolle prosequi* a case is to abandon the lawsuit.

[7] A third-order exponential smoothing algorithm was used because it is the lowest order smoothing algorithm where peaks are approximately distributed symmetrically and neighboring points around a peak are weighed more heavily than distant points. The decision to use a 120-day delay was chosen by comparing various delays and looking for shortest delay that clearly identified the general trends. Ultimately, however, the question is not whether the optimal smoothing algorithm was selected, but whether the model reproduces realistic time series behavior over a wide range of inputs generated from a variety of smoothing algorithms and hypothetical scenarios.

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Figure 7 Simulated Results from PACM120

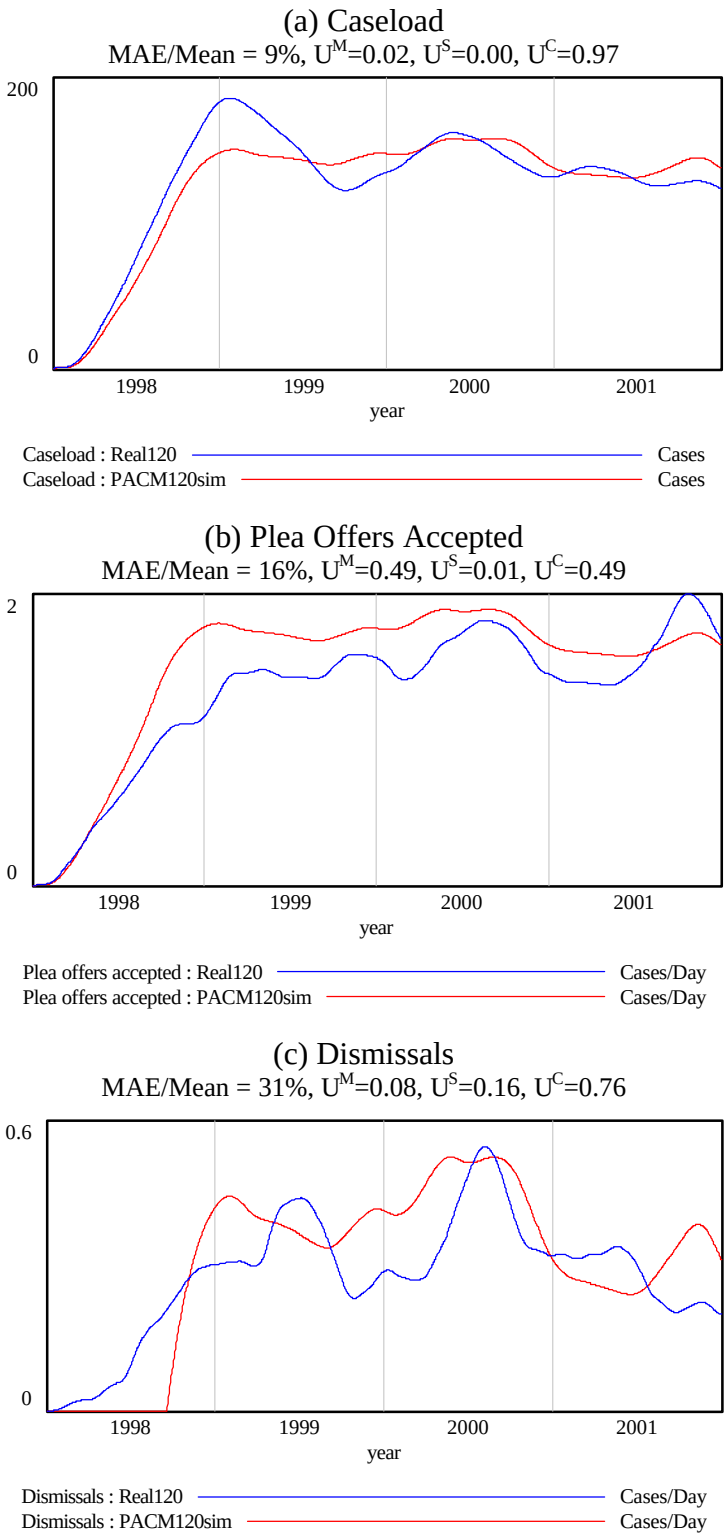
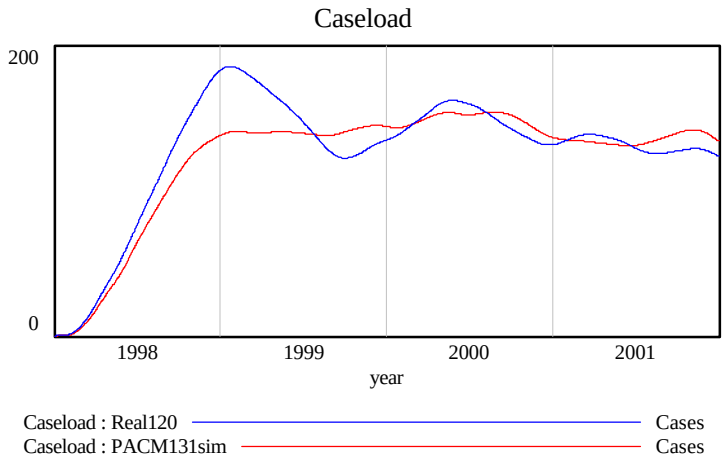


Figure 8 Simulated Results from PACM131

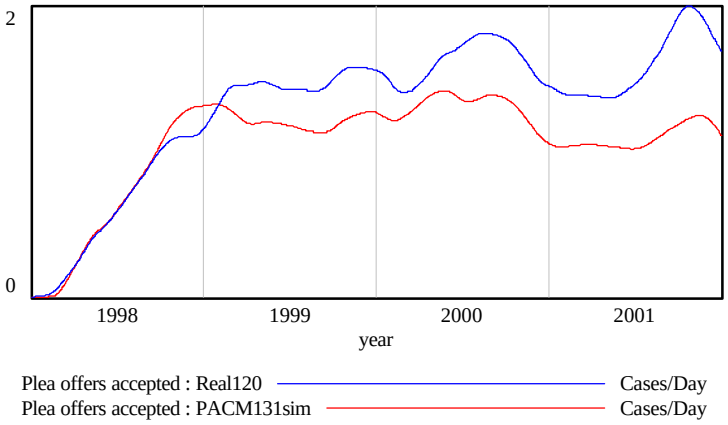
(a) Caseload

MAE/Mean = 10%, U^M=0.08, U^S=0.01, U^C=0.90



(b) Plea Offers Accepted

MAE/Mean = 21%, U^M=0.56, U^S=0.16, U^C=0.28



(c) Dismissals

MAE/Mean = 171%, U^M=0.81, U^S=0.14, U^C=0.05

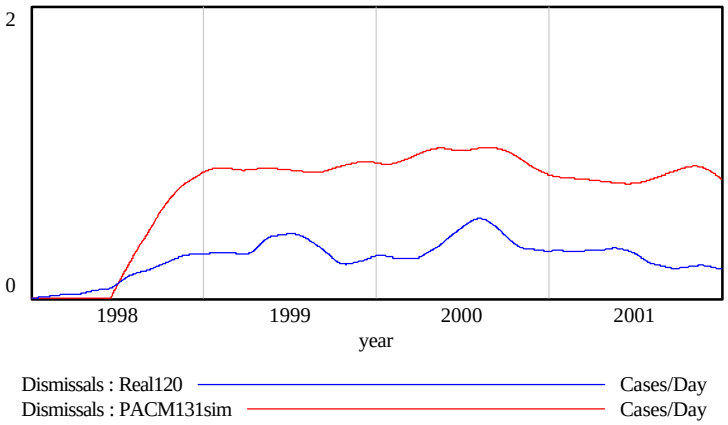
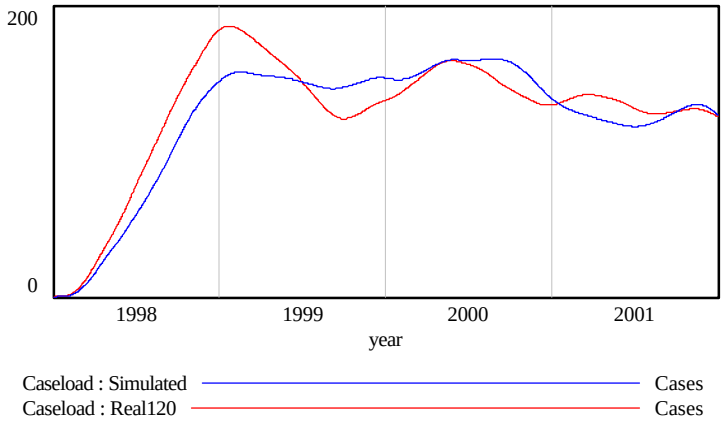


Figure 9 Simulated Results from PACM141

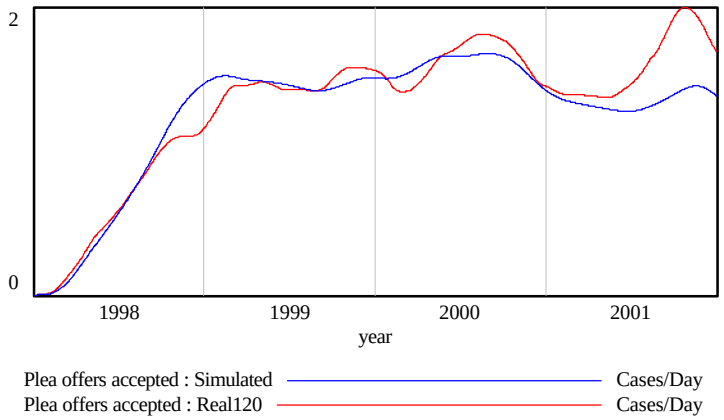
(a) Caseload

MAE/Mean = 10%, U^M=0.08, U^S=0.00, U^C=0.92



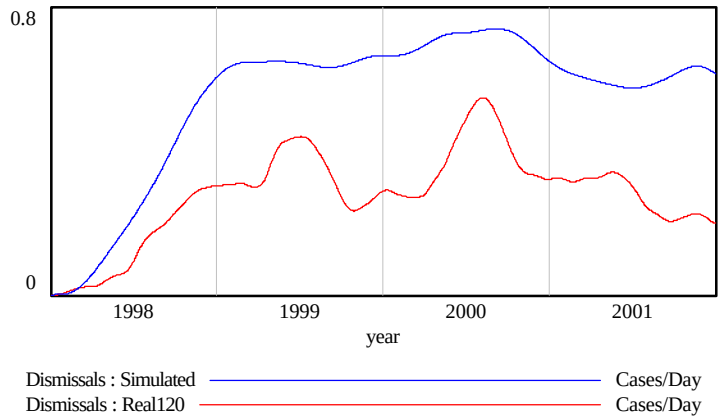
(b) Plea Offers Accepted

MAE/Mean = 9%, U^M=0.09, U^S=0.05, U^C=0.87



(c) Dismissals

MAE/Mean = 98%, U^M=0.85, U^S=0.07, U^C=0.08



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