Improving Victim Engagement and Officer Response in Rape Investigations: A Longitudinal Assessment of a Brief Training[*]

SCOTT M. MOURTGOS, University of Utah

IAN T. ADAMS, University of Utah

SHARON H. MASTRACCI, University of Utah

The initial interaction between rape victims and police affects how cases progress through the criminal justice system. In one US state capitol, the police agency determined its initial response to rape victims was sub-par. Victim engagement was low, and officer-written reports often endorsed negative stereotypes about rape victims. A four-hour training to enhance police response was developed and implemented. Within four months, all sworn officers (n~600) completed an in-person, four-hour training. We first test the effects of training on the percentage of rape victims who stay engaged in the investigative process following their initial contact with officers. We then use a machine-learning-based text analysis of all written reports (77 pre-training, and 55 post-training cases) of initial contacts between officers and victims. Compared to the six months before training, victim engagement improved 32% in the post-training period. Written reports by officers also improved, with increased victim-supportive language and improved focus on victim services.

Keywords: police training, victim engagement, rape investigation, text analysis

Note

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Introduction

Police response to sexual assault victims has received public scrutiny and scholarly attention for decades (Franklin et al., 2020). This attention and scrutiny are not unwarranted. Sexual violence happens frequently (Franklin et al., 2020), yet when victims[1] report occurrences to police, they are frequently met with skepticism, dismissiveness, questions probing the validity of their statement, and inquiries regarding extralegal topics such as previous sexual history (R. Campbell, 2008; Martin, 2005). Police-victim interactions such as this often leave victims reluctant to have further contact with the police and discontinue their cooperation in the justice process (Ahrens, 2006). Seventy-five percent of case attrition occurs during the investigation phase of a sexual assault complaint (Barrett & Hamilton-Giachritsis, 2013), with one of the most common reasons for attrition being a victim withdrawing their[2] participation (Feist et al., 2007).

Police agencies attempt to address victim-engagement concerns through specialized sexual assault training for their officers. However, few jurisdictions have implemented mandatory training of this nature (B. Campbell et al., 2019), and even fewer have been evaluated for their effectiveness (Franklin et al., 2020). Moreover, studies tend to evaluate individual officers' attitudes rather than examining officers' behavioral performance (Lonsway

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[1]There are active terminology debates among academics, practitioners, and advocates concerning descriptive language, including "victim," and "survivor," with the former more consistently used within the criminal justice practioner context. Given the focus of this study in policing, we opt to use "victim" throughout the paper, though different audiences may find alternate language choices appropriate for their use.

[2]We recognize that the vast majority of sexual assaults and other forms of sexual violence are perpetrated against women. However, sexual violence is also committed against males, thus, we seek gender neutrality throughout the manuscript by using plural nouns.

et al., 2001). The study of police attitudes through surveys and scales may not detect implicit attitudes and preclude assessing whether such attitudes affect sexual assault investigations (Shaw et al., 2017).

The attitudinal focus arises from a belief that officers' attitudes towards sexual assault and assault victims are the "primary block" to an effective police response (Lonsway et al., 2001, p. 697). We submit that police attitudes regarding sexual assault are a secondary concern compared to improved police behaviors during their interactions with sexual assault victims. While a decrease in officer ascriptions to rape myths or other thinking errors regarding sexual assault would ideally coincide with improved behaviors, behaviors should be the primary concern (Goff, 2016; Lonsway et al., 2001). Research suggests that "change efforts are increasingly successful when they target behavioral change as opposed to trying to force value change from an external agent (Shaw et al., 2017, p. 611)." Whether words spoken or actions taken, behaviors are what victims tangibly experience, regardless of whether those words or actions align with unseen police attitudes.

In the current study, we evaluate a police sexual assault training program's efficacy on police behavior when engaging with sexual assault victims. We accomplish this with a longitudinal study examining two outcome measures. First, we test victim engagement: Using a Bayesian paradigm, we find an average expected improvement in victim engagement post-training of 32%. Second, we examine the content of written police reports documenting rape complaints before and after the provided training. By examining police behavior in this manner, we move beyond measuring attitudes with survey methods. How an officer officially documents a rape allegation directly impacts the case's future processing (Venema, 2016) and provides insight into the police-victim interaction itself (Shaw et al., 2016, 2017). Our algorithmic analysis of reports finds that post-training, officers' written reports are more concerned with victim well-being, use more appropriate phrasing, and generally reflect a positive change in how officers interact with victims.

Police Response to Sexual Assault and Victim Engagement

While not all police-victim interactions with sexual assault victims are negative, bad experiences are not uncommon. Negative interactions are attributed primarily to police officers holding problematic attitudes about sexual assault victims, such as victim-blaming and rape-myth acceptance (R. Campbell et al., 1999; Ullman & Filipas, 2001). By rape myths, we mean extralegal factors associated with stereotypes about 'real rape' (Estrich, 1987; e.g., "It can't really be rape if …" victim drug or alcohol use, sex worker status, and antecedent victim 'risk-taking' behavior) that may bias officers' perceptions about a sexual assault report and their decision-making regarding it. Further, police officers have been found to discount cases based on assessments of a victim's credibility, determined by alcohol or drug consumption on the victim's part, affectual responses by victims that do not align with what an officer thinks a victim should act like, and having a current or past relationship with the suspect (R. Campbell & Raja, 2005; Patterson, 2011; Shaw et al., 2017; Sleath & Bull, 2017). Indeed, officers who more readily accept rape myths tend to rate victims as having some responsibility in the sexual assault, hold perpetrators less responsible, and deem sexual assault cases less authentic (Hine & Murphy, 2019).

However, it remains unclear whether police attitudes are the proximal cause of negative police-victim interactions upon examining the relevant literature. In a study conducted by Campbell and Raja (2005), victims were frequently asked how they were dressed when the assault occurred and about their prior sexual history. Accordingly, most of the study victims reported that their interactions with the police made them feel guilty, distrustful, depressed, and anxious. In research conducted by Patterson (2011), a substantial portion of victims reported being told their story was unbelievable, being asked about prior sexual history, being asked about how they were dressed leading up to the assault, and being told they would be charged with a crime if they did not provide an accurate story. Unsurprisingly, many of these victims reported that they would not have reported the sexual assault if they had known beforehand what they would experience. Further, Temkin (1999)

relates that victims who reported a negative experience with the police described officers as having disbelieving attitudes, expecting 'genuine' victims to act in a particular manner, and lacking sympathy.

All of these studies have in common overt officer behavior that resulted in negative perceptions on the victims' part. Victim blaming and endorsing rape myths are presumed to be the motivations behind these actions. However, behavior and motivations are separate phenomena. That is, while it is hard to imagine some of the actions taken by officers during negative police-victim interactions are not driven by internal attitudes (especially when one reads first-hand accounts from victims of sexual assault, see Spohn & Tellis, 2010 for example), the causal link between behavior and motivation has not been clearly established (Sleath & Bull, 2017).

Some argue that it is not personal attitudes that drive negative interactions with sexual assault victims; rather, the problem's root lies within police systems. Officers are trained to be skeptical, unemotional, and to challenge and validate stories in an attempt to reveal the truth. They are not typically trained to be supportive and empathetic. Processing cases in the manner described above benefits the police system, as victims can be managed with less effort. Officers are free to respond to additional calls for service more quickly if the patience and time it takes to respond to a sexual assault victim appropriately are not required (Martin, 2005). "Thus, the priorities of the organization take precedence over the needs of the victim" (R. Campbell & Raja, 2005, p. 98). Barrett et al. (2013) find support for this idea in an experimental paradigm studying police sexual assault investigators. They find that investigators primarily perceive rape victims as a source of information to further case progress. The welfare of victims was of secondary importance.

Viewing negative police-victim interactions in sexual assault cases through this lens may also help explain the oft-reported victims' experiences of police persuasion to pursue their case or not. As Kerstetter (1990) and Kerstetter and Van Winkle (1990) highlight, police officers have a substantial amount of influence over whether victims cooperate with an investigation or not. Officers can sway victims to withdraw from participation if details of the case do not align with ideas about 'real rape.' Conversely, officers can encourage victims to continue participating in the justice process if they perceive the case to be 'legitimate.' Indeed, Konradi (2007) found that sexual assault victims often felt that officers were trying to persuade them to either pursue or not pursue their cases.

These experiences could arise for a couple of reasons. First, officers often become accustomed to factors within cases that determine whether prosecutors will file charges. Sometimes referred to as a 'downstream orientation' (Alderden & Ullman, 2012; Frohmann, 1991; Pattavina et al., 2016; Spohn & Tellis, 2019; Ylang & Holtfreter, 2019), if the circumstances of a particular case do not meet those standards (i.e., a 'trial sufficiency' standard), officers may attempt to dissuade a victim from pursuing the case to conserve agency resources. Second, it is also possible that officers attempt to dissuade victims from continuing in the justice process because they do not assess the victim as credible (Kelly et al., 2005; Patterson, 2011; Venema, 2016). Regardless of which explanation, or a combination thereof, is accurate, a victim's continued engagement with the justice process represents more than a simple statement by a victim of their own volition (Kerstetter, 1990).

Police officers have a sizeable effect on a victim's decision to cooperate and engage in the legal process (Kerstetter & Van Winkle, 1990). Negative interactions with police officers can serve a silencing function, resulting in the victim's withdrawal of cooperation. That is, if a victim perceives that the police do not care about what happened to them, convey blame, or express doubt in their narrative, a victim may be reluctant to have further contact with the police (Ahrens, 2006; Alderden & Ullman, 2012; Kelly et al., 2005).

Most sexual assault victims' first contact will be with the responding patrol officer to make an initial report (Patterson, 2011; Spohn & Tellis, 2010). This initial interaction is crucial to retaining victims' engagement in the justice process[3]. Suppose the responding officer discourages a victim's participation by framing the interview

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[3]This study explicitly examines an intervention aimed at increasing victims' engagement in the justice process. However, victim engagement may not be the primary goal when exploring ways to improve society's response to sexual assaults. Involvement with

with repeated questions to evaluate consistency or giving the impression of questioning the victim's credibility. In that case, the victim will be less likely to engage in the justice process further. Inquiries regarding extralegal factors, such as prior sexual history or whether the victim sexually responded to the assault, can also discourage continued engagement with the justice process (R. Campbell, 2008).

As Spohn and Tellis (2010) emphasize, inappropriate treatment of victims by initial interviewing officers is the primary cause of case closures due to 'uncooperative' victims. They provide numerous first-hand accounts from victims describing their treatment by initial responding officers. The first excerpt from their study illustrates what occurs when a responding officer focuses on extralegal factors, leaving the victim to conclude that the officer blames them for the assault.

> I was harshly interrogated…The police officer was incredibly rude and harsh; well, not rude, harsh. Their main focus was that I was drunk and how drunk was I but they never considered if I was too drunk to consent…I gave a statement and again they fixated on how much I had drank and moved towards blaming me because the rapist was someone I knew…At that point they believed him because I was drinking a lot and they made the assumption it was consensual (pp. 1412-1413).

The second excerpt illustrates an explicit accusation of dishonesty.

> Immediately they told me I was lying and on drugs. 'Straight up! You're on drugs…You're lying, you're lying! Stand up, close your eyes, and count to thirty. Can you count to thirty?…Tell me the truth or you will personally go to prison for lying to a police officer' (p. 1414).

Given this type of initial interaction with officers, a victim may choose to withdraw from the justice process. As will be seen below, documentation of police-victim interactions similar to the two excerpts from Spohn and Tellis (2010) leads us to the present study.

The Current Study

Context of the Study

The setting for the study is one major metropolitan police agency. The subject agency provides full-spectrum policing services to a mixed urban core and suburban service area that includes the state capital, a population of more than 200,000 nighttime residents, and a wider metro area population of over 1.1 million. The agency is one of only two in the state that has attained accreditation through the Commission on Accreditation for Law Enforcement Agencies (CALEA). The agency employs approximately 600 sworn officers and has a specified unit within its investigation division responsible for investigating all sexual assault allegations.

In 2014, the department came under public criticism regarding its handling of sexual assault investigations. During the resulting review of past police reports documenting sexual assault investigations, numerous instances were discovered of less-than-ideal interactions between victims and the initial responding officer. The below excerpt is only one example and echoes the Spohn and Tellis' (2010) examples listed above.

> My entire interview with [] was done alone, without her boyfriend or family present. I did find it

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the criminal justice system can take an extreme toll on victims' mental and emotional health (Adams & Mastracci, 2017). Accordingly, stepping away from the justice process may be the healthiest decision for some victims. While recognizing this, a primary goal of police involvement in sexual assault investigations is to hold offenders accountable. This cannot be accomplished without the victim's engagement in the justice process.

odd, however, that [] stated she did not fight to get away from [] during the incident. [] stated he had a hold of her hands so she couldn't get away, but she stated she didn't use her legs as a weapon, or call out at any time for help. []'s story isn't consistent with being able to fight back since she would have had a free hand while he was pulling down her shorts and then again when he inserted his penis into her vagina…[] could not explain any of these things to me. I did not press [] for explanations about these oddities.

While the officer conducting this initial investigation may have been well-meaning (Martin, 2005), concerns abound in their interview with the victim: Formally documented skepticism, unrealistic expectations of a victim during a violent assault, and inappropriate judgment. A victim could easily interpret active disbelief on the officer's part and that they were being ascribed responsibility for the incident. In this case, the victim refused further contact with detectives for continued engagement with the justice process. This example was just one of many similarly styled police-victim interactions, resulting in a loss of victim contact or victim withdrawal from the justice process. While there are likely many reasons why victims choose to withdraw from the justice process, previous research suggests problematic interactions with the initial responding officer are responsible for a substantial portion of victim withdrawal.

Hypotheses: Victim Engagement and "What police actually do"

Prior studies on the efficacy of sexual assault training focus on officer attitudes. The findings of these studies are mixed (Sleath & Bull, 2017), with several resulting in decreased problematic attitudes (B. Campbell et al., 2019; Darwinkel et al., 2013; Franklin et al., 2020) and several others finding no effect (Goodman-Delahunty & Graham, 2011; Sleath & Bull, 2012).

While an improvement in officer attitudes is a desirable goal in and of itself, we are concerned with the effect of training on victim engagement. Specifically, we test whether focused training leads to improved victim engagement in the justice process. Past research indicates that police's improved response may increase victim engagement (Ahrens, 2006; Alderden & Ullman, 2012; Bouffard, 2000; R. Campbell & Fehler-Cabral, 2018; Kelly et al., 2005; Kerstetter, 1990; Spohn & Tellis, 2010). Thus, we offer the following hypothesis:

Hypothesis 1: Specialized sexual assault training for officers will increase victim engagement.

But what is it about the training that keeps victims engaged with the process? How does training increase engagement? The only study that we are aware of that examines the effect of sexual assault training on police behavior suggests that sexual assault-specific training improves police-victim interactions. In an experiment, Lonsway et al. (2001) provided specialized sexual assault training to new police recruits, measuring the effects of training on attitudinal outcomes and behavioral performance through simulated victim interviews. They found no significant difference between recruits in the experimental group and control group when it came to attitudes regarding sexual assault and sexual assault victims. However, when behavior was examined in simulated victim interviews, recruits in the experimental group were more likely to allow victims to control the pace and tone of the interview, address the needs and concerns of the victim, provide empathy and reassurance, and question victims less about their use of alcohol.

We build upon Lonsway et al.'s (2001) findings and examine the effect of sexual assault training on how police actually describe sexual assaults in their case reports, rather than in follow-up surveys of attitudes about sexual assault or in interview simulations. As Lonsway and colleagues indicate, "police attitudes are ultimately of lesser concern than their actual behavioral performance when responding to sexual assault cases and victims…[I]t is particularly unfortunate that…research has not systematically documented what police actually do when they respond to a sexual assault case and interview a victim" (p. 698, emphasis supplied). With this in mind, we

provide the following hypothesis:

> *Hypothesis 2: Specialized sexual assault training will lead to improved police-victim interactions during the initial response.*

Data and Method

Data

To test these hypotheses, we use official police report data from the subject department. The training intervention was provided to all sworn members of the police department between September 2015 and December 2015. All rape reports for six months prior (March 2015 through August 2015) and six months after (January 2016 through June 2016) were collected to allow for a pre- and post-training comparison. Cases were identified through evidence reports documenting the collection of a Sexual Assault Kit (SAK). Typically performed by sexual assault nurse examiners (SANEs), SAK examinations include collecting biological evidence, such as semen and saliva, which may be present on victims' bodies post-assault. After collection, police take custody of the SAKs and are tasked with transporting them to a forensic laboratory for analysis, after which their contents may be used in the investigatory and prosecutorial processes (Mourtgos et al., 2021; Valentine et al., 2019).

This department's policy is to obtain a SAK whenever possible in all reported incidents of rape when the rape is reported within 120 hours of the occurrence[4]. While a victim may refuse to undergo a SAK examination, it is rare[5]. Thus, identifying cases in this manner is nearly (if not entirely) comprehensive for the crime of rape. After removing cases where a SAK was collected for a crime against a juvenile, the crime occurred in another jurisdiction, or an officer conducted no initial interview, 77 pre-training cases were retained, and 55 post-training cases were retained for analysis[6].

Training Intervention

Based on an internal review, a training program was developed within the subject department to better prepare first responders for handling the initial investigation of sexual assaults. The principal investigator is a subject matter expert in sexual assault investigations and was asked to help develop a training course for initial responding officers. The class was designed as a 4-hour training block consisting of the following modules, all based on contemporary research:

- Understanding sexual assault offenders.
- Victim vulnerabilities that offenders are looking to exploit.
- Perceptual, behavioral, and cognitive distortions experienced by victims of sexual assault.
- Victim neurobiology.
- Explaining paradoxical behaviors sometimes reported by victims during sexual assault investigations.
- The current state of research regarding false allegations of sexual assault.
- How to properly interview sexual assault victims.
- Instructions on recently updated department policy requiring: 1) the primary consideration in sexual

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[4]This timeframe is set by the local SANE organization that conducts the exams for the studied department.

[5]Due to data limitations, we are unable to provide an exact percentage of victims that choose to not undergo a SAK examination. However, the sergeant overseeing the Special Victims Unit at the time of this study estimates that only approximately 5% of victims refuse.

[6]Cases with a juvenile victim were removed prior to analysis. At the studied agency, policy dictates that child sexual abuse victims are not to be interviewed in the field by the responding patrol officer. Rather, the patrol officer collects limited information from the reporting parent or guardian and the child is interviewed at a later time by a detective trained in child forensic interviewing approaches.

assault investigations to be the health and safety of the victim; 2) patient, objective, and non-judgmental interviews; and 3) no opinion of whether the case is founded or unfounded to be included in the initial report.

Notably, the training was developed so that police officers could relate their own experiences to those of the victims they were interviewing (see Di Nota et al., 2020, for a synthesis of research). For example, the perceptual (and other) distortions often experienced by police officers during violent encounters were paralleled with those of sexual assault victims (e.g., impaired memory, auditory blunting, visual distortions, disassociation, etc.). Further, two case studies were included during the training to showcase sexual assault cases that appeared unlikely upon the initial report but were found to be accurate upon investigation. These case studies included reviews of the initial report (specifically noting paradoxical behaviors that the responding officers expressed doubt about), subsequent investigation, and case outcomes. The inclusion of these training methods was deemed necessary by those developing the training program to get buy-in from officers within the department.

Longitudinal Design

In the current study, we test the efficacy of a sexual assault training program. Specifically, we examine if the program resulted in more positive police-victim interactions during officers' initial response to sexual assault reports. The training was conducted during in-service sessions from September 2015 through December 2015. All sworn employees received the training. All training sessions were taught by the principal investigator and the then-current supervisor of the department's Special Victims Unit.

While a randomized control trial (RCT) design would be ideal, the associated legal, ethical, and practical considerations often make RCTs impossible to employ (Singleton Jr. & Straits, 2018). Such was the case here. Public and political pressure to improve the department's response to sexual assault victims would not allow RCTs. Further, conducting RCTs in this particular circumstance raises ethical concerns. Assuming the training was beneficial and resulted in officers better serving sexual assault victims, by conducting an RCT the agency would provide this enhanced response to some victims and withhold it from others.

Accordingly, a longitudinal analysis was employed to test the training program's effect on victim engagement. This type of design is proper when an entire sample receives the same treatment. In this case, the entire population of sworn officers in the agency received the same training intervention. By extension, all rape cases were handled (in the post-training context) by officers who had undergone the training. By leveraging available data in both the pre- and post-training period, we build a more robust causal inference than is possible with a single-shot cross-sectional design. Notably, the pre-training phase includes reports in the period following the initial intense public and political attention, such that we are more confident that any effect detected in the post-intervention period is not simply a short-term reaction to the outcry. A further strength of using available data is that we avoid reactive measurement problems, as neither the officers nor the sexual assault victims were aware of being studied or observed, nor was a study planned at the time (Singleton Jr. & Straits, 2018). Therefore, there is no reasonable connection between the results we document in this study due to behavioral change in response to being studied.

Measures

Victim Engagement

To measure victim engagement, case records were examined to determine if a victim withdrew from the justice process after the initial police report was made. A victim was determined to have withdrawn from the justice process if 1) they failed to make contact with the follow-up detective after the initial report, or 2) the victim explicitly told the assigned detective that they no longer wanted to move forward with their case. To clarify the

point regarding a victim failing to make contact with a follow-up detective after the initial report, the following is provided. At the studied agency, detectives investigating sexual assault cases must adhere to a three-step process regarding victim contact. First, they have to exhaust all telephone options, including leaving voicemails. If contact cannot be made over the telephone, detectives must respond to the victim's residence. If contact cannot be made at the residence, detectives must leave their business card. Finally, if a victim still does not contact the detective, the detective must send a letter from the police department requesting contact and explaining that the case will be inactivated if the victim does not contact them. If victims fail to make contact after this three-step process is taken, the case is inactivated and would be considered meeting the first condition listed above for withdrawing from the justice process.

Officer Behavior

How an officer judges a victim's rape report is reflected in the officer's written report (Venema, 2016). Of course, an officer's written report cannot capture the full context of a police-victim interaction. However, based on Shaw et al.'s (2017) research, officers' written reports provide a workable proxy for measuring an officer's behavior during a police-victim interaction. Indeed, a "specific behavior to target for change" in sexual assault investigations is police report writing (p. 611).

While one may question whether an officer would document their own problematic behavior in a police report, the examples above show that this does occur (along with numerous other examples from the studied department that we do not have space to provide). Indeed, Shaw et al. (2017) recognized that officers frequently provide evidence of how police-victim interactions unfold in their written reports. Examining 248 sexual assault reports, they found officers routinely invoke rape myths in the official documentation. In more than half of the cases, at least one statement was made regarding what 'real rape' looks like.

Shaw et al. (2017) support the view that systemic, rather than individual, failures are at play. These interactions' root problem is organizational, and officers only conduct themselves in the expected manner (Barrett & Hamilton-Giachritsis, 2013; R. Campbell & Raja, 2005; Martin, 2005). As such, officers likely do not view these less-than-ideal interactions as problematic. Instead, they are documenting the 'proper' way of conducting an investigation. This is especially problematic when considering Shaw and colleagues' (2016) findings that as rape myths within a report increase, investigative efforts decrease. The number of investigative steps taken during a sexual assault investigation significantly predicts the likelihood of an arrest being made and the case being referred for prosecution. Accordingly, the behavior of police report writing in sexual assault cases "illuminates an invaluable opportunity for intervention (Shaw et al., 2017, p. 611)."

Measuring behavior in policing is critical. While many studies concentrate on attitude alone, the results are subject to important limitations, including the Hawthorne effect, demand bias, and even overt faking by respondents. Further, even where attitudinal changes are real, they are subject to quick change. Studies with a sole focus on attitudinal change can lead to a false sense of efficacy, as demonstrated in a recent review of the literature on the impact of de-escalation training in policing (Engel, McManus, & Herold, 2020).

Analytic Plan

This study uses a two-part analysis, and two different modeling techniques are used. First, the effect of officer behavior on victim engagement is examined with a Bayesian two-sample hypothesis test. Second, officer behaviors are examined by using machine learning-based text analysis.

Bayesian Hypothesis Testing

We employ a Bayesian two-sample hypothesis test to examine the change in victim engagement between pre- and post-training. We accomplish this by treating the pre- and post-training cases as separate parameters. We estimate each parameter with beta distributions and then conduct Monte Carlo simulations to estimate the amount of change, if any, and the probability of observing that change due to chance.

Machine Learning-Based Text Analysis

The historical problems with prohibitive time allocation and protracted human coding efforts are no longer impediments to evaluating large corpora of word data. With the advent of machine learning, natural language processing, and widespread digitalization of text, including police reports, scholars can obtain a richer understanding of police behavior that was not possible even a decade ago (Mourtgos & Adams, 2019). We utilize machine learning-based text analysis to assess changes in official police reports documenting initial interviews of rape reports. Doing so allows us better to understand officers' actions through their own words and at a larger scale than usually allowed by more conventional qualitative analysis. Recalling that officer reports are necessarily only representative of the police's view of the case, these reports should not be considered a full accounting of the event. This limitation is well-known in policing research that can be over-reliant on agency-generated records. However, for this study's purposes, the initial written reports function as a record of officer behavior, rather than an attempt by the researchers to derive a finding about the victim, the victim's perceptions, or the case details.

Analysis and Results

Victim Engagement: Bayesian Hypothesis Testing

Conventional (i.e., frequentist) statistics assume there is only one true population parameter within the population (i.e., there is one true parameter coefficient that is fixed but unknown). However, within a Bayesian framework, all unknown parameters incorporate uncertainty defined as a probability distribution. As a result, Bayesian methods do not provide a single outcome value but rather a distribution with a probability that the distribution contains the given parameter coefficient (Van de Schoot & Depaoli, 2014). Barnes, TenEyck, Pratt, and Cullen (2019) recently called for a shift to Bayesian statistical analysis in criminological research. A failure to acknowledge and leverage uncertainty through Bayesian inferential methods can lead to an "increased rate of false-negative results, inflated false-discovery rates, and over-estimates of effect size," and thus, a crisis of confidence in criminological research (Barnes et al., 2019, p. 1).

The uncertainty around parameter values is captured by a distribution defined before observing the data called a prior distribution. Van de Schoot and Depaoli (2014) identify three main classes of priors. These include non-informative priors, weakly-informative priors, and informative priors. The variance, or precision, of the prior reflects a researcher's level of certainty about the parameter of interest. This prior knowledge typically stems from previous studies with similar data or expert knowledge.

The 'principle of indifference' advises researchers to assign equal probabilities to all events unless known a priori that some events are more probable than others (Golan, 2018). Uninformative (or "flat") priors specify equal plausibility for every possible value of the modeled parameters. Some researchers argue that uninformative priors should be the default because they maximize entropy (Golan, 2018) and reduce error probabilities (Mayo, 2018).

Weakly-informative priors reflect more certainty about population parameters than do non-informative priors. Although weakly-informative priors typically have little influence on the final parameter estimate (McEl-

reath, 2020; Van de Schoot & Depaoli, 2014), they help constrain parameters to reasonable ranges and retain a conservative estimate of any prior knowledge available about the parameter. Accordingly, it is often argued that unless one truly believes that all possible events have an equal probability, weakly-informative priors should be used in Bayesian analysis (McElreath, 2020).

When examining victim engagement in the present study, it is clear that a non-informative prior is not an accurate reflection of reality. Pre-training, approximately 77% of all victims were classified as withdrawing from the justice process. Post-training, approximately 67% of victims were classified as withdrawing from the justice process. With this in mind, a weakly-informative prior is more appropriate than an assumption that engagement or a failure to retain have equal probabilities. We are then left with determining the prior distribution for the analysis. To do this, we consult three different sources of prior information. First, the sergeant overseeing the Special Victims Unit at the studied department was consulted (i.e., expert opinion). Based on seven years of experience overseeing all sexual assault investigations for the studied department, the sergeant estimated that approximately 30% of victims do not withdraw from the justice process. Second, internal records management system data was examined for the two years before the training intervention. According to case closure codes in the records management system, approximately 68% of victims did not withdraw from the justice process. Finally, a recent publication using National Incident-Based Reporting System (NIBRS) data from 2011 to examine variables that affect sexual assault case closures was consulted. This study reported that, per NIBRS data, only 8.2% of sexual assault cases were closed due to a victim 'refusing to cooperate' (in other words, 91.8% of victims did not withdraw from the justice process).

These three sources provide a wide range of estimates for victim engagement priors, even given what is known about misused clearance codes (Spohn & Tellis, 2010). Discrepancies are found across the US with different agencies' use of clearance codes, and discrepancies exist across detectives within the same police agency. Accordingly, the prior for victim engagement based on expert opinion (30%) was retained. Given the uncertainty, we used a wide variance (i.e., weak prior) for our analysis. These conservative choices allow us to represent a distribution where 0.3 is the mean but allow for a wide range of possible alternative rates. Like any other statistical assumption, the use of priors in Bayesian analysis should be interrogated. This maxim is especially true when there is no strong argument for a particular prior over another, and there are several reasonable choices, as in this instance. Accordingly, in Appendix A, we analyze the data with each of the three described priors to test how sensitive inference is to the prior's specification. We demonstrate that regardless of which of the three priors are used, our results do not change. This outcome is expected as the likelihood function (i.e., observed data) quickly overtakes the prior assumption with even moderate size samples, producing similar inferences (McElreath, 2020). In other words, just as in many other Bayesian applications, in large enough samples, the data overwhelm the prior, regardless of the form that prior takes.

The second statistic necessary in a Bayesian method is the likelihood function. The likelihood function, in its simplest sense, is the observed data. In this analysis, the dependent variable of interest is victim engagement. We model the dependent variable with the probability density function (PDF) of the beta distribution. The PDF of the beta distribution is defined as:

$$Beta\left(\rho; \alpha, \beta\right) = \frac{\rho^{\alpha-1} \times \left(1 - \rho\right)^{\beta-1}}{beta\left(\alpha, \beta\right)}$$

where ρ represents the probability of an event, α represents how many times we observe the 'positive' event (i.e., a victim does not withdraw from the justice process), and β represents how many times we observe the positive event did not occur (i.e., a victim withdraws from the justice process). The equation's denominator is the beta function, which allows us to normalize the posterior distribution such that our distribution sums to 1, giving us a workable probability (Kurt, 2019).

Each victim has a unique probability of staying engaged in the justice process or withdrawing. These probabilities of individual victim engagement also have a common distribution, which is the beta distribution. Thus, the beta distribution is a probability distribution for probabilities (McElreath, 2020). By taking these unique probabilities into account when estimating the overall probability distribution, we include more information and more appropriately account for uncertainty in the model.

We have two sample parameters (pre- and post-training) to estimate. We arrive at a posterior distribution for each parameter by estimating the PDF for each. Figure 1 shows the estimates for the pre- and post-training parameters side by side. The data suggests that there was an increase in victim engagement post-training. However, it is also clear that there is overlap between the two parameters' distributions. The distribution overlap leaves open the possibility that post-training gains are possibly due to chance or that pre-training victim engagement could be better than post-training. We use Monte Carlo simulation to interrogate further whether post-training gains in victim engagement are due to chance or not.

Beta Probability Distribution Functions for Victim Engagement
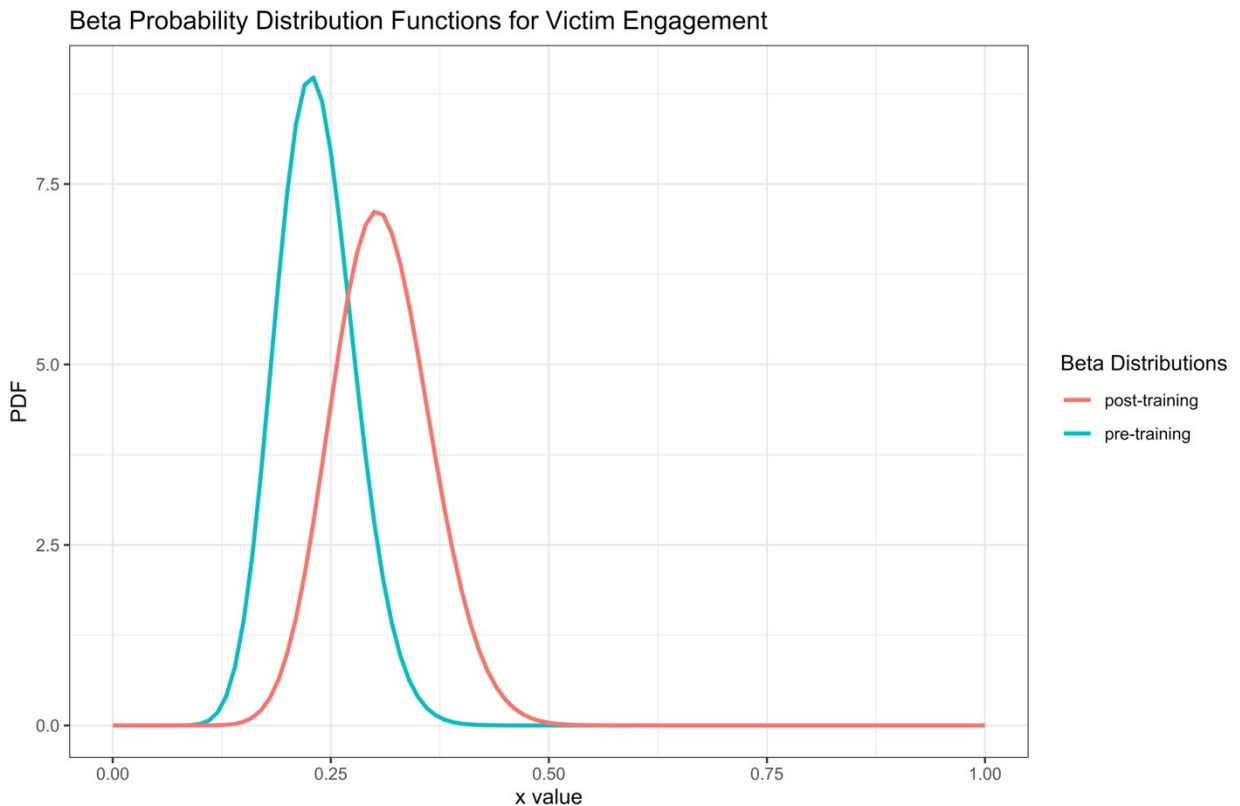
Based on Figure 1, we should expect more possibilities where post-training victim engagement is better than pre-training victim engagement. The more frequently we sample, the more precisely we can observe how much more frequently post-training victim engagement is better than pre-training victim engagement. Once all of the samples are drawn, the ratio between when post-training victim engagement is superior, and the total number of possibilities can be calculated to arrive at an exact probability (Kurt, 2019).

One million samples were drawn from each distribution using a Monte Carlo simulation to establish an exact probability. Next, the number of times post-training victim engagement was greater than pre-training victim engagement was divided by the total number of samples. The results indicate that in 86% of the one million samples, post-training victim engagement was better than pre-training victim engagement. Thus, based on the distribution of all possible scenarios, in 86% of those scenarios, post-training victim engagement was better than pre-training victim engagement. This finding indicates that even with a relatively small number

of observed sexual assault cases, we can have a relatively strong belief that post-training victim engagement is better than pre-training victim engagement.

Returning to the analysis of victim engagement, we want to know not only if post-training victim engagement is better, but also *how much* better. We can accomplish this by calculating how many times greater post-training victim engagement is than pre-training victim engagement. We divide the post-training samples by the pre-training samples and plot the results. Figure 2 shows the resulting density plot, which indicates that the average expected improvement in victim engagement post-training is 32% (ratio of 1.32). This finding supports our first hypothesis: An improvement in police-victim interactions will lead to an increase in victim engagement.

## Relative Improvement Post-Training
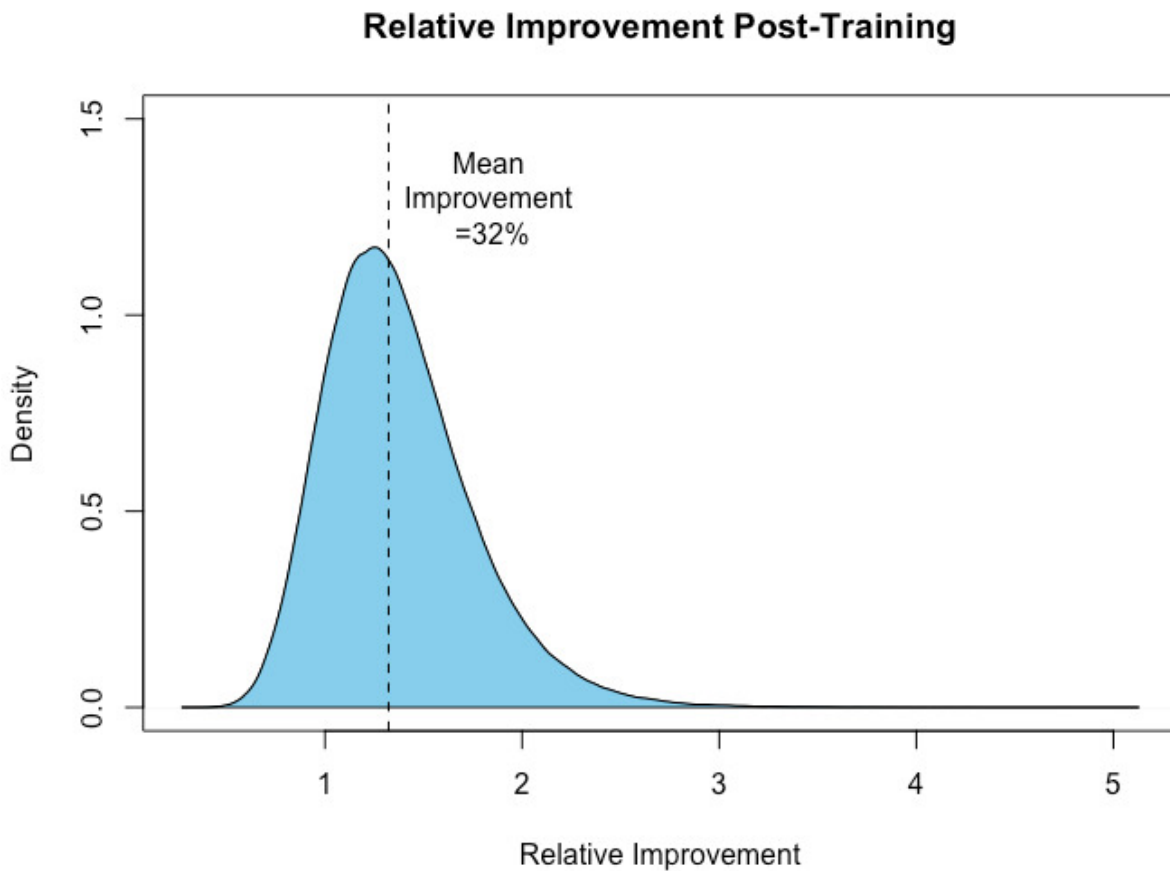
### Sexual Assault Case Reports: Text Analysis

Before employing machine learning techniques on the text data in the police reports, the text required transformation into a format a computer can 'read.' First, the text is tokenized. Tokenization entails separating the text into pieces by separating each word from other words. In practice, this is accomplished by treating white spaces and punctuation as word boundaries. Next, punctuation and numerical values are removed, followed by the conversion of all letters to lowercase. Finally, stopwords are removed. Stopwords are ubiquitous words (e.g., "the," "of," "to") that are not useful for analysis. A custom stopword list of all names and locations was then generated, and all instances were removed from the corpus to protect confidentiality.

Once pre-processing was completed, the resulting text data were grouped into either the pre-training or

post-training period. Next, the frequency with which each word was used between periods was calculated and plotted. In Figure 3, words near the red line were used with equal frequency pre- and post-training, while words further away from the line were used more frequently in one period. Note that pre-training, words such as "bar" and "club" (as in nightclub) were used more often by officers compared to the post-training period. This change is especially significant, as the internal evaluation of how officers had been handling sexual assault cases indicated that officers had been over-focusing their reports describing alcohol-use and intoxication levels of victims (recall, Lonsway et al., 2001 observed the same change in behavior following their training intervention with police recruits). Post-training, words indicating increased attention to victim well-being such as "advocate" (as in victim advocate) and "drugged" were used more frequently by officers. Further, it appears that post-training, officers were more actively suspect-focused. For example, the words "charges," "aggravated," and "arrests" are used more frequently.
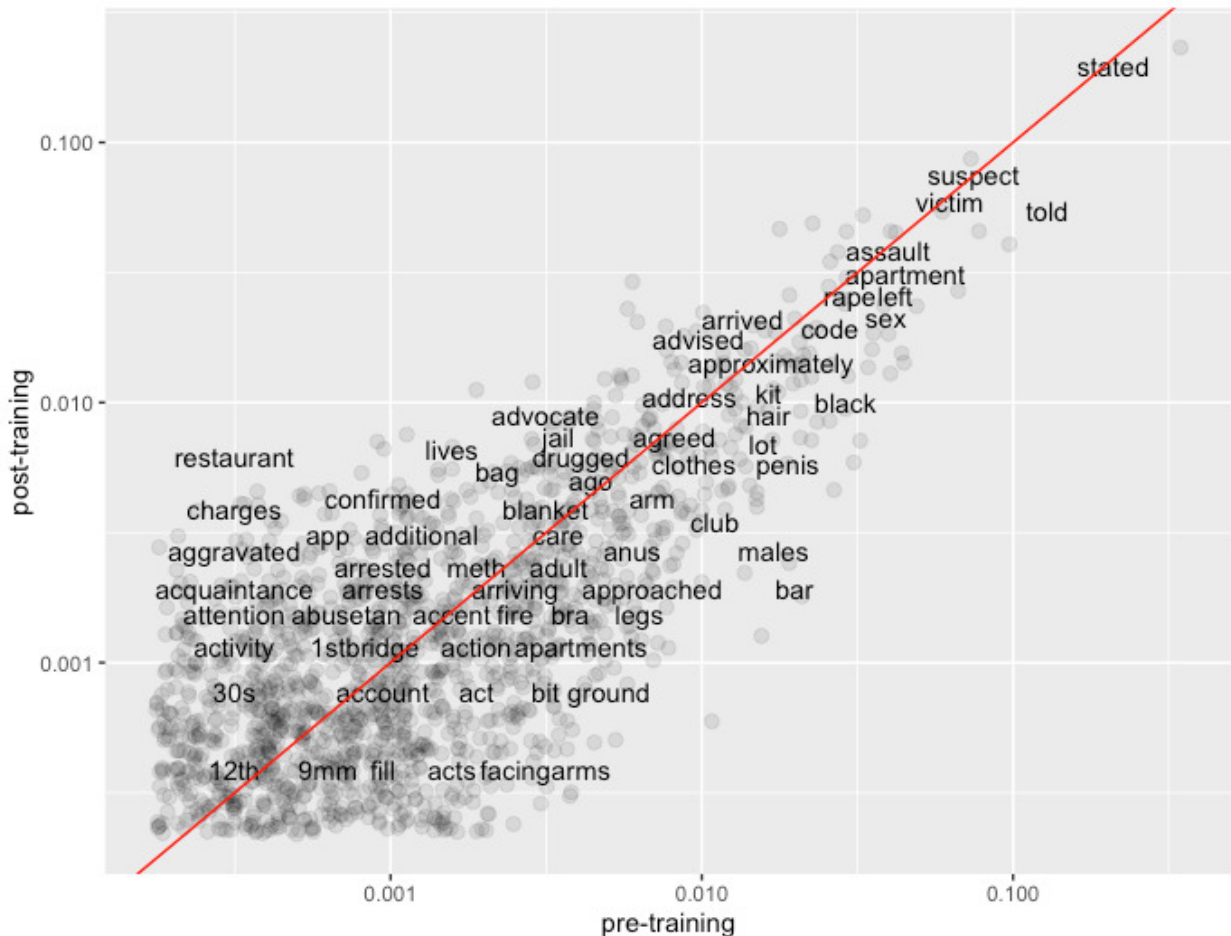
While this single-word analysis provides some insight, consecutive words, called n-grams, can also be examined. By seeing how word X followed by word Y is followed by word Z, greater insight into the context of officers' writing can be obtained. The difference in reports pre- and post-training is even starker when examining trigrams in Figure 4.
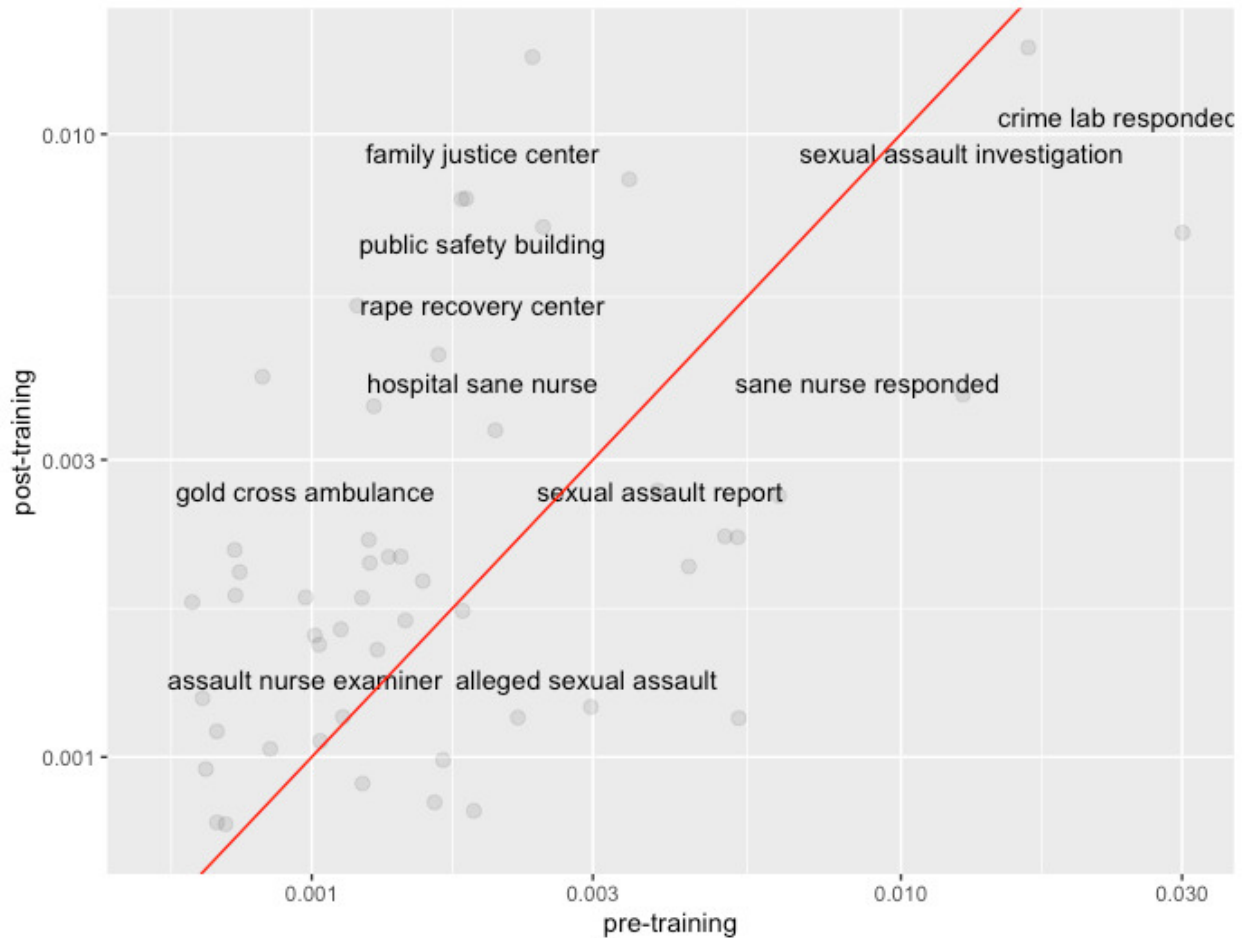
Post-training, officers' reports emphasize victims' well-being: "rape recovery center" and "family justice center" are phrases directly related to providing victim services to sexual assault victims. In the pre-training period, the focus was more on the system's needs: "SANE nurse responded" and "crime lab responded" (i.e., the system needs evidence). Of further note are the increased use of "Gold Cross ambulance" and "public safety building" post-training. During the review of past handling of sexual assault cases, one problem that was identified was that some officers required rape victims to secure their own transportation to the hospital for medical attention. In the provided training, an emphasis was placed on officers facilitating this transport through the local ambulance service and not burdening victims with that detail.

Further, very rarely are victims taken to the public safety building immediately after an initial report at the subject department. The increase in the public safety building mentions indicates that suspects were being taken to the police department for questioning by detectives more frequently than being questioned by patrol officers on scene and then released.

Finally, especially interesting is the choice of words used by officers during the pre-training period: Specifically, the more frequent use of "alleged sexual assault." The inclusion of the adjective "alleged" modifies the phrase, shifting meaning in a way that does not place a high level of veracity in victims' statements. A shift in this phrasing suggests that a better explanation of victim responses to a traumatic experience during training, in a way that parallels an officer's own experience with traumatic experiences, pays dividends.

In sum, this algorithmic analysis of reports indicates that following training, officers' written reports were more concerned with victim well-being, used more appropriate phrasing, and generally reflected a positive change in how officers interacted with victims. These findings support our second hypothesis: The training

intervention lead led to improved police-victim interaction during initial sexual assault investigations and increased victim engagement. These effects are not likely to be the result of chance, but rather, the training intervention.

Discussion

Sexual violence receives significant attention from the public, policymakers, and researchers (Franklin et al., 2020). Much of the attention surrounding policing and sexual assault encompasses how to improve police response to sexual assault victims and sexual assault investigations. While assessing police attitudes regarding rape myths and attitudes towards victims is important, affecting and assessing what police actually do should be of primary importance (Goff, 2016; Lonsway et al., 2001).

Police departments typically provide specialized training to improve police response to sexual assault victims and sexual assault investigations. Most specialized training curricula tend to cover the same domain content, including the neurobiological response to trauma, interviewing techniques, legal and procedural issues, crisis intervention, evidence collection, and attitudinal orientation toward the topic of rape (Lonsway et al., 2001). The training program examined in this study was similar. However, this study sidesteps the traditional focus on attitudinal outcomes and concentrates on assessing behavioral outcomes. We first tested victim engagement post-training and then discussed reasons why the attendant positive changes might occur. We found evidence that victims were 32% more likely, on average, to remain engaged in the justice process post-training and that there is a .86 probability that this increase in victim engagement is not due to chance. Examining officer reports of sexual assault, we found that the training brought about positive behavioral change manifested in officers' written reports exhibiting more concern for victim well-being and less focus on the extralegal factor of the victim's alcohol consumption, and less language questioning victim credibility.

We agree with Lonsway and colleagues (2001) that it is unfortunate that research in this particular domain has not better documented what police actually do when responding to sexual assault investigations. Rather than relying solely on attitudinal scales and surveys (Shaw et al., 2017), the field should attempt to think more creatively about measures that will more accurately assess desired changes in performance (Lonsway et al., 2001; Shaw et al., 2016). We accomplished this through the use of official police reports written by initial responding officers. We are not the first to use written reports to evaluate police response to sexual assault (Shaw et al., 2016, 2017). We build upon previous work through the use of machine learning text analysis, which allows for a more objective and reproducible evaluation of word data than conventional human coding (Mourtgos & Adams, 2019). These techniques reduce the cost and personnel required to analyze large volumes of officer reports and provide an opportunity to recover potentially valuable patterns that have been mainly inaccessible to researchers and practitioners.

Our results indicate that focusing on police behavior rather than police attitudes may be a fruitful path for policing scholars. The mixed findings of previous research on police sexual assault training may not accurately reflect training efficacy but instead related to what is chosen to be measured. Lonsway et al.'s (2001) study lends credence to this possibility as their results found a positive change in police behaviors post-training, without a corresponding change in police attitudes.

Limitations

One limitation of our study again points to what is chosen to be measured. Based on prior research, we used officers' written reports as a proxy for officer behavior during police-victim interactions (Shaw et al., 2016, 2017). While we believe our measure is a workable proxy for officer behavior during a police-victim interaction, as stated previously, it clearly cannot capture the full context of an interaction. This study's design

assumes that officers' increased documentation of referrals to victim services and victim-centered language in their reports reflects an improved police-victim interaction. Of course, it is possible that the training changed the organizational demands perceived by officers to note these activities in their reports, rather than an actual improvement in interactions. Without observations of the police-victim interactions themselves, it cannot be definitively concluded that interactions improved—a combination of improved interactions and a change in perceived organizational demands is likely. A research design that includes observational data or interviews with victims should be considered in combination with the text analysis approach we used in future research assessing the efficacy of similar training programs.

Second, it remains unclear if simply providing specialized training to officers improves police-victim interactions or if there is something specific about the training developed at the subject police department that resulted in the observed positive outcomes. Our research design is not able to parse the relationship between specific training and outcomes at that level. Regardless, practitioner inclusion in the development and evaluation of the training is critical. It provides a more nuanced view of the complex issues involved when working with police officers and sexual assault investigations (Huey & Mitchell, 2016). Similar to the causal questions addressed below, we should be careful not to overstate the evidence of a link between officer report-writing behavior and subsequent victim decisions to interact (or not) with the police investigation. This limitation could begin to be addressed with qualitative interviews of officers, with a focus on uncovering the link between the two outcomes studied.

Thirdly, the findings here should be considered within the limits of causal identification. In short, the design here is not a true experiment, and so the detected effects could have been confounded by unmeasured effects. For example, there was prior negative publicity surrounding how police responded to sexual assault cases and victims. There is a possibility that officers were individually responsive to the negative attention, and changed their behavior. This design limitation is fundamental but should also be contextualized by time precedence, in that in the present study, the pre-training phase included reports that followed the public outcry, and yet the reports from that period were not as victim-centered as the reports in the post-training period. The lack of a true experimental design means the detected effects could also theoretically be confounded through turnover of the existent front-line officer cohort and replacement with newly hired officers. Because we specifically study officer turnover in this agency in parallel research, we are confident this vulnerability is not seen in the currently studied agency (blinded, under review). However, causal identification is vulnerable to this class of confounding effects generally, and so generalizing our findings to other agency contexts need to consider how agency and personnel responses could affect similar training. We recommend that researchers attempt to replicate the results reported here using a true experimental design to confront the causal identification problem inherent to non-experimental designs.

Fourth, it should also be recognized that while the observed improvements are important, the majority of victims still did not stay engaged in the justice process, even after the training was provided (approximately 67%). There are other factors at play when it comes to victim engagement in sexual assault investigations. One such likely factor is interactions with, and actions taken by, follow-up investigators. While our study explicitly examined police-victim interactions during the initial report and their effect on victim engagement, further research should assess the impact of police-victim interactions with follow-up investigators.

Finally, it is currently unknown if the training effects were durable. There is always a possibility that the training effect wore off over time. Expanded longitudinal analyses could assess this possibility. Further, victim engagement in this study was measured by continued engagement with the police. Due to data limitations, we could not examine if the increase in victim engagement further increased prosecutions or guilty verdicts.

Conclusion

It is incumbent upon police departments to engage in data-driven policing by scientifically testing interventions to determine if those interventions had the desired effect (Engel, McManus, & Isaza, 2020). Despite its limitations, the current study's resulting increase in victim engagement, alongside a high probability that that increase resulted from the department's training, suggests that the training holds promise. Further, the additional evidence provided by the text analysis offers support that the training did indeed cause a positive change in police-victim interactions, as reflected in officers' written reports. In sum, we find that a relatively small training intervention was associated with better police-victim interactions and a subsequent increase in victim engagement in the justice process.

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