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Examining Probation Lengths in Philadelphia, PA

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by

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Abstract

One out of every 22 adults in Philadelphia, PA is under community supervision which is more the double the national average (Schiraldi, 2018). Even though probation has been seen as a more lenient alternative to prison it actually serves as a net-widener (Phelps, 2020). Probation can result in increased punishments for low-level offenses when failure to meet probation conditions results in jail or prison time when there was never a possibility of long-term incarceration at the time of sentencing (Phelps, 2020). This study uses public court information data from Philadelphia to analyze the effects different dosages of probation have on recidivism through propensity score matching. Analysis of 451 individuals on probation in Philadelphia indicates that a dose of 3 years of probation is more effective at reducing the odds of recidivism than a sentence of up to 2.5 years of probation. The dose of 3 years of probation was the only dose that showed a significant decrease in the odds of recidivism. The other doses had similar recidivism rates as the average across the city. The results of this study show the need for future studies to expand on research about dosage of probation.

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Chapter 1: Introduction

The aspect of the criminal justice system that tends to get the most attention from the public, politicians, and the media is incarceration, yet incarceration is not the most common form of supervision in the criminal justice system (Phelps, 2018). In fact, 60% of people under correctional control in the United States are on probation (Steinmetz & Henderson, 2016). Over the last few decades, probation has become a more popular option as an alternative to incarceration (Phelps, 2018). Between 1980 and 2007 the number of probationers in the United States increased from 1.1 million to 4.3 million (Phelps, 2018).

Probation was originally created as an alternative to incarceration (Phelps, 2018). Being placed on probation requires certain conditions to be met, such as frequent drug testing, reporting to one's probation officer, needing permission to leave the jurisdiction, maintaining employment, and many other rules (Phelps, 2018). A probationer typically has 10-20 conditions they must adhere to (Phelps, 2018). Failure to meet any of these conditions can result in being sent back to jail or prison even if a new crime was never committed (Phelps, 2018). Conditions of probation for those already facing difficulties finding employment, housing, and meeting their basic needs are close to impossible to satisfy (Phelps, 2018).

Conditions of probation can be exceedingly difficult for marginalized probationers who are facing dire economic situations and have few access to resources (Phelps, 2020). They also have higher likelihoods of being discriminated against by police officers, potential employers, landlords, and others (Phelps, 2020). Being on probation can cause

skepticism from potential employers making it harder to find a job (Doherty, 2016).

The city of Philadelphia, Pennsylvania stands out in its use of probation compared to the rest of the country. The city of Philadelphia and the county of Philadelphia are one in the same, which is unique compared to many major cities in the United States. This makes the criminal justice system there an interesting jurisdiction to analyze. In 2018, only Georgia and Idaho had higher rates of community supervision than Pennsylvania (Schiraldi, 2018).

Larry Krasner took office as the Philadelphia District Attorney in January of 2018. Krasner was elected on a progressive reform agenda. One of Krasner's main goals was to reduce the number of people under supervision in Philadelphia (Ewing, 2021). As of December 31st, 2018 there was a total of 39,485 people under the supervision of the Adult Probation and Parole Department (APPD) of Philadelphia (The First Judicial District of Pennsylvania, 2018). Krasner recently was quoted saying "Supervision for probation and parole, in general, is not just ineffective, it causes failure. It causes crime, it causes people to lose their jobs and not be able to support their families and not rehabilitate, and go back to jail." (Ewing, 2021). In order to combat mass supervision Krasner implemented office policies to cap new probation sentences at 3 years for felonies and 1 year for misdemeanors (Ewing, 2021). The policies also directed assistant district attorneys to ask for no more than 60 days of incarceration for technical violations of probation.

Another part of Larry Krasner's plan to reduce the number of people on supervision in Philadelphia included increasing the number of early probation terminations being filed and granted. In the past, the Philadelphia Public Defender's

office would file termination petitions when they felt a person had been doing well on probation and it could take an unnecessarily long time for the district attorney's office to review the case. When Krasner took office he assigned a specific assistant district attorney to respond to early probation termination petitions allowing the process to be sped up. As of February 9th, 2021, the Public Defender's office had filed over 800 termination petitions and 95% of them had been granted (Ewing, 2021). This report aims to further the understanding of how shorter terms of community supervision affects recidivism.

Pennsylvania has unique sentencing laws that allow for people to be sentenced to longer lengths of probation. Typical sentencing practices for many judges in Pennsylvania is to sentence a person to a term of incarceration and followed by a probation "tail" (Doherty, 2016). Pennsylvania laws allow probation terms to be equal to the maximum statutory sentence for the offense (Schiraldi, 2018). Due to this law, probation sentences of 20 years are not uncommon, which is unheard of in many other states (Schiraldi, 2018). There are only 3 other states that allow the maximum sentence for felonies and Pennsylvania is the only state that allows the maximum for misdemeanors to be given as a probation term (Schiraldi, 2018). In fact, 31 states limit most probation sentences to 5 years or less (Schiraldi, 2018). Pennsylvania judges also commonly sentence people to consecutive terms of probation, so they are serving multiple probation sentences for different cases stacked upon each other (Schiraldi, 2018).

Understanding the realities of probation sentences and outcomes is essential to reducing mass supervision and mass incarceration in the United States. In order to

mitigate the exponential impact of collateral consequences the criminal justice system has on poor and minority communities continued research needs to be conducted on probation. This report aims to further the academic knowledge about the relationship between dosage of probation and the likelihood of recidivism in Philadelphia, Pennsylvania.

Chapter 2: Literature Review

While there has been extensive research conducted on the criminal justice system there is still a gap in the research when it comes to probation. Even though probation is the most commonly used form of a criminal sentence it has not been the focus of much research or analysis (Doherty, 2016). The research that does exist on probation has consistently shown that over supervising people on probation who are low-risk can result in more harm than good (The Pew Charitable Trusts, 2018). Over supervision can disrupt successful elements of people's lives that reduce their risk such as family, employment, and education (The Pew Charitable Trusts, 2018). Providing supervision and services to low-risk probationers can cause an increase their chances of recidivism (Schiraldi, 2018). Additionally, a randomized control trial in Philadelphia (Barnes, Hyatt, Ahlman, & Kent, 2012) of low-risk probationers found no increased risk of recidivism for those on low-intensity supervision. Research has consistently shown that early termination of probation for appropriate offenders does not compromise public safety (Baber & Johnson, 2013).

The literature that does exist on community supervision shows it can be effective when used correctly. The problem becomes what is "correctly" and are agencies like Philadelphia supervising this way. A study in Canada showed when the Risk-Need-Responsivity (RNR) principles are correctly applied this reduces recidivism to 26.5% but when the principles were not met there was a 60.6% recidivism rate (Dyck, Campbell, & Weshler, 2018). The RNR model is also more cost effective at reducing recidivism than traditional community supervisor sanctions (Dyck et al., 2018). Agencies using RNR principles correctly can see a $2 cost for a 1% decrease in recidivism compared with a $40 cost using traditional sanctions (Dyck et al., 2018).

Early Termination of Probation

Baber and Johnson (2013) conducted a study comparing the 3 year recidivism rates of early terminated offenders with those who served their entire probation term. Those who had their probation terminated early had a rearrest rate of 10.2% and those who served their entire term had a rearrest rate of 19.2%. The study also found the time to rearrest was greater for those who were early terminated. Research has indicated those who receive early termination of probation have lower rates of recidivism across all risk levels (Carter & Sankovitz, 2014). Similar results were also found in New York City when early probation discharges were increased almost 600% from 2007 to 2013 (Schiraldi, 2018). One year post-discharge only 3% of people had been rearrested for a felony compared to 4.3% of people who had completed their full supervision term (Schiraldi, 2018). The Pennsylvania Commission on Crime and Delinquency found no difference in a 3 year matched group recidivism rates for Philadelphia and the surrounding 4 counties for those were sent to jail versus jail plus a probation tail and the same for those sent to prison versus prison plus a probation tail (Reynolds, Weckerly, & Armstrong, 2016).

Dosage of Probation

An additional way that has been proven to improve the effectiveness of community supervision is through a dosage model of probation. The dosage model being used in Washington County, Minnesota is based on the premise all probationers must serve a minimum of one year on probation and complete all program hours in order to be discharged (Orput, 2019, pp. 14-15). The number of dosage hours are determined based upon risk level and they are designed the address criminal thinking patterns and values,

poor decision-making skills, anti-social peers, family/marital stressors, and chemical abuse (Orput, 2019, pp. 14-15). A probationer could also chose to not complete the dosage treatment hours and then they would remain on probation for the original length of their sentence. A dosage model of probation can more effective because it put the responsibility of changing one's criminal behavior onto the client. Although there is still a need for this model to be empirically studied.

There is currently a gap in the existing literature on community supervision dosage in relation to recidivism. Taxman (2002) reviewed the existing literature on the effectiveness of supervision dosage and found 4.2 million adults were under community supervision and one third of the new intakes to prison were due to failures of supervision (Taxman, 2002). Many of the reasonings behind the failures were unknown, which highlights the need for research surrounding what makes supervision the most effective. Existing research also indicated that supervision should not exceed 18 months in order to be the most effective (Taxman, 2002).

Dosage of Incarceration

Research in the field of criminal justice and what is most effective to reduce crime and increase public safety is an ever growing field. Particularly in recent years, research on dose-response has been begun as a way to attempt to identify how long of incarceration or community supervision terms a person needs to serve. Being able to identify a sentence length that has the potential to maximize decreases in recidivism can reduce crime, increase public safety, and save taxpayer money.

Dose-response in corrections is still a largely under-studied field, especially when it comes to adults. Loughran, Mulvey, Schubert, Fagan, Piquero, and Losoya (2009)

determined a dose-response relationship using propensity score modeling (PSM) between the length of stay for juveniles in placement and their future rates of rearrest and self-reported offending in Maricopa County, AZ and Philadelphia, PA. Of the youth in the sample 55% were on probation and 45% were in placement. Dosage for length of stay was separated into 4 categories; 0-6 months, 6-10 months, 10-13 months, and greater than 13 months. Overall, the study showed there was no added benefit of longer stays in placement in regards to rearrest (Loughran et al., 2009).

The literature on dose-response in corrections for adults is more mixed. Some studies have found a nonlinear dose-response curve for time served and recidivism (Meade, Steiner, Makarios, & Travis, 2012). Although still showing that certain lengths of sentences can be reduced without any compromise to public safety, because there is no significant effect of time served on recidivism until a certain point (Meade et al., 2012). Additionally, longer lengths of incarceration have been shown to increase the odds of a parole or probation revocation (Rydberg & Clark, 2016).

In contrast, other literature indicates there are deterrent effects of incarceration. The United States Sentencing Commission found incarceration periods of over 10 years has deterrent effects using a matched comparison group study. In the Netherlands a study showed there was no significant relationship between the amount of time incarcerated and the odds of future offending (Snodgrass, Blokland, Haviland, Nieuwbeerta, & Nagin, 2011). These findings are also supported by Wermink, Nieuwbeerta, Ramakers, Keijser, and Dirkzwager (2017) who found a null effect of length of imprisonment on future rates of recidivism. Although, Snodgrass et al. (2011) did find modest evidence supporting those serving sentences less than 3 months were sentenced to fewer aggregate days of

incarceration within 3 years after release than those who served 3 months to a year. Some explanations of why there has been mixed findings on the effects of incarceration lengths on recidivism argue it is partially due to methodological constraints of the studies (Berger & Scheidegger, 2021). This study aims to address potential methodological constraints by utilizing propensity score modeling.

Propensity Score Modeling

An effective way to analyze dosage of probation or incarceration is through using propensity score modeling (PSM) (Hong, 2012). Certain factors influence the sentence a person receives such as criminal history, charge type, and age. There are also certain factors that affect a person's likelihood of recidivating. PSM allows for comparison of groups who received different sentence lengths by controlling for factors that determine sentencing lengths (Harmon, Campbell, Henning & Renauer, 2019). This allows researchers to measure the influence the length of probation has on recidivism with confidence there is no bias from factors that influence sentencing. Based on previous research, this study will control for age at arrest, race, sex, , courtroom, charge grade, count of charge grade, type of charge, count of prior charge by category, number of supervision violations, and prior prison or probation sentences (Olson & Lurigio, 2000) (Harmon et al., 2019).

Reforms

Due to research indicating the lack of increased crime rates when reducing people's probation there has begun to be probation reform enacted in some jurisdictions. Between 2007 and 2016, 37 states saw a reduction in the number of people on probation while also seeing a drop in crime (The Pew Charitable Trusts, 2018). Two of those states,

Texas and South Carolina, saw reductions of both supervision and crime rates by over 20%. Additionally, Louisiana started capping jail or prison terms for first time technical violations to 90 days (The Pew Charitable Trusts, 2018). After this reform, probation revocations for new crimes decreased by 22% (The Pew Charitable Trusts, 2018). In 2012, Missouri enacted a good time credit for those under supervision (Schiraldi, 2018). The policy granted 30 days of earned compliance credit for every 30 days of compliance while under supervision (Schiraldi, 2018). The reconviction rates for those released early through good time credits were the same prior to the policy being enacted (Schiraldi, 2018).

In summation, the existing literature has shown that use of shorter probation sentences and terminating longer sentences early can be done without a threat to public safety. There is a lack of literature on dosage of community supervision. Because of this it is possible supervision decreases the likelihood to reoffend but there could be a tipping point where supervision actually increases the odds to reoffend as has been seen in dosage of corrections literature (Meade et al., 2012). Due to Philadelphia having more people on probation then most other places in the United States it is essential to study Philadelphia individually and see if there will be the same relationship between dosage of probation and recidivism. This is also a critical time to conduct research on mass supervision in Philadelphia because there is a progressive District Attorney in office who is willing and eager to implement reforms.

Chapter 3: Methodology

Hypothesis: Increasing the length of probation does not result in reduced odds of recidivism.

Sample

This study relies on data from The Unified Judicial System of Pennsylvania Wed Portal, which provides access to all court case information for the state of Pennsylvania. Every person with a criminal history in Philadelphia has a court summary that captures a running list of every case a person has been arrested for, what the charges are, the disposition outcomes, sentences if applicable, disposition dates, and disposition judges. Every case is assigned a docket number, which also has a docket sheet that provides detailed court information for a given case. Docket sheets provide information such as arrest date, filing date, all court/hearing dates, type of court appearances, fees, fines, and restitution information. Although this information is publicly available, it is only accessible via downloadable portable document format (PDF) versions of separate court summaries and docket sheets.

The sample for this study consisted of case information from three SMART court rooms. SMART stands for Strategic, Management, Advance Review and Design, Readiness, Trial pretrial courtrooms. In 2018, the First Judicial District of Pennsylvania produced an annual report that provided the following information; the criminal section of the trial division of the Philadelphia court system includes pretrial services, criminal listings, and courtroom operations and in 2018 the criminal section disposed of 11,377 dockets and 3,569 (31.3%) of those cases were processed through SMART pretrial courtrooms. Due to the volume of cases that are processed through SMART rooms, the

judges assigned to those rooms have large numbers of probationers on their caseloads. Judges assigned to a SMART room do not rotate rooms. Once they are assigned to a SMART room they stay there until reassigned. The sentencing structure in Philadelphia allows a person to remain under the sentencing judge's control if they are sentenced to a period of incarceration less than 2 years or a probation only sentence. The sentencing judge is then in charge of hearing any violations that person may commit while under supervision in addition to some judges holding regular status hearings to have probationers on their case load come to court and check in with the judge. These are also the judges that handle the largest percentage of early probation termination petitions.

A batch of data was collected in December of 2020 from the SMART room files on the public website (A, B, and C). Court summaries and docket sheets were collected for 175, 392, and 709 cases from the three respective court rooms (1,276 total). Cases were selected if they had any type of court dates in any of the three SMART rooms in December 2020. Court dates ranged over the course of the entire month, and provided a basic cross-section of the types of cases seen in the three courtrooms. The aim in selecting a recent month of cases was to establish a portion of the sample that recidivated and then work backwards from there. In other words, by identifying the cases that ended in a new sanction as of December, 2020, the sample construction then began with a portion of the sample that ultimately failed. From the 1,276 cases collected, a total of 24, 185, and 491 cases were excluded from the A, B, and C court room samples, respectively, due to the December court case being their first criminal case or having a sentence without probation. This left a total of 363 cases from courtroom A, 525 cases from courtroom B, and 297 cases from courtroom C (total n = 1,185).

In order to collect a second, ideally non-recidivating group, a systematic random sampling was used with a sampling fraction of 1/9 using the initial sentencing date of the recidivating group as a starting point. In Philadelphia, PA docket numbers are assigned to cases based on the order they are arraigned in the year. For example, the first case coming into the system on January 1st, 2016 would be assigned docket number CP-51-CR-0000001-2016. The sampling fraction was used starting with the first 2016 case until a large enough sample was reached, determined by an a priori power analysis via the G-power software estimating roughly 20 predictor variables in a logistic regression, and detecting a moderate effect. In order to be included in the second group the case had to have been sentenced to a term of probation or incarceration plus probation between January 1st, 2016 and June 31st, 2016 to allow for up to four years of potential follow-up time. In total, 479 cases were collected from courtrooms A (n=37), B (n=102), C (n=97), and other courtrooms (n=243). Due to data limitations in transferring from the PDFs to the readable data files, the entire sample from courtrooms A and B were used while C was left out of the analysis. Additionally, only 70 of the comparison cases from other courtrooms were used due to similar merging problems. People who were in prison at the time of the data being pulled were excluded from the sample. After these restrictions were enforced, this left a final sample of 451 people.

Ultimately, the online program Docparser was used to extract information from the PDFs into a format useful for analysis. Docparser was used to create a total of 17 rules to extract the docket number, judge, date filed, initiation date, arresting agency and officer, arrest date, defendant's date of birth, case status, calendar events, confinement information, defendant's zip code, bail information, charges, disposition information,

attorney, payment information, costs and fines, sentence conditions, and court events from the docket sheets. An additional 7 rules were created to extract defendant's sex, defendant's date of birth, defendant's zip code, sentencing information, defense attorney, docket number, DC number, OTN number, arrest date, disposition date, and judge from the court summary.

Measures

Dependent Variable

For this study, the dependent variable is a dichotomous variable representing recidivism. Recidivism is measured as any new sanction (new probation sanction or sentence or any new reincarceration) from the most recent case in the sample. This includes a new sentence from either a new arrest or for a violation of probation. The variable for recidivism is coded as 1 if an event occurred between January 2016 (the initial sentence of the sample) and December 2020 (the date the data was pulled) and 0 if no event was detected.

Independent Variables

The primary independent variable in this study is the maximum dose of sentenced probation. Due to the indeterminant sentencing style used in Pennsylvania, sentences are handed down as ranges with a minimum or a maximum, with many probation sentences omitting a minimum and only including a maximum length. Consequently, the length or "dose" of the sentence imposed is measured by capturing the maximum length of probation sentenced. If a person was sentenced to confinement first and there was no start date for probation listed, then it was assumed the maximum confinement period applied. The dosage categories used for this study are *up to 2.5 years*, *3 years*, *4 – 5 years*, and *6*

or more years, which were largely determined by the fact that they had the highest frequencies among all dosage categories used by the judges. These categories were captured in a single ordinal measure (coded 1 through 4 = 6 or more years).

Control Variables

Multiple control variables are also included in order to isolate the effects of probation lengths and also to detect any other explanations for the length of probation given and recidivism rates. These measures include defendant demographics (gender, race, and age); charge count, type, and grade (severity); whether or not the person was sentenced to confinement for any time for the index offense; the courtroom from which the individual was sentenced; other case information (e.g., hearing count); and the defendant's violation and criminal history. Gender was recoded to a dichotomous variable with 1 = male and 0 = female. Race was recoded into 3 dichotomous variables representing White, Black, and Asian. Age at the time of arrest was collected as a continuous variable calculated using a date differential equation between date of birth and arrest date. Charges were recoded into six dichotomous variables of violent, drug, property, weapon, sexual, and other/unknown. Charge grade was collected and recoded to two dichotomous variables representing felony and misdemeanor. A variable for sentence type was created to capture those who were sentenced to probation only and those who were sentenced to incarceration plus probation. A variable representing the number of hearings a person had for their most recent case was created. A variable capturing the number of probation violations was created. The courtroom the case was in is nominally captured by the variable CourtRm with court room A = 1, B = 2, and other courtrooms = 3. Criminal history information was captured through variables counting the number of

prior arrests, prior convictions, prior probations, prior number of felonies, and the number of prior violent, drug, property, weapon, sexual, and other/unknown charges.

In order to capture geographic differences across the city of Philadelphia the defendant's zip code was captured. Census information from each zip code was found from censusreporter.org and added to the dataset. Variables representing median age, percent White, percent Black, percent Asian, percent Hispanic, percent of people in poverty, average number of people per household, percent of female headed households, percent married, percent renter, percent of multiunit residential buildings, percent that have moved in the last year, percent with high school degree, and percent with bachelor's degree were collected for each zip code.

Analytical plan

This study relies on a quasi-experimental design by using propensity score modeling in order to analyze how the dosage of probation a person received affected the odds of them recidivating. Specifically, this study used marginal means weighting through stratification (MMW-S). MMW-S is a way to statistically weight cases of multiple treatment groups to ensure that they are statistically similar and comparable. In effect, MMW-S is a way to simulate the effects of a randomized controlled trial, and allow for conclusions to be drawn about the effects of the treatment groups on the outcome (Hong, 2012). In this study, the treatment groups are the different dosage categories of sentence length, and using MMW-S provides a way to isolate the effects of probation length on recidivism by balancing people based on characteristics that influence sentence length. Essentially, this allows for the creation of groups comprised of statistical twins who received different sentence lengths but can be compared because

they have otherwise similar characteristics once the weight is applied. Following the application of the weight, a weighted binary logistic regression is then used in what is known as a double-robust regression (Stuart, 2010) which controls for any other measures that could be influencing the outcome, further isolating the effects of the treatment categories. A binary logistic regression was chosen due to the dependent variable, recidivism, being a dichotomous variable.

Chapter 4: Results

Hypothesis: Increasing the length of probation does not result in reduced odds of recidivism.

Bivariate analysis

Analysis of the data collected for this study was conducted by first doing a bivariate analysis to understand the demographic breakdown of both groups across the different dosage categories (see Table 1). As seen below, the percentage and significance of independent variables across the four dosage categories. Out of the total 451 people in the sample, 197 (43.6%) received a probation sentence of 4-5 years. The second most common dosage category is up to 2.5 years with 124 people (27.5%). The dosage of 3 years has 74 people (16.4%) and the smallest category is 6+ years with 56 people (12.4%). For race it can be seen that blacks are overrepresented in the highest dosage category (6+ years) with 86% compared to the other dosages where blacks only account for 57-66%. Whites are underrepresented in the highest category with 14% compared to 35-42%. Although these results of race are not statistically significant. Age at time of arrest is significant at the $p < .01$ level with the average age across the whole sample being 28. The lower three dosage categories mean age is approximately 29. The highest dosage category has a mean age of 24.

The only charge type that was statistically significant was property charges ($p < .001$). The dosage category with the largest percentage of property charges is 4-5 years with 40% being property charges. Drug charges were almost significant with a *p*-value of .059. Drug charges make up the largest percentage of any charge across all dosage categories (49%-68%). Although not statistically significant, violent charges show an

interesting trend. Violent charges are about 10% of both the lowest and highest dosage categories, but the middle two categories violent charges are only about 4% of cases. Not surprisingly, charge grade is significant at the $p < .001$ level. Felonies make up all of the highest dosage category and the highest proportion of misdemeanors are in the lowest dosage category (12.9%).

The number of hearings an individual had on their most recent case is significant ($p < .05$) with there being about 8 hearings at each dosage level except for 3 years which has an average of 5.6 hearings. The number of probation violations is also significant at the $p < .01$ level with the number of violations increasing as the dosage categories increase, except for the 3 year category which has an average of 5.8 violations. The courtroom a case was in is also significant at the $p < .001$ level. Courtroom B has the highest proportion of the two highest dosage categories (4-5 years and 6+ years). While the lower two dosage categories the number of cases is more balanced across courtroom B, A, and other courtrooms. A breakdown of the descriptives for each courtroom can be found in Appendix B. Of the eleven variables representing criminal history four were statistically significant. The number of prior arrests is significant at the $p < .001$ level. Surprisingly the average number of prior arrests did not increase as the dosage categories increased. The 4-5 year dosage category has the highest mean number of prior arrests with 24. The 3 year dosage category has the lowest mean of prior arrests with 10.5. Without controlling for any of the independent variables, the recidivism rate (defined in this study as any new sanction) across the sample is 72%. The dosage category with the lowest recidivism rate by far (36.49%) is 3 years. The three other dosage categories all have fairly high recidivism rates (about 70-90%).The recidivism rate for those in

Table 1: Descriptives by Dosage Category

	up to 2.5 years	3 years	4 -5 years	6+ years		
	n/mean (%/SD)	n/mean (%/SD)	n/mean (%/SD)	n/mean (%/SD)	Chi2/ F	*p*-value
Sample (n = 451)	124	74	197	56		
Race					15.9	0.07
White	52 (41.9%)	24 (32.4%)	70 (35.5%)	8 (14.3%)		
Black	71 (57.3%)	49 (66.2%)	124 (62.9%)	48 (85.7%)		
Asian	1 (0.8%)	1 (1.4%)	2 (1.0%)	0 (0.0%)		
Sex					8.5	0.204
Male	113 (91.1%)	69 (93.2%)	185 (93.9%)	56 (100.0%)		
Female	11 (8.9%)	5 (6.8%)	10 (5.1%)	0 (0.0%)		
Charge Type						
Violent	12 (9.7%)	3 (4.1%)	9 (4.6%)	6 (10.7%)	5.5	0.139
Drug	74 (59.7%)	41 (55.4%)	97 (49.2%)	38 (67.9%)	7.5	0.059
Property	29 (23.4%)	20 (27.0%)	79 (40.1%)	6 (10.7%)	22.5	0
Weapon	3 (2.4%)	4 (5.4%)	6 (3.0%)	3 (5.4%)	1.9	0.596
Sexual	2 (1.6%)	1 (1.4%)	0 (0.0%)	1 (1.8%)	3.2	0.361
Other/Unknown	4 (3.2%)	5 (6.8%)	6 (3.0%)	2 (3.6%)	2.2	0.53
Charge Grade						
Felony	108 (87.1%)	70 (94.6%)	195 (99.0%)	56 (100.0%)	26.5	0
Misdemeanor	16 (12.9%)	2 (2.7%)	0 (0.0%)	0 (0.0%)	36.5	0
Sentence Type						
Probation only	103 (83.1%)	51 (68.9%)	90 (45.7%)	35 (62.5%)	47.1	0
Confinement plus probation	21 (16.9%)	23 (31.1%)	107 (54.3%)	21 (37.5%)	47.1	0
Courtroom					142.3	0
505	53 (42.7%)	36 (48.6%)	24 (12.2%)	7 (12.5%)		
705	41 (33.1%)	22 (29.7%)	168 (85.3%)	49 (87.5%)		
Other	30 (24.2%)	16 (21.6%)	5 (2.5%)	0 (0.0%)		
Age at Arrest (range = 18-61 y/o)	29.7 (10.9)	28.7 (9.1)	29.4 (11.0)	24.3 (8.1)	3.9(3,447)	0.009
# of Hearings (range = 1-45)	8.2 (8.6)	5.6 (8.6)	8.1 (6.0)	8.4 (5.9)	2.9(3,447)	0.036
# Probation Violations (range = 0-76)	8.4 (13.0)	5.8 (7.7)	10.7 (14.3)	12.9 (13.3)	3.9(3,423)	0.01
Criminal History						
# Prior Arrests (range = 2-100)	13.6 (10.8)	10.47 (10.1)	24.2 (18.6)	18.7 (10.4)	9.8(3,216)	0
# Prior Convictions (range = 0-34)	6.3 (2.9)	7.1 (3.3)	6.3 (3.7)	8.7 (6.4)	5.8(3,423)	0
# Prior Probations (range = 0-40)	10.6 (7.7)	8.5 (5.5)	10.9 (7.8)	11.9 (8.2)	2.31(3,423)	0.079
# Prior Confinements (range = 0-36)	7.2 (5.5)	5.5 (3.3)	6.4 (6.2)	6.8 (7.5)	1.3(3,423)	0.285
# Prior Felonies (range = 0-30)	4.7 (4.5)	3.6 (4.5)	4.8 (3.9)	5.1 (3.5)	2.0(3,447)	0.12
# Prior Violent Charges (range = 0-21)	1.0 (3.2)	1.0 (2.9)	1.2 (3.4)	0.9 (2.5)	.3(3,423)	0.853
# Prior Drug Charges (range = 0-52)	4.7 (5.2)	3.4 (3.6)	4.8 (5.2)	9.7 (13.0)	10.7(3,423)	0
# Prior Property Charges (range = 0-40)	3.1 (6.5)	3.3 (6.8)	4.5 (7.3)	2.1 (4.2)	2.5(3,423)	0.061
# Prior Weapon Charges (range = 0-24)	1.1 (3.1)	2.7 (4.5)	1.0 (3.3)	1.9 (4.3)	4.0(3,423)	0.008
# Prior Sexual Charges (range = 0-8)	0.2 (0.9)	0.3 (1.4)	0.1 (0.6)	0 (0.0)	1.8(3,423)	0.144
# Prior Other Charges (range = 5-116)	24.0 (16.1)	22.0 (11.9)	24.5 (17.3)	30.3 (19.1)	2.8(3,423)	0.41
Zip code						
Percent White	0.20 (0.25)	0.13 (0.18)	0.18 (0.21)	0.14 (0.18)	2.1 (3,447)	0.104
Percent Poverty	0.26 (0.16)	0.26 (0.16)	0.25 (0.16)	0.30 (0.16)	1.4 (3,447)	0.242
Percent Female Headed Household	0.31 (0.18)	0.31 (0.19)	0.31 (0.19)	0.37 (0.16)	1.8 (3,447)	0.145
Percent Renter	0.40 (0.22)	0.38 (0.23)	0.38 (0.22)	0.44 (0.19)	1.5 (3,447)	0.214
Percent Moved	0.12 (0.71)	0.11 (0.07)	0.11 (0.07)	0.12 (0.06)	1.0 (3,447)	0.371
Percent High School Degree	0.65 (0.32)	0.61 (0.3)	0.62 (0.34)	0.72 (0.3)	1.9 (3,447)	0.128
Recidivism- Any New Sanction					64.8	0
Yes	89 (71.8%)	27 (36.5%)	169 (85.8%)	39 (69.6%)		
No	35 (28.2%)	47 (63.5%)	28 (14.2%)	17 (30.4%)		

Philadelphia, PA being rearrested within three years is 68% (Houser, McCord, & Nicholson, 2018). Considering this sample measured recidivism as any new sanction which could include arrest 72% is in line with the typical recidivism rate. Next is an analysis of how these recidivism rates change when controlling for significant factors.

MMW-S

To calculate the weight, an ordinal logistic regression was used with the variables that affect sentencing in order to create a predicted probability a person would fall into a specific dosage category (Hong, 2012). This then allows for the prediction of the likelihood of a person falling into one dosage category compared to the next given the factors that go into determining the sentence length (e.g., criminal history, index crime type, and number of index charges). This predicted probability of falling into a dosage category is the propensity score. Each dosage group has its own average and range of propensity scores. Each dosage category is split up for stratification. Each of these groups were matched and weighted in ordered to compare the group to the groups from other dosage categories. Once the weight is created it was applied to the dataset, and allows for a weighted binary logistic regression to be run in which the effect each dosage category has on recidivism can be analyzed with substantially reduced bias.

Table 2: Pre- and post-weight balance of the propensity score by sentence max dosage

Length of probation sentence	**Pre-Weight**			**Post-Weight**		
	N (451)	**Mean propensity score**	**Standard deviation**	**N** (451)	**Mean propensity score**	**Standard deviation**
Up to 2.5 years	124	0.417	0.272	124	0.277	0.226
3 years	74	0.315	0.159	74	0.277	0.179
4-5 years	197	0.205	0.130	197	0.260	0.180
6 years or more	56	0.124	0.131	56	0.268	0.200
F-statistic		47.54			0.240	

p-value for *F*	<.001	0.869
% of covariates significant	17.10%	2.90%

In order to know if the bias was adequately reduced, the pre-weight bivariate tests were analyzed again after the weight was applied. The post-weight tests suggest a substantial reduction in the number of significant differences across the dosage categories. For example, prior to the weight being applied, the ordinal logistic regression used to create the propensity score yielded 17.1% of the covariates used were predictive of probation sentence length. After the weights were applied, only 2.9% of the measures were statistically significant predictors of the dosage category. With the differences of observed measures being statistically similar across the dosage categories, the binary logistic regression can then be examined with added confidence of a less biased effect of probation length on recidivism.

Binary Logistic Regression

Since propensity score weight was applied before running this regression the main result to focus on from the binary logistic regression is the relatively unbiased odds ratio for the dosage categories. As can be seen in Table 2 only the second dosage category of 3 years is statistically significant ($p < .05$). The odds of an individual sentenced to 3 years of probation recidivating are 84% lower than for those sentenced to the lowest dosage category (up to 2.5 years). While not statistically significant, interesting patterns can still be identified from the results of the other two dosage categories. The odds of a person who was sentenced to 4-5 years of probation recidivating is 16.4% higher than for those sentenced to up to 2.5 years. The odds of a person sentenced to 6 or more years of probation recidivating are 63% lower than those who were in the lowest category.

A few of the control variables produced results worth noting as well. The odds of defendants who were white recidivating are 353.6% higher than for those who are not white ($p < .01$). The odds of those who received a sentence of confinement plus probation were 81% less likely to recidivate than those who received just probation. Age at time of arrest is also significant at the $p < .05$ level. The odds of recidivating are 8% lower for every one year increase in age. Additionally, multiple zip code variables had to be removed in the regression due to collinearity. Percent white and percent poverty were both significant at the $p < .01$ level. Furthermore, the pseudo-R^2 value is .588 which shows 58.8% of the variation in recidivism is explained by the variables in the regression. The Hosmer and Lemeshow goodness of fit test is not significant with a value of .811 and therefore the model fits the data well.

Table 2: Binary Logistic Regression

	OR (*p*)	S.E.	95% C.I.for EXP(B)	
			Lower	Upper
Dosage Category				
Dose 2 (3 years)	.160 (.024)	0.811	0.033	0.786
Dose 3 (4-5 years)	1.640 (.430)	0.627	0.480	5.603
Dose 4 (6+ years)	.370 (.318)	0.996	0.053	2.609
White	4.536 (.006)	0.546	1.556	13.217
Male	.825 (.844)	0.979	0.121	5.625
Drug Charge	.558 (.463)	0.793	0.118	2.641
Property Charge	.164 (.033)	0.849	0.031	0.865
Felony	.561 (.636)	1.220	0.051	6.127
Confinement plus probation	.187 (.005)	0.600	0.058	0.607
Court Room	.698 (.404)	0.432	0.299	1.626
Age at Arrest	.924(.011)	0.031	0.870	0.982
# of Hearings	1.366 (.000)	0.091	1.144	1.631
# of Probation Violations	1.069 (.063)	0.036	0.996	1.146
# of Prior Arrests	1.083 (.005)	0.029	1.024	1.145
# of Prior Convictions	.793 (.001)	0.073	0.688	0.915
# of Prior Drug Charges	.981 (.858)	0.105	0.799	1.206

# of Prior Property Charges	1.199 (.997)	0.094	0.997	1.443
Zip Code				
Percent White	.020 (.007)	1.445	0.001	0.348
Percent Poverty	.013 (.009)	1.653	0.001	0.339
Constant	2.289 (.000)	0.152		
Nagelkerke R Square	0.588			

Chapter 5: Discussion

The main goal of any criminal justice agency or researcher should be to determine what reduces crime and increases public safety in a cost-effective way. The results of this study indicate that probation sentences of 3 years compared to a length up to 2.5 years provide the lowest odds of recidivism. The hypothesis of increasing probation lengths not providing a reduction in the odds of recidivism is partially supported by the results of this study. Through propensity score modeling this study was able to isolate the effects the dosage of probation has on recidivism. This include controlling for the courtroom an individual was in. By controlling for courtroom it can be confidently said the results are not affected by different sentencing preferences of different judges. The second dosage category of 3 years of probation showed significantly reduced odds of recidivism compared to receiving a dose of up to 2.5 years of probation. While not statistically significant, the dose of 4-5 years of probation showed much higher odds of recidivism than the lowest dosage group. These results provide evidence against the idea of as probation lengths increase recidivism will decrease. This only holds true for up to 3 years of probation. Increasing probation past three years does not significantly reduce the odds of recidivism.

Additionally, through the descriptive table the dose category of 3 years saw 36% of individuals in the group recidivate while the lowest dose category saw 89% recidivism. These results also indicate that a dose of 3 years of probation may be more effective at reducing recidivism than a sentence of up to 2.5 years. Even after controlling for factors that affect sentence length through MMW-S, longer probation lengths of 4-5 years and 6+

years did not significant reduce the odds of recidivism compared to the average recidivism rate across Philadelphia.

The results found in this study are in line with the existing literature that suggests shorter probation sentences do not cause an increase in crime (Baber & Johnson, 2013) (Schiraldi, 2018) (Taxman, 2002). It is possible to reduce not only the number of people on probation but also the length of time people are serving on probation without causing a threat to public safety (Schiraldi, 2018). Other states across the country have begun to implement reforms to reduce their probation populations and have not seen an increase in crime (Schiraldi, 2018). Based on previous literature and the results of this study Philadelphia, PA should be able to safely reduce probation sentences that are longer than 3 years.

Furthermore, in line with previous research the odds of recidivism decreased with an increase in the age at time of arrest (Stolzenberg & D'Alessio, 2008). This study included an age range of 18 – 61 years of age with the average age being 28 across the sample. The age crime curve can also help explain why this sample saw the youngest mean age in the highest dosage category. The results of this study also indicate the odds of white defendants recidivating are 354% higher than those who are not white. This was an unexpected finding and warrants further analysis in future research.

Limitations

One limitation of this study is that it is limited to analyzing dosage of probation only in Philadelphia. There are unique sentencing practices and cultural aspects to Philadelphia that may not be present in other cities. When considering sentencing decisions Philadelphia judges must adhere to the sentencing guidelines for Pennsylvania

(*204 Pa. Code § 303.16(a)*). Due to criminal histories and the type of charge under the sentencing guidelines a judge may have been required to sentence an individual to a certain length of incarceration and/or probation. Even given these factors this study should be considered generalizable to other cities that have punitive or indeterminate sentencing.

Due to confinement plus probation being a variable that significantly reduced the odds of recidivism compared to probation only it may be possible probation dosage is dependent on how much time a person spent incarceration prior to serving probation. Calculating the time a person served in prison prior to being released is almost impossible with this dataset due to Philadelphia's indeterminate sentencing. Due to the minimum maximum structure of incarceration sentences there was no way for this study to determine exactly at what point an individual was released from confinement onto their probation tail. Additionally, this study only looks at recidivism within a four year time period. It is expected that results might differ if analyzing a larger time period. There were also certain variables this study was unable to account for due to time constraints such as type of defense attorney. Although prior research indicates the type of defense attorney does not affect sentencing outcomes (Cohen, 2014).

Furthermore, there are factors that can influence recidivism that were impossible for this study to capture. These factors are things like reentry services provided by the courts, probation and parole, or community organizations. Having support during reentry can help a person on probation decrease their odds of recidivism through opportunities such as employment or other connections (Houser et al., 2018). Family/community support is another factor that can play into a person's odds of recidivism that this study

was unable to capture. If a person has family who allow them to live with them or provide some type of financial support this can increase a person's chance of success. As noted previously, a probation officer's adherence to the RNR principles can affect recidivism and this was something this study was unable to track (Dyck et al., 2018). This study was also unable to account for personal factors such as education level or income.

Future Research

The dataset used for this study contains a lot of information that was unable to be looked at during this study due to time constraints. Future research using this dataset could look at court costs, fees, and fines, type of defense attorney, and plea bargaining. Additionally, time to recidivate could be part of a future analysis. An expansion of the data used in this study could include factors like employment and education of the defendant. Another factor to consider with this study is the dosage of probation categories. The smallest probation category was up to 2.5 years of probation. Future studies should consider breaking down this category to see if there is variation of recidivism within this category.

Future research should consider extending this type of study to a nationwide sample or comparing different cities. A study comparing different cities could allow for analysis as to what types of policies and other factors can be effective at reducing recidivism. By comparing what aspects of probation work in some cities can help inform other probation office's policies. Future analyses of this type should also consider longer periods of assessments of recidivism.

Policy Implications

As research has been consistently showing community supervision is a large contributor to mass incarceration and does not effectively reduce crime, research is also showing it is possible to reduce reliance on probation without compromising public safety. Criminal justice agency leaders across the country are also starting to accept and implement reforms based off of these types of research findings. In February 2018, 20 current and former community supervision administrators recommended community corrections should be reduced by 50% (Williams, Schiraldi, & Bradner, 2019). The results of this study align with this recommendation. Policy makers need to consider setting limits on the lengths of probation judges are allowed to sentence in addition to reassessing sentencing guidelines.

Probation should be determined by individual factors of progress and not simply based on a formula at the time of sentencing. Probation brings with it a plethora of conditions and collateral consequences. One of the possible reasons this study indicated 3 years of probation was the most effective at reducing the odds of recidivism could be tied to collateral consequences that get harder to manage the longer one spends under supervision. For example, one condition of being on probation is frequently meeting with one's probation officer. The Philadelphia probation office is downtown in an area where there are few residential buildings meaning many people have to travel across the city to get there. Due to large caseloads of the probation officers, people are often made to wait for hours to see their PO. Having to spend a half or even full day to go report to your PO requires time off of work. Many employees might not be willing to allow their employee to take that much time off regularly. Especially after a few years this can become

unsustainable for individuals on probation. The goal should be to reduce the amount of time under supervision to the minimum necessary for rehabilitation and community safety. Due to most re-offenses occurring within the first two years, probation sentences of more than 3 years are unnecessary (Williams et al., 2019).

Conclusion

To conclude, this study has made it clear that by simply increasing lengths of probation we cannot expect recidivism to decrease. While this study shows 3 years of probation provides reduced odds of recidivism compared to up to 2.5 years the same does not apply for sentences of 4-5 years and 6+ years. There is no significant reduction in the odds of recidivism for probation sentences of 4-5 years and 6+ years compared to sentences of up to 2.5 years. The results of this study also show the need for more research to be conducted in the area of dosage of probation. In order to reduce crime we need to determine what makes probation the most effective. Policy makers, criminal justice actors, and the public need to consider other courses of action to reduce crime. Simply placing people on probation for many years is not effective.

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Appendix A: Univariate

Table A: Univariate

Sample (n = 451)		n	% or mean(SD)
Race			
	White	154	34.1
	Black	292	64.7
	Asian	4	0.9
Sex			
	Male	423	93.8
	Female	26	5.8
Charge Type			
	Violent	30	6.7
	Drug	250	55.4
	Property	134	29.7
	Weapon	16	3.5
	Sexual	4	0.9
	Other/Unknown	17	3.8
Charge Grade			
	Felony	429	95.1
	Misdemeanor	18	4
Sentence Type			
	Probation only	279	61.9
	Confinement plus probation	172	38.1
Courtroom			
	A	120	26.6
	B	280	62.1
	Other	51	11.3
Age at Arrest (range = 18-61 y/o)			28.7 (10.4)
# of Hearings (range = 1-45)			7.8 (6.9)
# Probation Violations (range = 0-76)			9.1 (12.9)
Criminal History			
	# Prior Arrests (range = 2-100)		19.2 (16.1)
	# Prior Convictions (range = 0-34)		6.4 (4.2)
	# Prior Probations (range = 0-40)		10.0 (7.7)
	# Prior Confinements (range = 0-36)		6.2 (5.9)
	# Prior Felonies (range = 0-30)		4.6 (4.2)
	# Prior Violent Charges (range = 0-21)		1.0 (3.1)

# Prior Drug Charges (range = 0-52)			4.9 (6.7)
# Prior Property Charges (range = 0-40)			3.5 (6.6)
# Prior Weapon Charges (range = 0-24)			1.4 (3.6)
# Prior Sexual Charges (range = 0-8)			0.1 (0.8)
# Prior Other Charges (range = 5-116)			23.4 (17.1)
Recidivism- Any New Sanction			
	Yes	324	71.8
	No	127	28.2

Appendix B: Courtroom Descriptives

Table B: Descriptives by Courtroom

	Courtroom A n (%) or mean SD	Courtroom B n (%) or mean SD	Other Courtrooms n (%) or mean SD
Race			
White	36 (23.4)	100 (65.0)	18 (11.7)
Black	82 (28.1)	178 (61.0)	32 (11.0)
Asain	1 (25.0)	2 (50.0)	1 (25.0)
Sex			
Male	110 (26.0)	270 (63.8)	43 (10.2)
Female	10 (38.5)	8 (30.8)	8 (30.8)
Charge Type			
Violent	17 (56.7)	11 (36.7)	2 (6.7)
Drug	52 (20.8)	166 (66.4)	32 (12.8)
Property	35 (26.1)	85 (63.4)	14 (10.4)
Weapon	5 (31.3)	11 (68.8)	0 (0.0)
Sexual	2 (50.0)	0 (0.0)	2 (50.0)
Other/Unknown	9 (52.9)	7 (41.2)	1 (5.9)
Charge Grade			
Felony	110 (25.6)	277 (64.6)	42 (9.8)
Misdemeanor	8 (44.4)	1 (5.6)	9 (50.0)
Sentence Type			
Probation only	71 (25.4)	157 (56.3)	51 (18.3)
Confinement plus probation	49 (28.5)	123 (71.5)	0 (0.0)
Age at Arrest (range = 18-61 y/o)	27.1 (8.7)	29.0 (11.2)	30.8 (9.8)
# of Hearings (range = 1-45)	11.0 (9.9)	7.3 (5.0)	2.8 (2.5)
# Probation Violations (range = 0-76)	10.0 (15.1)	9.9 (12.4)	2.7 (7.9)
Criminal History			
# Prior Arrests (range = 2-100)	14.6 (11.4)	22.2 (16.9)	7.3 (6.0)
# Prior Convictions (range = 0-34)	6.8 (3.9)	6.3 (4.3)	5.8 (3.9)
# Prior Probations (range = 0-40)	10.7 (8.0)	10.2 (7.5)	7.1 (7.7)
# Prior Confinements (range = 0-36)	8.0 (6.8)	5.7 (5.4)	4.7 (5.2)
# Prior Felonies (range = 0-30)	5.9 (5.0)	4.4 (3.8)	2.3 (2.4)
# Prior Violent Charges (range = 0-21)	1.7 (4.2)	0.9 (2.7)	0.3 (1.3)
# Prior Drug Charges (range = 0-52)	4.6 (7.8)	5.5 (6.5)	2.6 (3.7)
# Prior Property Charges (range = 0-40)	5.1 (9.4)	3.0 (5.4)	1.9 (3.2)

# Prior Weapon Charges (range = 0-24)	1.5 (3.2)	1.4 (4.0)	0.5 (1.6)
# Prior Sexual Charges (range = 0-8)	0.2 (1.1)	0.1 (0.7)	0.1 (0.6)
# Prior Other Charges (range = 5-116)	26.8 (18.2)	23.3 (16.7)	15.8 (13.8)
Recidivism- Any New Sanction			
Yes	83 (25.6)	219 (67.6)	22 (6.8)
No	37 (29.1)	61 (48.0)	29 (22.8)

*percent calculated across row