MANAGEMENT AND BUDGET

Yellow Line Project Impact Evaluation

Effects on Recidivism and Use of Health Care Services

July 2023

About the Impact Evaluation Unit
Minnesota Management and Budget's (MMB) Impact Evaluation Unit is a team of data and social scientists that rigorously evaluates state investments and policies to find what works and what does not. The legislature established the team in 2019 to assess the impact of the state's response to the opioid epidemic and to study human services grants, broadly. We prioritize working with agencies and partners to identify and answer pressing questions, and creating evidence that is rigorous, relevant, and used by policymakers.

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Executive Summary

Blue Earth County's Yellow Line Project (YLP) is designed to provide alternatives to arrest when police officers encounter individuals with behavioral health concerns who are, otherwise, determined to be a low risk to themselves or the community. Police officers can connect individuals to a YLP coordinator who can offer a screening and provide them with options for accessing services and other supports. This enhances law enforcement engagement options beyond jail, detox, or the emergency room. Even when an arrest is warranted, collaborating with law enforcement upstream in the process enables YLP to provide supports earlier and try to interrupt the cycle of recidivism caused by underlying behavioral health needs.

Our study evaluates the impact that YLP had on reducing short-term recidivism and changing utilization of mental health and substance use disorder (SUD) treatment for Minnesotans with behavioral health needs who encounter law enforcement. The evaluation uses a quasi-experimental study design to compare the impact on participants, relative to like non-participants.

Findings

We find, compared to the baseline period and relative to similar non-participants, YLP participants:

- Experienced a 17% reduction in their risk of future recidivism;
- Were approximately 1.5 times more likely to use SUD treatment services in the short term and less likely to use the emergency department for nonfatal overdoses;
- Were 2 to 3 times more likely to use MH services for a full year after encountering YLP and 3 times more likely to use intensive MH services (e.g., hospitalizations); and
- Were no more likely to use Medications for Opioid Use Disorder.

Policy Implications

Our findings indicate YLP has a significant, positive impact on its goals of interrupting the cycle of recidivism and connecting people with services and supports. Compared to all people who are arrested, YLP targets individuals who law enforcement officers perceive as having a higher risk of recidivism due to prior interactions or behavioral health concerns. Our analysis of program participants indicates this is true, as participants had significantly less time between court cases than a closely matched group of non-participants before exposure to the program. YLP was able to substantially reduce that greater risk of recidivism and bring it in line with the average rate of the matched group after exposure to the program. These findings are supported by a county-wide analysis that shows a similar reduction in recidivism in Blue Earth County, relative to peer counties which have not implemented a program like YLP.

YLP could be replicated with fidelity in other counties with potential health and safety benefits for both participants and the entire community. Recent legislation passed in 2022 made "office-involved community care coordination" a Medicaid reimbursable service, offering a funding stream to scale programs like YLP throughout Minnesota. That said, our findings point to the important role of resources and commitment by criminal justice, human services, and healthcare partners to replicate the success of YLP in Blue Earth County.

Introduction

This evaluation of the Yellow Line Project (YLP) was conducted by Minnesota Management and Budget's (MMB) Impact Evaluation Unit in partnership with Blue Earth County's Department of Human Services. We analyzed data at county and individual levels to estimate the program's effects on recidivism and utilization of behavioral health care services. This report builds on our previously released interim report [1], which included descriptions of YLP's implementation, target population, and demographic characteristics of people served.

Background

Blue Earth County's YLP has operated in Minnesota since 2018. It was created to help police officers encountering individuals with mental health or substance use concerns and provides resources for accessing services and other supports. By intervening upstream, the county seeks to interrupt the cycle of recidivism caused by underlying behavioral health needs. Screening individuals can identify those who have never received the appropriate care for their mental illness, substance use disorder (SUD), or other behavioral health concerns and might benefit more from treatment rather than jail time.

Across the nation, many interventions exist that provide alternative criminal justice pathways for persons experiencing mental health and substance use challenges. Usually, these programs fall into two general categories: pre-booking and post-booking interventions. Post-booking programs occur when an individual's criminal charge has already been referred to the courts. The most common examples of a post-booking program is drug and/or mental health courts (Sirotich, 2009). Pre-booking programs occur at the street-level when an individual first encounters a police officer or at the police station. Examples of pre-booking programs are Law Enforcement Assisted Diversion (LEAD) in multiple jurisdictions across the United States (Clifasefi et al., 2017; Collins et al., 2015, 2017, 2019), Crisis Assistance Helping Out on The Streets (CAHOOTS) in Eugene, Oregon (Skiles, 2022), and Support Team Assisted Response (STAR) in Denver, Colorado (Enos, 2020; Khalsa et al., 2018).

While these programs have similar goals to YLP, they differ in important ways. Where CAHOOTS and STAR focus on immediate de-escalation and conflict resolution, YLP instead focuses on needs assessments, treatment plans, and social service access (*FAQ*, 2017). When compared to LEAD, YLP also intervenes pre-court or as early as street-level. However, it does not divert charges or tie charges to program participation for an individual. Law enforcement officers independently decide on whether to charge the individual and whether to contact YLP. As such, it is more appropriate to categorize YLP as a model of "officer-involved community care coordination" , which is a new Medicaid covered service in Minnesota (*MNDHS OICC*, 2023). YLP is not designed to alter immediate criminal justice proceedings, but rather address underlying needs that can mitigate future interactions with law enforcement. YLP may be unique in its ability to engage with individuals across all stages of

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[1] For more details see YLP website or our Descriptive Report
(https://mn.gov/mmb/assets/YLP%20Interim%20Descriptive%20Report_Final%20Draft_tcm1059-579088.pdf).

the criminal justice system from the beginning of a law enforcement encounter up until incarceration, or just prior to release.

For the two most common types of law enforcement intervention programs, there are few studies that have systematically examined their effectiveness using client and program outcome data (Cowell, 2008). The LEAD program is one of the most widely supported programs in the United States. However, to date, existing evaluations present this program as only promising. A systematic review regarding the effectiveness of mental health courts on reducing recidivism has only found a small positive effect on recidivism reduction (Perron et al., 2018; Perrone et al., 2019). For officer-involved community care coordination, there is even less evidence and, while promising in theory, there is no causal evaluation of the efficacy of this kind of program currently.

YLP's primary intervention is to offer behavioral health screenings, as well as individualized care plans, to Minnesotans perceived by law enforcement to be experiencing behavioral health concerns or social, economic, or housing needs. In most cases, when an individual is identified, a law enforcement officer contacts one of YLP's Community Based Coordinators (CBC) to provide the screening. If the individual is eligible and agrees to participate, the CBC connects them to healthcare resources or county and state human services if needed and initiates a My Yellow Line Plan. These care plans detail the individual's need for change, provide structure to set personal goals for treatment and recovery, and describe how the individual and the CBC will work together to address identified needs over the following two months.

Since its inception, YLP has been successful connecting many individuals to treatment services and improving collaboration between human services and law enforcement. Program partners report a culture change with greater alignment philosophically and in practice, and apparent financial cost savings in treatment and detox, jail bed days, and minor court costs. However, previous research has not investigated whether YLP is causing reductions in repeated law enforcement contact and increasing access to behavioral health services.

Our study evaluates the impact YLP had on reducing short-term recidivism and changing utilization of services for mental health concerns and SUD for Minnesotans with a history of law enforcement encounters and who made use of publicly-funded health care services. If YLP functions as intended, we would expect to see a reduction in the incidence of recidivism amongst individuals who have contact with the program, relative to similar individuals who did not participate in the program. We may also expect to see changes in health care utilization following YLP interaction, though we expect the direction of these effects to be highly nuanced as changes in health care utilization can signal both positive and negative outcomes depending on the associated condition and context.

Data and Methods

General Design

Study

This evaluation was an observational cohort study of the county-wide and individual impacts of YLP in Blue Earth County, Minnesota. We used a generalized difference-in-differences framework (Roth et al., 2023; Wing et al.,

2018) to estimate the impact of YLP. Outcomes after the onset of the program (both at the county or programmatic level) were compared with baseline measures prior to the period when YLP started. We then compared this to similar individuals who did not receive YLP. With some well-supported assumptions, we can provide a reliable measure of the program's impact. We used an intent-to-treat design that counted any individual who was offered a YLP screening (regardless of whether they refused or accepted the screening and moved further along in the program) as having a YLP encounter and being part of the YLP group.

Outcomes

Our first outcome of interest was short-term recidivism, defined as having one or more court cases occurring within the two-year follow-up period. YLP is aimed at halting the revolving door of recidivism for individuals with mental illness, SUD, or other behavioral health concerns. YLP offers an alternative option besides jail for non-violent offenders. It also seeks to prevent recurrent law enforcement encounters by connecting people with healthcare resources or county and state human services.

Our second outcome of interest was the change in health care utilization for those individuals who were eligible for Minnesota Health Care Programs (MHCP). When a YLP screening was offered, YLP CBCs provided clients with a list of locally- and state-funded services and programs. In cases where individuals engaged with YLP, staff helped them enroll in health insurance and find appropriate behavioral health care.
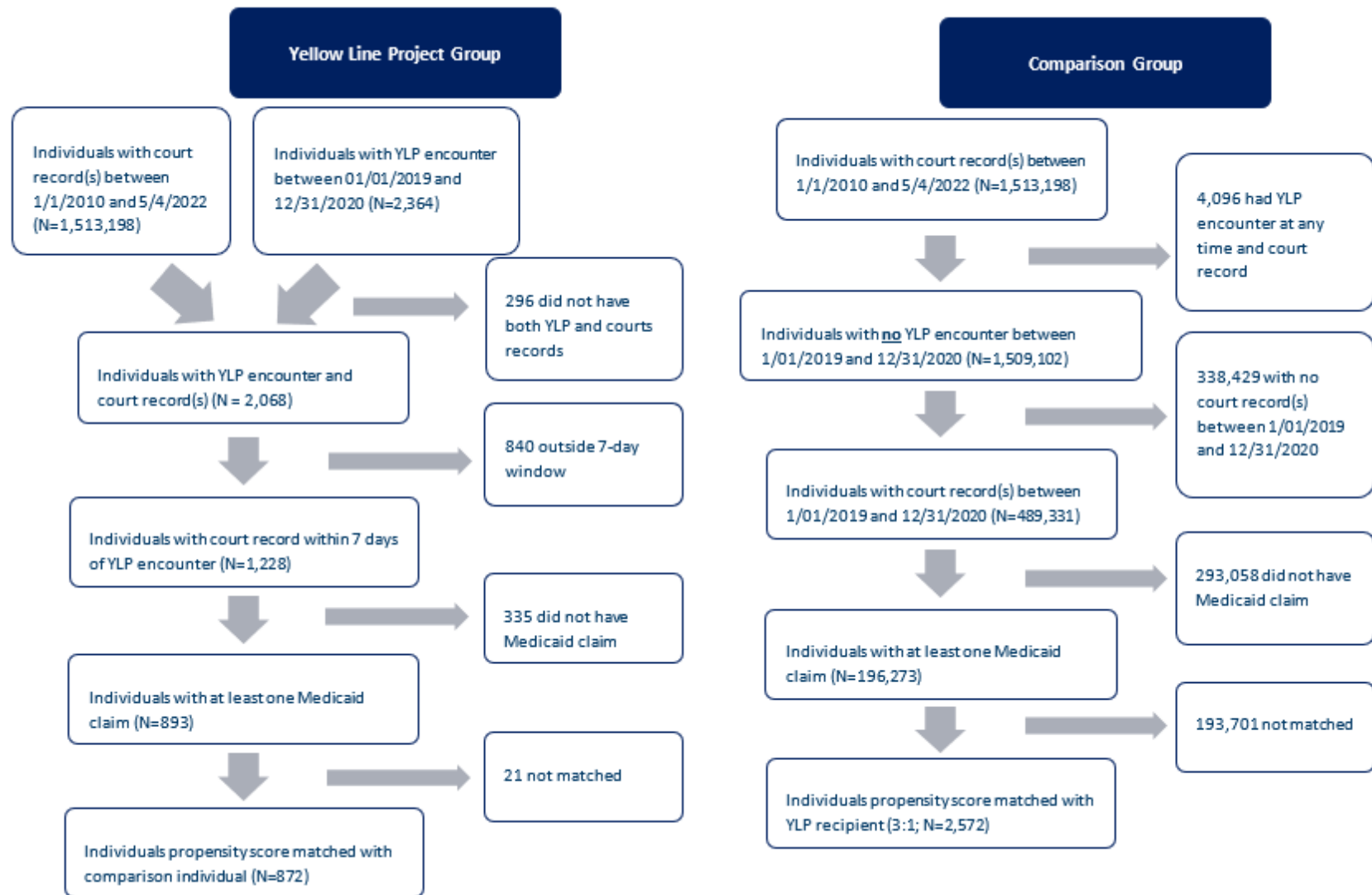
Population

Our study estimated effects on outcomes for Minnesotans enrolled in an MHCP and who had at least one court case in Minnesota between January 1, 2010 and May 4, 2022. From this population, we defined a YLP group and a comparison group who were well-matched on medical and court history, as well as demographics. Figure 1 provides a flow diagram of our sample selection process, which is also summarized below.

We defined our YLP group as individuals from this study population who had their first encounter with YLP fall between January 1, 2019 and December 31, 2020. We consider a YLP encounter or interaction to be the point at which a screening by a YLP coordinator is offered. Individuals may choose to accept or decline the screening and may enlist further aid from YLP at various stages. However, being offered a screening is the minimum point of contact with YLP and captures all subsequent levels of interaction with the program. Records of YLP interactions were provided by Blue Earth County and were matched to court and health care utilization claims data using first name, last name, and date of birth. We then identified all individuals who had a court case within seven days of this YLP interaction and defined this court case as the beginning of the individual's follow up period in our study.

Our comparison group was defined by first identifying individuals *not* in our YLP group who had a court case in the same year and month as at least one individual from the YLP group. As with our YLP group, this court case was used to define the beginning of the follow up period for our comparison individuals. We then used a propensity score matching procedure (see Appendix) to identify three well matched individuals without a YLP encounter for each individual in our YLP group. The final sample included 875 people in the YLP group and 2,574 in the matched comparison group.

Table 1 shows the demographic composition of our groups. Sixty percent of the YLP group was White, 18% were Black/African American, 3% were American Indian, 1% were Asian, and the remaining 18% did not specify race. Seventy percent were male, and 8% identified as Hispanic/Latinx. For both groups, more than 85% of the individuals were between the ages of 18 and 44. We have previously analyzed the distribution of YLP recipients by race and age in greater detail in our Descriptive Report (Barton et al., 2022).

Figure 1. Study Sample Selection and Composition

Flow diagram showing development of study samples and groups from initial sample population.

Table 1. Characteristics of Study Populations

Characteristic	YLP Group, N = 872[a]	Comparison Group, N = 2,572[a]
Race		
American Indian	27 (3%)	85 (3%)
Asian	10 (1.1%)	22 (0.9%)
Black/African American	158 (18%)	413 (16%)
Unspecified	155 (18%)	443 (17%)
White	525 (60%)	1,611 (63%)
Ethnicity		
Hispanic/Latino	71 (8%)	212 (8%)
Not Hispanic/Latino	793 (91%)	2,317 (90%)
Unspecified	11 (1%)	45 (2%)
Age Group		
18 − 24	250 (29%)	730 (28%)
25 − 34	308 (35%)	907 (35%)
35 − 44	202 (23%)	591 (23%)
45 − 54	68 (8%)	190 (7%)
55 − 64	39 (4%)	127 (5%)
65+	8 (1%)	29 (1%)
Sex		
Female	259 (30%)	818 (32%)
Male	616 (70%)	1,756 (68%)

[a] n (%)

Data and measures

Recidivism

For our measures of recidivism, we used Minnesota Court records. This represents our most complete statewide data on criminal justice encounters. While not all law enforcement encounters result in a court case, all cases are assumed to result from a law enforcement encounter, making court cases an incomplete, but strong proxy for criminal justice interactions.

Recidivism was measured either by the count of court cases following the first court case observed in a period (baseline or follow-up), or by the amount of time between court cases (measured in weeks). These indicators offer complementary measures to help us understand if YLP impacts recidivism.

Health Care Utilization

To quantify health care utilization, we used records of health insurance claims obtained from Minnesota's Medicaid Management Information System (MMIS). This system logs all health insurance claims, payments, associated procedures, and diagnoses for people enrolled in MHCPs, including medical Assistance, MinnesotaCare, and Minnesota Family Planning Program. While this is not a complete record of all the health care utilization in the state, it provides a detailed measure of the health care utilization for a section of Minnesota's more vulnerable population.

We measured health care utilization as the number of days in a 3-month period in which an individual accessed one or more relevant health care services; we will refer to these as *claim days*. Our analyses then focused on the proportional differences in claim days across a period between the YLP-exposed and YLP-unexposed groups, and before and after study enrollment. Importantly, a higher number of claim days in a period for a specific healthcare intervention may or may not indicate a successful healthcare journey (e.g., increase in SUD treatment days could indicate increased motivation for recovery or increased acuity of addiction). By examining the changes in claim days within individuals before and after YLP exposure, we explore changes induced by the program *without* assigning a value judgment to the direction of this change.

County-Level Data

We used county-level data to explore broad cultural shifts in county law enforcement activity that may coincide with YLP. Descriptive data on counties across Minnesota was obtained from the U.S. Dept. of Agriculture Economic Research Service. Measures included population, income, unemployment rates, poverty, and educational attainment metrics, and were primarily used to identify Minnesota counties that were similar to Blue Earth County on these dimensions.

Yellow Line Program Records

Finally, Blue Earth County Human Services department provided records on the interactions with individuals eligible for YLP. These records identified the frequency of YLP encounters, the result of each encounter, and

whether additional services were recommended or offered. We primarily used these records to identify when an individual was first exposed to YLP, as part of our individual-level analysis.

Methods

Recidivism

We evaluated the impact of YLP on recidivism at both a county and programmatic level. Our county-level analysis was a longitudinal difference-in-difference analysis that looked at how Blue Earth County differed from other like counties in terms of the frequency of repeat court cases within individuals (see Appendix). An important nuance of this analysis is that it does not capture the effect of a program like YLP specifically (in terms of the stated program process), but rather estimates the effect associated with any behavioral or programmatic changes that arise in a county following implementation of a program like YLP. For example, YLP may not intend to modify the charging behavior of law enforcement officers who encounter an individual committing a crime, but if charging behaviors do change during YLP implementation, those changes will be reflected in this analysis.

We also looked at the programmatic impact of YLP on individual risk of recidivism (Murray et al., 2021). This analysis also employed a difference-in-difference framework but looked at the change in relative risk of recidivism between our YLP group and our comparison group across the baseline and follow up period. Again, we would expect that the effects of YLP at this level arise from a combination of program, cultural, and motivational effects. However, this analysis closely ties these factors to an actual interaction individuals have with the program. As such, the estimated changes in risk reflect reasonable impacts for a county seeking to combat recidivism with a program like YLP.

Health Care Utilization

We used a generalized difference-in-difference framework to estimate the proportional change in the number of healthcare claim days associated with interaction with YLP. Rates of health care utilization for our YLP and comparison group were used to construct claim use ratios that estimate the proportional increase or decrease in utilization associated with YLP interaction.

Results

Recidivism

County-level Effects

Figure 2 shows the difference between Blue Earth County and other like counties in the average number of weeks between court cases. In the three years prior to YLP, law enforcement involved individuals in Blue Earth County had more frequent court cases (6-11 fewer weeks between court cases) compared to individuals with law enforcement encounters in other counties. Our analysis of the effect of YLP across the years indicates that all individuals with court cases in Blue Earth County experienced a significant increase in the number of weeks between court cases (a positive impact), after YLP started, relative to other like counties. This shift suggests a

meaningful decrease in the frequency of law enforcement interactions within Blue Earth County overall. While the design of this analysis cannot attribute this change directly to YLP, it does reveal a change in county-wide behavior after the program began.

Figure 2. Percent Difference in Court Case Reoccurrence
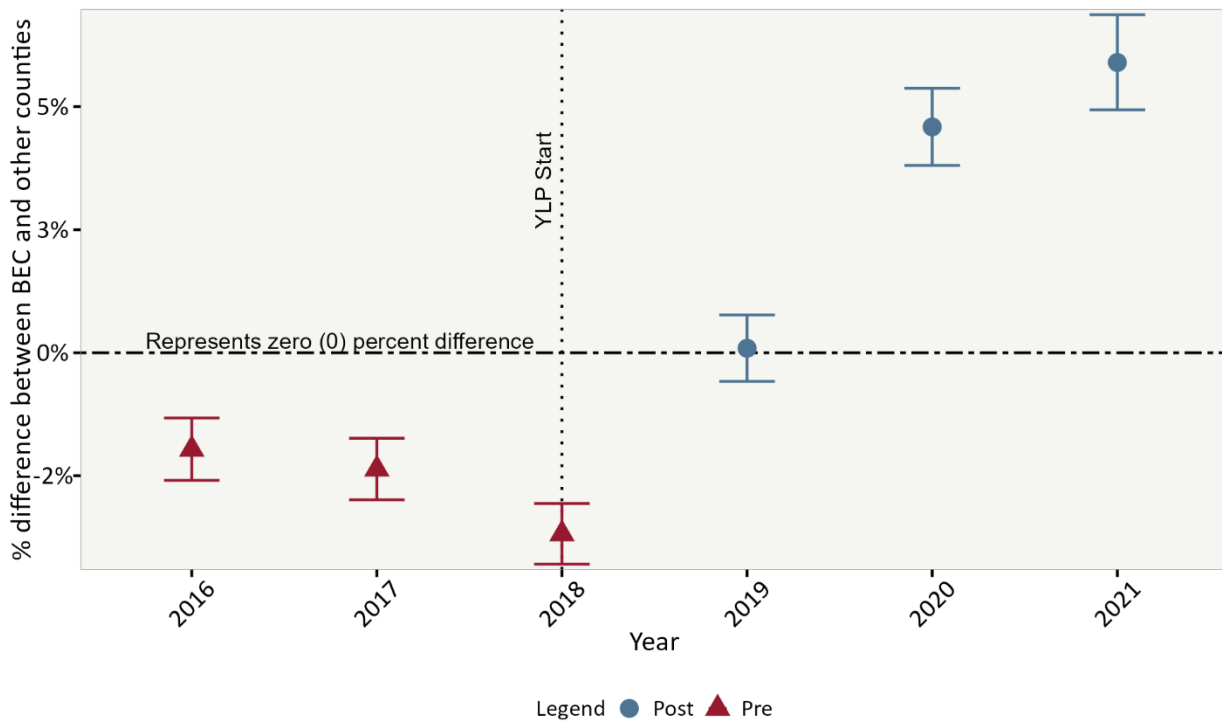
Estimated mean difference in time (weeks) between court cases in Blue Earth County, relative to other like counties. Here 0% indicates no difference, while negative values indicate Blue Earth County had relatively less time between court cases and positive values indicate Blue Earth County had relatively more time between court cases than other like counties. Error bars are 95% confidence intervals.

Programmatic-Level Effects

Figure 3 below shows the change over time in the percent of individuals in the YLP (solid) and comparison (dashed) study groups that did not yet experience the indicated number of recidivism events[2]. Higher recidivism risk in a group is associated with a steeper decrease over time in the percent of that group without any recidivism. We can see that before interacting with YLP, individuals in our YLP group were at a higher risk of

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[2] For example, blue curves show the percentage of each population that has not yet experienced 2 or more recidivism events by the time indicated on the x-axis.

recidivism (as indicated by solid line curves that decrease more rapidly over time compared to the same color dashed line curves). We assessed risk of future recidivism amongst individuals who had 1, 2, 3, or 4 or more observable instances of recidivism in the baseline period and used these individual instances to compose an aggregate risk of *future* recidivism, accounting for recidivism history.

Figure 3. Percent of Population With Indicated Number of Recidivism Events
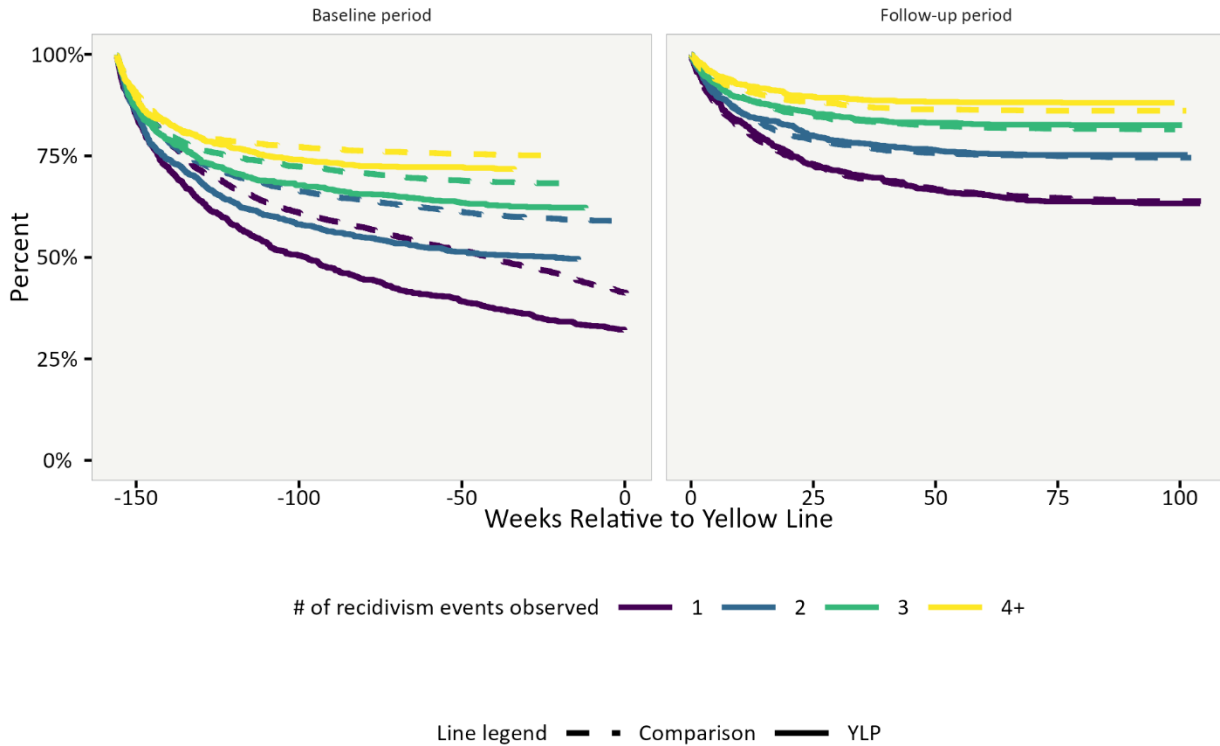
Changes in the percentage of the population that has not yet experienced the indicated number of recidivism events. Steeper decreases over time indicate a faster rate of recidivism within a group. Colors indicate whether the recidivism event is the first, second, third, or fourth or greater incident.

Over the first 100 weeks of the baseline period, 48% of the comparison population experienced one or more recidivism events, while 61% our YLP population experienced an incidence of recidivism by this same point. In the follow-up period (after our YLP population had their first interaction with Yellow Line), there was very little difference between our groups. Over the first 100 weeks, 64% of the comparison population and 63% of the YLP population experienced at least one incident of recidivism over this time, indicating a broad reduction in recidivism prevalence between the two time periods, but a much larger reduction for the YLP group.

Table 2 shows the results of a hazard model that translates the observed incidence of recidivism into a change in risk associated with YLP interaction. As demonstrated in Figure 3, we saw a reduction in risk of recidivism in both

groups between our baseline and follow up periods, but this reduction appears to be greater for those who interact with YLP. Table 2 shows:

- The estimated risk for recidivism associated with being in the YLP-exposed group at baseline is 26% greater than being in the comparison group.
- A 17% greater reduction in risk for our YLP group relative to the comparison group. This is shown as the difference between the groups in the *change* in risk that occurs between baseline and follow-up in Table 2.

Together, these results suggest that interaction with YLP may significantly lower an individual's risk of recidivism, particularly for those who previously have had a higher risk of recurrent interactions with law enforcement. Differences in the risk of recidivism between our YLP and comparison groups were less evident as the number of prior instances of recidivism increased for individuals. This may be because few individuals in each group experienced larger numbers of recidivism events.

Table 2. Change in Recidivism Risk

Fixed Effects

Effect Estimate	Coefficients (95% CI)	Hazard Ratio (95% CI)	% Change
Risk for YLP Group at Baseline	0.21 ** (0.12, 0.35)	1.26 (1.13, 1.42)	+26%
Change in Recidivism Risk for YLP Exposure	-0.19 ** (-0.26, -0.11)	0.83 (0.77, 0.89)	-17%

Variation in Baseline Hazard

Group	Standard Deviation
Person in County Cluster	1.28
County Cluster	0.21

p<0.05 = *, p<0.01 = **

Health Care Utilization

We quantified health care utilization as the number of days in a 3-month period where an individual had at least one healthcare claim for the relevant outcome paid for by MHCP. Claim days were then analyzed by comparing the changes between baseline and follow up periods for our YLP and comparison groups. Similar changes in utilization between baseline and follow up for these groups would suggest little or no effect of YLP, while large differences in these baseline-to-follow up changes would indicate a YLP-specific effect. We analyzed changes in claims for five groups of healthcare services: any SUD treatment, prescriptions for medications for opioid use

disorder (MOUD, including methadone, buprenorphine, or naltrexone), emergency department (ED) visits for nonfatal overdoses, any mental health service, and mental health inpatient hospitalizations.

Figure 4 shows the proportional difference in claim days between YLP-exposed individuals and our unexposed comparison group for SUD treatment, MOUD-use, and emergency department visits for nonfatal overdoses. There is a clear and sizable increase in the number of SUD treatment claim days for YLP-exposed individuals during the first three months after their interaction with YLP. Individuals in our YLP group had roughly 1.5 times as many days with claims for SUD treatment as their unexposed counterparts following their YLP interaction. This suggests the higher degree of utilization of SUD treatment for this group is driven, at least in part, by their interaction with YLP. We do not see any differences between these groups in utilization of MOUD treatment specifically. Finally, individuals in our YLP group had a higher number of days in the baseline period with claims related to ED visits for nonfatal overdose. Following interaction with YLP, this group was no longer different from the comparison group in terms of ED utilization for nonfatal overdoses.

Figure 4. Proportional Difference in SUD Treatment Utilization
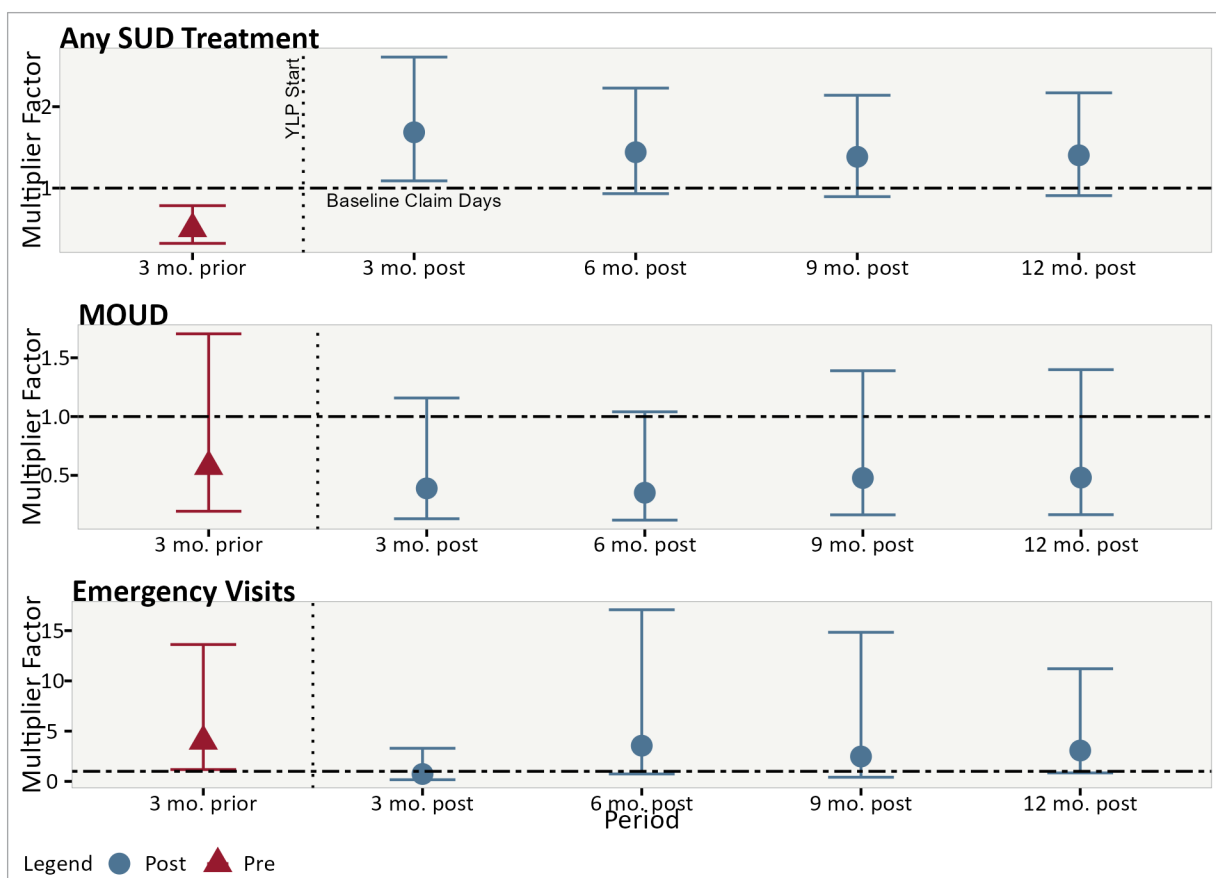
Proportional differences in health care utilization for YLP-exposed individuals relative to well-matched unexposed individuals. Y-axes indicate the multiplicative effect on days in a quarter where the indicated healthcare claim type was made. Individuals exposed to YLP had roughly 1.5 times as many days with a SUD treatment claim, compared to unexposed individuals, in the first 3 months following interaction with YLP. We found no differences between groups in terms of

MOUD claims. We did find that individuals who interacted with YLP had more ED visits for nonfatal overdoses prior to YLP interaction, though variance on this estimate was high. There were no differences in ED visits between YLP and comparison groups after YLP interaction.

Figure 5 shows similar data for any mental health service claims and mental health inpatient hospitalizations. For any mental health service, we saw a strong and lasting difference between the two groups following YLP exposure. Individuals in the YLP group had *2 to 3 times* as many days with claims for mental health services as their unexposed counterparts following their YLP interaction. We also found that our YLP group had significantly more days with claims for mental health inpatient hospitalization (on average about 3 times as many) than our comparison group, but that these differences disappeared after six months.

Figure 5. Proportional Difference in Mental Health Service Utilization
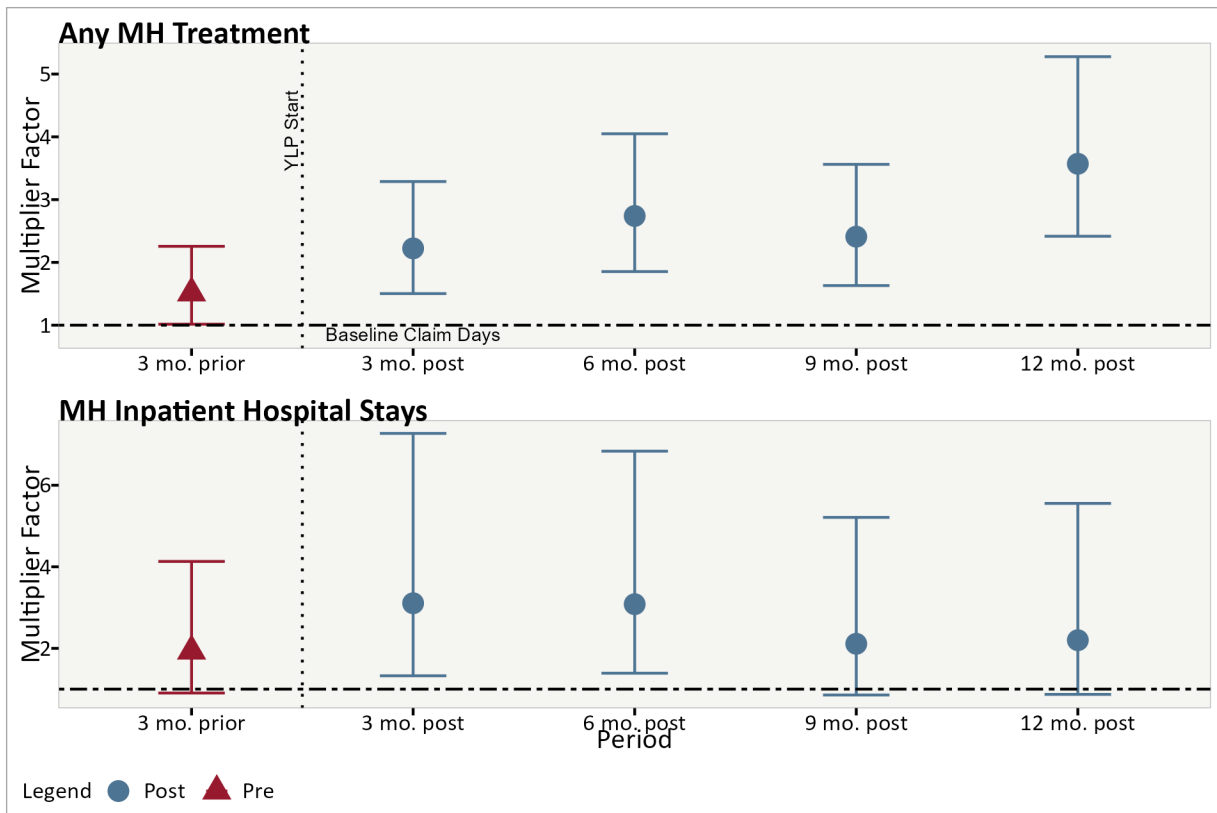

Proportional differences in mental health service utilization for YLP-exposed individuals relative to well-matched unexposed individuals. Y-axes indicate the multiplicative effect on days in a quarter where the indicated healthcare claim type was made. Individuals who were exposed to YLP had on average 2 to 3 times as many days with any mental health service claims after exposure. YLP-exposed individuals also had a higher proportion of days with claims for mental health inpatient hospital stays in the first 6 months following interaction with YLP. However, the variability around this estimate was high.

Table 3. Marginal Effects of YLP Exposure on Health Care Utilization

	Proportion of Days with Claims for YLP-Exposed (95% CI)				
	Baseline	**Follow-Up**			
Healthcare Service	**3 Mo. Prior**	**3 Mo. Post**	**6 Mo. Post**	**9 Mo. Post**	**12 Mo. Post**
Any SUD Tx	** 0.50 (0.32, 0.78)	1.69 * (1.09, 2.61)	1.44 (0.93, 2.22)	1.38 (0.89, 2.14)	1.40 (0.91, 2.17)
MOUD Tx	0.58 (0.19, 1.70)	0.39 (0.13, 1.16)	0.35 (0.12, 1.04)	0.48 (0.16, 1.39)	0.48 (0.17, 1.40)
ED Visits for nonfatal overdose	* 4.00 (1.17, 13.62)	0.73 (0.16, 3.92)	3.55 (0.74, 17.08)	2.47 (0.41, 14.83)	3.07 (0.84, 11.21)
Any mental health Tx	* 1.51 (1.02, 2.26)	2.22 ** (1.50, 3.29)	2.74 ** (1.85, 4.05)	2.41 ** (1.63, 3.56)	3.57 ** (2.42, 5.27)
Inpatient mental health Tx	1.93 (0.90, 4.13)	3.11 ** (1.33, 7.27)	3.08 ** (1.39, 6.84)	2.11 (0.86, 5.21)	2.20 (0.87, 5.56)

$p < 0.05$ = *, $p < 0.01$ = **

Table 3 presents the comparison between our groups in utilization of services across baseline and follow up periods. Estimated values are a ratio of our YLP group's claim days over our comparison group's claim days. As such, a value of 1 on this scale represents no difference between groups, as the ratio of claim days is 1:1. Values greater than 1 indicate greater utilization of the YLP group relative to the comparison group, while values less than 1 indicate greater utilization by the comparison group.

Discussion

Recidivism

The findings reported here indicate a positive impact of YLP on its goals of interrupting the cycle of recidivism and connecting people who have frequent law enforcement encounters to behavioral healthcare resources when appropriate, at least for short-term recidivism (within 2 years) and broadly across mental health and SUD services. While the program is too young to evaluate long-term effects and implications, these short-term impacts are promising. YLP appears to have been especially impactful for individuals who had some prior history of recidivism and who, based on their history, were at an increased risk of future recidivism. Those who were in our YLP group had a significantly higher risk of recidivism than individuals in our comparison group during the three years prior to our study period. The primary impact of YLP for these high-risk individuals appears to be in reducing their risk of future recidivism to be in line with the broader population average for like individuals.

Our individual risk finding is corroborated by our county-level analysis, which looked at overall frequency of court cases in Blue Earth County relative to other like counties. We similarly saw that Blue Earth County had a higher frequency of court cases than like counties prior to the beginning of YLP, and that the start of YLP was

associated with a reversal of this relationship. These findings together indicate that an important impact of YLP is to reduce existing or heightened risk of recidivism. Because YLP was intended to target individuals at a high risk of recidivism, it is encouraging that these high-risk individuals have significantly lower risk after interaction with YLP.

This does, however, suggest room for improvement in the efficacy of YLP to lower recidivism for participants overall, rather than primarily for those with the greatest tendency to have a law enforcement encounter. In our previous descriptive report (Barton et al., 2022), we identified that only about half of individuals offered a screening by YLP coordinators accept it, and of these only a small percentage go on to complete the full YLP program. While it was not feasible for us to conduct an analysis of the impact of "dosage" (i.e., how much an individual engaged with YLP) for this evaluation, it is likely that improving engagement with YLP would improve the impacts of the program overall.

In addition to our findings here, it is worth mentioning that from a fiscal perspective Blue Earth County has previously conducted its own analysis of cost-savings that result from the reduction in jail-bed days and detox center admissions observed following the start of YLP. The administrative costs associated with confinement in jails and prisons, as well as the costs associated with short-term detox (which in most cases are paid by county dollars), is high. Failure to address underlying causes of recidivism leads to repeat expenditures by counties and the state to house individuals in these facilities. Following the beginning of YLP, Blue Earth County experienced a reduction in the time individuals spend in jail, as well as a reduction in admissions to detox[3]. While the study presented here did not evaluate a cost-benefit impact, the findings presented corroborate Blue Earth County's previously reported findings.

The effects we observed here may also be (at least in part) a consequence of broader cultural shifts in law enforcement procedures that result from Blue Earth County committing broadly to an effort to reduce and treat recidivism. During conversations with program administrators, buy-in from the county sheriff's department and Mankato Department of Public Safety was stressed as a critical factor in the success of the program. YLP's primary mechanism involves significant law enforcement participation (e.g., during street-level encounters or shortly after booking at a local facility) and without communication from law enforcement officers, YLP would be more limited in its ability to reach those in need. In addition to involving YLP (and thus providing individuals with the specific benefits of the program), these cultural changes in enforcement behavior may have other downstream impacts on officer decisions, such as arresting charge or even the decision to arrest at all. These changes would be considered holistic secondary impacts of a program like YLP and are harder to measure.

Health Care Utilization

We found some indication that interaction with YLP is associated with an increase in utilization of SUD treatment services in the short-term after interacting with YLP. Individuals in our treatment group had on

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[3] Detox admissions rose again in 2020 following policy changes in BEC, but cost savings are still seen in the reduction of jail bed days.

average 1.5 times as many days with healthcare claims for SUD treatment as did individuals in our comparison group, a difference which was only present after interaction with YLP. While we did not see differences beyond six months after the YLP interaction, this is not unexpected given the transient and short-term nature of many forms SUD treatment. We did not find any difference between our treatment group and our comparison group in terms of MOUD utilization. Given rates of MOUD were relatively low in both populations, it is not surprising that detecting effects was challenging. While this does not mean that a program model like YLP cannot have positive impacts on MOUD utilization, any effects it had here were not detectable in the small sample of individuals with OUD in our study. We did find that, prior to interaction with YLP, our treatment group had statistically more days with ED visits for nonfatal overdose than comparators, and that after interaction with YLP this difference disappeared. Variability for this measure was high, so these findings should be interpreted with caution.

We also found that our treatment group had 2 to 3 times as many claim days for any mental health treatment than the comparators, a finding that remained consistent for the full year after YLP exposure. In addition, the YLP group had nearly 3 times as many days as comparators with claims for inpatient mental health treatment in the first six months after their initial YLP interaction. These differences disappeared at the nine- and twelve-month follow-up periods.

Context and Limitations

Generalizability of findings

During our study period, Blue Earth County was the only county in Minnesota that intervened pre-court or as early as street-level and was reimbursed for officer-involved community care coordination services. In addition, YLP has demonstrated significant buy-in and partnership from all the operational partners involved including law enforcement leads (Sheriff's Office and Mankato Police), Blue Earth County Human Services, the County Attorney's Office, local hospital and mental health center, community corrections law enforcement dispatch, and the local housing coordinator. These unique factors limit the ability of this study to predict to what extent the impacts of YLP are generalizable in a new setting. For example, YLP program administrators discussed attempts to establish a YLP-style program as part of a sister-county collaboration with at least one other state (Pennsylvania). However, that program failed to be implemented due to insufficient buy-in from local law enforcement agencies.

Moreover, the context in Blue Earth County may influence impact. Both the individual risk analysis and the county-level frequency analysis indicated that, prior to YLP, the target population was more likely to have law enforcement contact than in peer counties. YLP succeeded in eliminating this difference, but it is not clear what impact the program could have on improving recidivism relative to the broader state averages.

This study suggests broader adoption of YLP and officer-involved community care coordination may lead to promising results, but the above features are important and any future implementation should be closely studied for its impact.

Limitations

Sample Population

Our study sample was drawn from a population of Minnesotans who both had a court case on file between 2010 and 2022, and who made MHCP-paid claims for health care at least once during that timeframe. As such, the findings may not be generalizable to the whole population, such as those with no or private insurance. Conversations with YLP managers indicated that post-screening care coordination sometimes involves assisting individuals gain access to Medical Assistance, suggesting that there may also be an important population of individuals who lack health insurance impacted by YLP. Because our sample was limited to those already covered by MCHP, our analyses would not include this group.

Our study also did not include any subgroup analyses to probe differential program effects by demographics, such as age, race, or sex. While such analyses are critical for truly understanding how a program might best serve the entire community of Minnesotans, we were limited by the sample size. Preliminary tests of subgroup analyses showed there was insufficient power to detect possible differences in effects. We therefore elected not to include statistical analyses of subgroup effects, as weak findings from such analyses (or more likely a lack of findings) could cause confusion or be misinterpreted.

Outcome Measures

Finally, it is important to discuss the implications of our choice of outcome measures. Our county-level measure of recidivism cannot be considered a true estimate of a causal impact because counties were not randomized to treatment and control groups. We did employ a statistical clustering procedure to identify counties in MN that were most like Blue Earth County demographically, but with only a single "subject" (i.e., the county), it is important to recognize that the reported effects can only be considered associated with the beginning of YLP.

Our individual-level measures of recidivism risk and health care utilization can employ more robust statistical controls, such as matching and inverse probability of treatment weighting. To the extent that these controls were sufficiently conditioned on important confounders for program exposure, the case for the impacts reported at this level being caused by YLP is much stronger. One potential issue is the apparent dissimilarity in the baseline risks of the groups in our recidivism risk analysis. To correctly estimate a causal effect, a difference in difference model must assume that the groups being studied have similar outcome trajectories prior to program exposure. As discussed, our YLP group was significantly different from our comparison group in the baseline period, which gives cause to interpret the impact with caution[4].

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[4] We did verify that there were no systematic differences between these groups in terms of the number of court cases in each of the last 4 quarters of the baseline period Number of court cases experienced by individuals is one of the drivers of our risk of recidivism, so parallel trends on this measure does provide some reassurance. However, it is important to note this limitation when interpreting the findings.

Policy Implications of Findings

The success of YLP within the specific context studied here suggests that implementation of officer-involved community care coordination may be beneficial for counties that seek to address core causes of recidivism and break the cycle of repeated confinement for Minnesotans with behavioral health disorders. Replicating the impact requires a program with similar goals and structure, a motivated county agency to administer the program, and a law enforcement body motivated to implement the necessary behavioral and cultural changes. These factors appear critical to the success of YLP, though understanding the specific importance of each requires further study.

This study looked at YLP from an "intention-to-treat" perspective, meaning we quantified impacts associated with *any* exposure to YLP, regardless of engagement. Indeed, nearly half of the YLP interactions counted as "treatment" in this evaluation do not even result in a screening. Improvements here represent a potential opportunity for Blue Earth County to increase the overall impact of the program. We note, however, this is a difficult to serve population and cannot speak to upper bounds of take-up.

Conclusion

Our study found significant impacts on recidivism and behavioral health care utilization associated with the implementation of, and interaction with YLP. We found that the introduction of YLP was associated with reductions in the frequency of reoccurring court cases, and individuals who interacted with YLP experienced a significant decrease in individual risk of future recidivism. We also found that individuals who interacted with YLP demonstrated increased utilization of some behavioral health services, including for both SUD and mental health. The findings for mental health service persisted over the one-year follow up period, whereas the SUD treatment effect appeared to be shorter-lived.

Importantly, our study measured the direct impact of YLP as a model of officer-involved community care coordination, as well as the impact of buy-in from law enforcement and the cultural will to address recidivism for a community. Replication of the impacts described here would likely require efforts on all three fronts. Additionally, there is room for improvement in the current implementation of YLP, as limited program engagement by participants may lessen the overall impact.

Nevertheless, it is clear that YLP has meaningfully enhanced the ability for rehabilitation through the timely access to behavioral health services and improved the safety of Blue Earth County. There is ample opportunity for counties across the state and country to learn and replicate the Yellow Line Project.

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