

STAT 110: Practice Problem 10 Solutions

Fall 2017

In 2008, the Minnesota Department of Corrections and five Minnesota counties – Hennepin, Ramsey, Dodge, Fillmore, and Olmsted – implemented the Minnesota Comprehensive Offender Reentry Plan (MCORP) pilot project (see the attached “Backgrounder” document for more detailed information on MCORP). Offenders who met certain criteria were assigned randomly to either the programming group (the group receiving the services of MCORP) or the control group (the group receiving regular services in both the institution and the community). Offenders from both groups were released from prison to one of the five pilot counties between February and December 2008. They were then followed for another 16 months post-release. The overarching goal of MCORP is to successfully prepare offenders for re-entry into the community after completion of their sentence, and the researchers decided that one way to measure success was to record whether or not the offenders were able to find employment upon their release from prison. The data on this variable are shown in the following table:

Group	Find Employment?		Total
	Yes	No	
MCORP	94	76	170
Control	31	48	79
Total	125	124	249

Research Question: Does the likelihood of finding employment appear to differ between those offenders who go through the MCORP program and those that receive only the regular services to help them re-enter society?

1. Find the proportion of offenders in this study that found employment in the MCORP group.
 $94 / 170 = 0.5529$
2. Find the proportion of offenders in this study that found employment in the Control group.
 $31 / 79 = 0.3924$
3. Carry out a hypothesis test to investigate the research question. Use JMP to find the p-value for both the chi-square test and Fisher’s exact test.

H₀: $\pi_{\text{yes} | \text{MCORP}} = \pi_{\text{yes} | \text{Control}}$

H_a: $\pi_{\text{yes} | \text{MCORP}} \neq \pi_{\text{yes} | \text{Control}}$

p-value from chi-square test: 0.0184 (see **A** on output shown on page 2)

p-value from Fisher’s exact test: 0.0209 (see **B** on output shown on page 2)

Conclusion: This study does provide evidence that the likelihood of finding employment appear to differ between those offenders who go through the MCORP program and those that receive only the regular services to help them re-enter society.

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Tests				
	N	DF	-LogLike	RSquare (U)
	249	1	2.7962205	0.0162

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	5.592	0.0180*
Pearson	5.560	0.0184*

Fisher's		
Exact Test	Prob	Alternative Hypothesis
Left	0.9938	Prob(Emp=yes) is greater for group=Control than MCORP
Right	0.0130*	Prob(Emp=yes) is greater for group=MCORP than Control
2-Tail	0.0209*	Prob(Emp=yes) is different across group

4. Suppose your research question was worded as follows instead: Does the MCORP program appear to increase the likelihood of finding employment?

Carry out a hypothesis test to investigate the research question. Use JMP to find the p-value.

$H_0: \pi_{\text{yes} | \text{MCORP}} = \pi_{\text{yes} | \text{Control}}$

$H_a: \pi_{\text{yes} | \text{MCORP}} > \pi_{\text{yes} | \text{Control}}$

p-value: 0.0130 (see **C** on output shown above)

Conclusion: This study does provide statistical evidence that the MCORP program appear to increase the likelihood of finding employment.

5. Can we conclude that it is in fact the MCORP program that is responsible for the increased likelihood of offenders finding employment? Explain your reasoning.

Yes. This was a designed experiment which involved randomly assigning subjects to either the MCORP or control groups. Though there may potentially be other factors that would affect whether or not an offender finds employment once released from prison, these factors should theoretically be balanced out between the two groups because of the random assignment of subjects to groups. So, we can in this case conclude a causal relationship exists between the explanatory variable and the response; in other words, there is evidence that the MCORP program is responsible for the increased likelihood of offenders finding employment.

6. In problem 3, you used JMP to calculate the chi-square test statistic (and its associated p-value). Show how this value was calculated.

First, we must find the expected counts assuming the null hypothesis (which says there is no difference between the two groups) is true. Overall, $125/249 = 50.2\%$ of the offenders found employment upon release. Therefore, if the null is true, we expect to see this same percentage find employment in each of our groups:

Expected number who find employment in the MCORP group: 50.2% of $170 = 85.34$

Expected number who find employment in the Control group: 50.2% of $79 = 39.66$

We can fill in the table of expected counts as follows:

Group	Find Employment?		Total
	Yes	No	
MCORP	85.34	84.66	170
Control	39.66	39.34	79
Total	125	124	249

Recall the observed counts were given earlier:

Group	Find Employment?		Total
	Yes	No	
MCORP	94	76	170
Control	31	48	79
Total	125	124	249

The chi-square test statistic is computed as follows:

$$\sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}} = \frac{(94 - 85.34)^2}{85.34} + \frac{(76 - 84.66)^2}{84.66} + \frac{(31 - 39.66)^2}{39.66} + \frac{(48 - 39.34)^2}{39.34} = 5.56$$



Background

MINNESOTA COMPREHENSIVE OFFENDER REENTRY PLAN

The Challenge

Minnesota, like many other states, is experiencing dramatic growth in the number of offenders entering prison. Successfully preparing offenders for reentry is an investment in public safety and the social and economic health of families and communities throughout the state.

History

The State of Minnesota, in cooperation with Hennepin County, was the recipient of a Department of Justice Serious and Violent Offender Reentry Initiative (SVORI) demonstration grant in 2003-2004. Under the title of Project SOAR, Minnesota's initiative sought to demonstrate the benefits of early engagement of offenders to plan their post-release reentry and develop a seamless transition from incarceration to successful community reentry.

- 27% increase in the prison population in the last five years (FY2002-2007)
- 2% projected increase in the prison population each year to 2012
- 95% of incarcerated offenders return to the community (6,857 in fiscal year 2005)
- 36% recidivism rate three years post-release

As the SVORI grant came to an end, the Minnesota Department of Corrections (DOC) developed a long-term reentry strategy based on three components: a rational planning process, offender management practices, and multi-agency collaboration.

The Planning Process

The Minnesota reentry strategy is built on three major schools of thought: lessons learned from the SVORI grant, work from the National Institute of Corrections' Transition from Prison to Community Initiative, and the National Governors Association (NGA) Reentry Policy Council Report.

A target population has been identified for the first phase of the initiative. This population will consist of a selected number of offenders who will return to Hennepin, Ramsey and Olmsted counties, communities that receive the highest number of returning offenders.

Minnesota was one of five states chosen to participate in the NGA Prisoner Reentry Policy Academy, offered in 2007. Participants will receive ongoing technical assistance and take part in information-sharing that will provide support and strategy for Minnesota to move its offender reentry initiative forward.

Offender Management Practices

Successful offender reentry begins when an offender first enters prison

and continues through his or her reentry to the community as a productive, law-abiding citizen. To better prepare offenders for successful reentry, the DOC is organizing around three phases: the institution phase, the transition phase, and the community reintegration phase.

Two reentry managers oversee planning for a target population of offenders selected for the first phase of the initiative. Currently the department and community have multiple services in place designed to aid offenders in transition and reentry. One goal of this initiative is to coordinate those services into a comprehensive approach.

Multi-Agency Collaboration

In February 2005, the DOC created the Minnesota Comprehensive Offender Reentry Plan (MCORP), a strategic initiative between invested state agencies, the courts, and the community to plan and oversee the statewide offender reentry approach. Joining the DOC, the following agencies have committed to the success of MCORP:

- Education
- Employment & Economic Security
- Health
- Housing Finance
- Human Services
- Public Safety
- State Courts Administration
- Veterans Affairs