

Offender to Rehab Programme – Benefit / Cost Analysis

Data Analytics Lab

October 2022

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2 Executive Summary

The Offender to Rehab (O2R) pilot is a 12-month project covering the Birmingham area. It focuses on prolific retail offenders who persistently shoplift in order to fund their drug addiction and is funded by the OPCC and retailers. The programme has been operating in Erdington since 2018 and expanded into a Birmingham-wide 12-month pilot in July 2021. The programme is now post-pilot phase, and continues to function in its current form until a decision is made by the FET as to the future structure and scope of the programme.

The Data Analytics Lab (DAL) has been commissioned to undertake a cost benefit analysis to understand if there has been a reduction in offending by the cohort and whether this reduction outweighs the costs of achieving it. This is in addition to a process evaluation which was commissioned to run alongside the first year of the pilot, undertaken by Aptus Research and Consultancy Ltd.

Overall attendance at the programme should break-even (using total costs) within 1 year of clients attending and if abstinence from previous behaviours can be maintained for 5 years, the programme should see a net return of circa £5.80 for each £1 spent.

There is a nuance in the performance of the programme. Some of the clients (and others) were seen as being actively engaged in the process in that they were actively working with officers and working towards recovery.

This actively engaged group of attendees had a lower probability of committing crime post-first engagement which means that the potential benefit / cost ratio is higher than seen generally.

For this group if they remained criminally inactive for a period of 5 years, then for every £1 spent, the net return would be circa £6.50; circa £9.40 in the case of applying the multipliers (of the costs of crime).

3 Introduction

The British Retail Consortium (BRC) crime survey for 2020/21¹ suggests that incidents of violence and abuse against shop workers has almost tripled and the volume of theft and associated crime prevention costs have remained at elevated levels. Additionally, anecdotal reporting by supermarkets suggests that the cost-of-living crisis is placing further strain on stores in terms of theft. Prolific drug-affected offenders are reportedly finding new markets in which to fence their stolen goods as members of the public and small businesses are feeling the burden of economic strain².

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The project funded a team of four police officers, a part time sergeant and a Business Crime Co-ordinator with the objective of supporting 40 prolific retail offenders through a residential drug rehabilitation programme.

The offenders were identified through referrals made by neighbourhood police teams (NHT), partner agencies and retailers. In the 12-month period, 136 referrals were made. Of these, some were not traceable and some were not interested in taking part in the pilot. Others did not fit the criteria of being a retail offender who either lived or offended within Birmingham.

The role of the police team is to trace potential clients for the scheme and to engage with them to build rapport. Officers provide intensive, dedicated and ongoing support despite the chaotic lives of many of their clients, some of whom are not eligible for many other services due to a range of factors (such as initial commitment to change, or presenting with comorbid substance misuse and mental health issues)³.

The programme includes pre-admission visits to the rehabilitation provider for some weeks before the residential stay to acclimatise to surroundings and procedures. After the residential period, follow-up support includes staying in a dry house, access to services, opportunities to work or volunteer. The support provided to clients by the police officers continues on a long-term basis.

During the 12-month pilot, 27 clients were admitted to the programme. There were some capacity issues both in terms of the police team and of rehabilitation centre availability. In addition, three clients died during the pilot, reflecting the severity of their poor well-being and consistent with national trends⁴.

¹ <https://brc.org.uk/media/679954/crime-survey-2022.pdf>

² Aptus Research and Consultancy Ltd *Offender to Rehab Programme: A process evaluation of the Birmingham Pilot* July 2022, p.10

³ Aptus Research and Consultancy Ltd *Offender to Rehab Programme: A process evaluation of the Birmingham Pilot* July 2022, p.5. and Black, C. *Review of drugs part two: prevention, treatment, and recovery*, Updated 2 August 2021 <https://www.gov.uk/government/publications/review-of-drugs-phase-two-report/review-of-drugs-part-two-prevention-treatment-and-recovery>

⁴ Aptus Research and Consultancy Ltd *Offender to Rehab Programme: A process evaluation of the Birmingham Pilot* July 2022, p6 and ONS (2021) 'Deaths related to drug poisoning in England and Wales: 2020 registrations'.

The Data Analytics Lab (DAL) has been commissioned to undertake a cost benefit analysis to understand if there has been a reduction in offending by the cohort and whether this reduction outweighs the costs of achieving it. This is in addition to a process evaluation which was commissioned to run alongside the first year of the pilot, undertaken by Aptus Research and Consultancy Ltd.

The external process evaluation provides an assessment of the following areas:

1. Recruitment and training of O2R officers
2. Referral pathways
3. Client profile, engagement, and treatment
4. Rehabilitation experience and impact
5. Client preparation for sustainable change and case studies.
6. Key lessons learnt throughout the process evaluation

It is intended that the DAL's assessments of costs and benefits to the stakeholders will complement the process evaluation.

During initial contact with clients, officers explained about the programme and why a referral was being offered. Before being 'officially' referred to the pilot and before any detailed information was captured for research purposes, consent was obtained from clients.

4 Exploratory Data Analysis

Data (mostly details of the clients and their start date of the programme, the first engaged date) were provided covering 74 clients. 9 clients have been taken out from this analysis as 3 died, another 2 attended rehab outside of the WMP area or no longer resided in the WMP area, 2 have no crime records where they were the offender and another 2 do not have records relating to crimes within the WMP area.

With the remaining 65 clients, 100% of them were found to have committed crimes (where they were the offender) prior to the first engaged date whilst 55% of these had not committed crimes since they first engaged with the programme.

As measured by the Cambridge Crime Harm Index (CCHI) the mean level of harm arising from these crimes prior to first engagement was 1,130 whilst the mean level of harm arising post engagement was 222.

The mean total unit cost of the crimes⁵ pre-first engagement amounted to £1,133,460 whereas the mean cost post first engagement amounted to £226,141.

Of course, the periods of time over which these two sets of crimes occurred were very different (a mean period of 21 years for the pre-first engaged period and a mean of circa 6 months for the post-first engaged period).

The difference in lengths of time pre and post-first engagement result in the mean harm per crime of 30.3 (pre-first engagement) versus a mean of 50.1 post-first engagement. In terms of total unit costs the mean cost per crime pre-first engagement is £30,473 whilst for post-engagement crimes it is £51,046⁶.

Looking at the *rate* of crime (the daily rate in this case) reveals a mean pre-first engagement rate of 0.009 crimes / day with a mean post-first engagement rate of 0.063 crimes / day (which is 7 times higher).

⁵ The pecuniary costs of the crimes are based on the costings from the Home Office produced in 2018. These costings provide various costs arising from crime, but are categorised into broad groups that do not include all of the list of crimes that have been committed by the nominals who have come into contact with the programme. The harm of the crimes as measured by the CCHI has been used to interpolate to the costs estimated by the Home Office $\{ \min(\text{costs}) + (\text{cchi} - \min(\text{cchi})) \times (\max(\text{costs}) - \min(\text{costs})) / (\max(\text{cchi}) - \min(\text{cchi})) \}$ and the resulting costs have been updated to 2021 £s (the same £s as the costs of the programme).

⁶ There are multipliers associated with the crimes within the Home Office costings. Where a crime is within the categories used by the HO costs of crime 2018, that multiplier has been applied. This results in the mean pre-first engagement multiplied total costs of £1,660,649 and mean multiplied costs post-engagement of £367,192.

5 Analysis Overall

From the above, it can be seen that there is a mixed picture. Whilst some 60% of attendants of the programme did not commit crimes since starting the programme and the mean total costs of crimes and the harm arising from the remainder fell, the daily rate of crime increased, but the harm per crime and the cost per crime both fell for those who attended whilst for those who did not attend, the costs and harm per crime both increased.

There are difficulties in assuming that the post-first engagement daily rates of crime can be used to estimate future costs associated with clients' future crime activity; namely the condensed period of time compared to the pre-first engagement period. For this reason, the potential benefits of the programme could most usefully be estimated assuming that future costs of crime are similar to their pre-first engagement costs of crime.

For the purposes of this analysis the proportions of clients committing crimes post-first engagement are taken as the probabilities that post-first engagement crimes will be committed. The probabilities associated with committing crimes post-first engagement are noted below (the contingency tables from which these are calculated are presented in the appendix):

In the first instance, the overall assessment of attendance through the programme will provide an overview of performance as a whole.

Table 1: Probabilities of committing crime post-first engagement

Attended	Probability crime
Yes	0.41
No	0.47

Assuming (for the reason noted above) that post-first engagement crime activity is similar to past behavior (the pre-first engagement activity) on a per year basis, the expected costs⁷ arising from criminal activities would amount to:

Table 2: Expected future costs of crimes

	1 year	2 years	5 years
Attended	£248,560	£558,495	£1,315,705
Not Attended	£714,000	£1,372,540	£3,233,440

Note: figures are rounded to nearest £5.

Throughout this report, the costs of crime for two and five years are present values using (a potentially optimistic) value of 2% for inflation used as the discount rate.

⁷ Expected costs = probability(commit crime post-first engaged) x total costs of crime for time period. The costs arising from crime were circa twice as much for the not attended group as for the attended group. The length of time between the first engagement date and the first crime post-first engagement varies between 40 days and 618 days for those who attended. The presentation of the results over 1, 2 and 5 years is to provide an idea of actual and potential returns given the different amounts of time of potential abstinence.

It should be noted that these expected values are based on probabilities that are estimated for each of the time periods. For example, the probability that those who attended commit a crime within 1 year of the first engagement date is 0.35 (so of the participants who attended, 35% of those who are likely to commit a crime have done so within 1 year); however the probability that those who didn't attend commit a crime within 1 year is 0.47 and this remains the probability (whilst for those who attended, the probability increases to 0.41).

These expected values can also be compared to the clients' previous (pre-first engagement) costs of crime to ascertain potential "savings" (on a yearly basis):

Table 3: Potential savings from attendance at the programme

	1 year	2 years	5 years
Attended	£461,620	£806,715	£1,900,465
Not Attended	£821,095	£1,578,420	£3,718,460

Note: figures are rounded to nearest £5.

Whilst it may appear that non-attendance leads to higher "savings", it should be borne in mind that this relates to a relatively small number of nominals and the population of nominals who have committed a crime (and known to WMP) is far larger (so will have far larger associated costs of crime) than is the case here. It is also the case that attendance at the programme reduces the probability of crime post-first engagement compared to those who did not attend.

These "savings", when compared to the total costs of the programme (£278,924; the cost of being in rehab and the cost of the WMP staffing) lead to the following potential net return amongst those who attended:

Table 4: Potential net benefits arising from attendance at the Programme

	1 year	2 years	5 years
Attended	£182,695	£527,790	£1,621,540

Note: figures are rounded to nearest £5.

The potential savings lead to benefit / cost ratios of:

Table 5: Potential benefit / cost ratios arising from attending the programme⁸

	1 year	2 years	5 years
Attended	1.65	2.89	6.81

Overall therefore, attendance at the programme should break-even (using total costs) within 1 year of clients attending and if abstinence from previous behaviours can be maintained for 5 years, the programme should see a net return (i.e. "profit") of circa £5.80 for each £1 spent.

⁸ This is the savings / costs of programme.

Taking the multiplied costs on board however leads to:

Table 6: Potential benefit / cost ratios arising from attending the programme; multiplier costs

	1 year	2 years	5 years
Attended	2.81	4.91	11.57

Based on the multiplier costs as specified in the Home Office costs of crime report, the programme could see a net return of circa £1.80 for each £1 spent within the first year with a potential net return of circa £11 if abstinence from crime can be maintained for 5 years.

6 A Nuance in Performance

Whilst the section above examined the potential benefits arising from attendance at the programme in its entirety, there is a nuance worth examining.

Some of the clients were seen as being actively engaged in the process in that they were actively working with officers and working towards recovery. Other categories of clients are inactive (they were active, but engagement has reduced / stopped or they have relapsed) or withdrawn (nominals who are not part of the programme; they were either not eligible, weren't interested or they started but there has been a lack of engagement for a sustained period despite Officers' attempts to re-engage them). Some of the clients are classed as active but not attended which means they are actively engaging with Officers but have not yet attended (due to readiness, capacity or an alternative may be more appropriate).

As can be seen from the table below, whilst the overall probability of those attending the programme committing a crime post-first engagement is 0.41 (Table 1), attendance at the programme and being active leads to a probability of committing crime post-first engagement of 0.27.

Table 7: Probabilities of committing crime post-first engagement

	Attended	Not Attended
Active	0.27	0.53
Inactive	1	0.55
Withdrawn	0.67	0.35

Note: the probability of certainty of committing a crime when attended and being inactive is due to one nominal falling into this grouping.

If the inactive and withdrawn groups are taken as one ("not active") group, the probabilities are:

Table 8: Probabilities of committing crime post-first engagement (two groups)

	Attended	Not Attended
Active	0.27	0.47
Not Active	0.71	0.43

It can be seen therefore that attending the programme and being actively engaged leads to a lower probability of committing crime post-first engagement than either attending and not engaging or not attending at all.

As above, assuming that post-first engagement crime activity is similar to past behavior (the pre-first engagement activity) on a per year basis, the expected costs arising from criminal activities would amount to:

Table 9: Expected costs of crime post-first engagement

	1 year	2 years	5 years
Active	£168,710	£324,320	£764,020

Note: figures are rounded to nearest £5.

Again, the probabilities are estimated for each of the time periods. For example, the probability of committing a crime for those who were active within 1 year of the first engagement date is 0.27 (so of the active participants, those who are likely to commit a crime have done so within 1 year), however the probability that those who weren't active committed a crime within 1 year is 0.6 whereas within two years, the probability increases to 0.71.

Comparing these expected values to the clients' previous (pre-first engagement) costs of crime allows the ascertaining of the following potential "savings" (on a yearly basis):

Table 10: Potential savings on costs of crime for those who attended

	1 year	2 years	5 years
Active	£463,950	£891,870	£2,101,080

Note: figures are rounded to nearest £5.

Comparing the costs of the programme to the potential "savings" results in the following potential benefits:

Table 11: Potential net benefits arising from the programme

	1 year	2 years	5 years
Active	£185,030	£612,950	£1,822,155

Note: figures are rounded to nearest £5.

The potential savings would lead to benefit / cost ratios of:

Table 12: Benefit / Cost ratios arising from the programme

	1 year	2 years	5 years
Active	1.66	3.2	7.53

Therefore, the benefits of the programme principally accrue from those who were actively engaged and likely to abstain from offending over a period of at least one year. If they remained criminally inactive for a period of 5 years, then for every £1 spent, the net return would be circa £6.50.

With the multipliers applied, the benefit / cost ratios would be:

Table 13: Potential benefit / cost ratios; active, multiplied costs

	1 year	2 years	5 years
Active	2.29	4.41	10.38

This of course begs the question, what is the probability of being active? Of the nominals encountered for the programme, the probability of being active is 0.46. For those who attended, the probability of being active is 0.68⁹.

This could be taken as evidence for two potential effects, either people who are more likely to actively engage are more likely to attend or attending leads to clients being more likely to be active (or a mixture of the two). Either way, **it would appear that if the programme can attract clients who are more likely to become actively engaged, the greater the benefit will be.**

⁹ This contingency table leads to a Bayes Factor of 13.3:1 against independence amongst the entries of the table; 'positive' evidence in favour of a difference.

7 Taking Uncertainty into Account

Ignoring the uncertainty that will be in the Home Office costs figures and multipliers¹⁰, there are two sources of uncertainty when ascertaining the potential benefits of the programme; the uncertainty regarding the proportion of successful clients and the uncertainty surrounding the levels of the benefits that will accrue.

Taking success to mean the clients attending the programme have a lower probability for some period of time of committing crime means, of those who attended some 59% (73% for the active cohort) have been successful (so far).

However due to the numbers involved, this means that the probability of further crimes being committed by those who attended is 41% \pm 10%¹¹ (27% \pm 11% for the active cohort). This means that moving forward, the probability for further crimes could be between 31% and 51% (16% and 38% for the active group).

Furthermore, there will be uncertainty regarding the level of benefits that could be achieved even where clients are successful given that different clients do / will exhibit different behaviours, etc.

Therefore, there will be some uncertainty around the expected benefit levels that could accrue as a result of the programme.

To assess this, a Monte Carlo approach has been taken¹². This is based on 10,000 observations (taking uncertainty into account) over which expected value calculations are undertaken which form the basis of the benefit / cost calculations used here.

This analysis leads to the following benefit / cost ratios:

Table 14: Potential benefit / cost ratios taking uncertainty into account

	1 st Quartile	Mean	3 rd Quartile
Attended	0.03	1.98	2.86
Active	0.03	2.28	3.06

¹⁰ No information is provided as to the uncertainty surrounding the estimates in the relevant documents.

¹¹ The number of observations means that the standard error of the proportion (0.41) is = $\sqrt{(0.41(1 - 0.41))/22} = 0.1$; for the active group, the same calculation gives 0.11 (with the number of observations being 15).

¹² The probability of committing crime post-first engagement is used as the centre of a beta distribution (with 10000 draws, beta(9,13) for the attended and beta(4,11) for the active). 10,000 random draws from the actual total unit costs of crime are then used as the basis for the costs arising from crime moving into the future (the distribution of these costs is right skewed). These form the basis of the expected costs of crime following attendance at the programme. The costs of crime minus the expected costs of crime lead to the potential savings which are then compared to the costs of the programme to derive the benefit / cost ratios.

Appendix –

Contingency tables:

Attended the programme:

	Attended	Not_attended
crime_after	9	20
Not_crime_after	13	23

So in this case, the probability of committing a crime post-first engagement for those who attended is:

$$P(C|A, I) = \frac{P(C, A|I)}{P(C, A|I) + P(\neg C, A|I)}$$

Where C = committed crime, $\neg C$ = didn't commit crime, A = attended the programme and I = information (as all probabilities are conditional on the information available).

Active participants:

	Attended	Not_attended
crime_after	4	8
Not_crime_after	11	7

Proportion (probability of being) Active:

	Attended	Not Attended
Active	15	15
Not Active	7	28

References

Heeks, M., Reed, S., Tafsiri, M. and Prince, S., Home Office, *The economic and social costs of crime*, 2nd Edition, Research Report 99, July 2018.