Addiction Recovery

Overview

This paper outlines our approach to measuring the impact of addiction recovery programs in the Canadian context. In particular, we have explored research related to the prevention or treatment of eight types of substance use disorders, including alcohol and opioid use disorders. Appendix III provides a partial bibliography of the studies that we used to inform our model[1]. Studies were selected based on their relevancy to different aspects of our model and availability of quantitative results. Results were weighted according to things like recency, geography, research design, and overall strength. These studies represent a fraction of the existing research literature on substance use disorders, a comprehensive review of which would exceed the limits of our resources. We acknowledge this limitation and have done our best to provide as thorough a survey of the research as possible with the studies we have selected.

The Social Return on Investment (SROI) to Addiction Recovery Programs

Outcome Categories

Our research finds several categories of outcomes connected to substance abuse – see Table I. These could be considered the various costs of substance abuse, or, reversely, possible benefits of lesser substance use. This is not intended as an exhaustive list of all possible costs of substance abuse.

Table I – Addiction Recovery Outcome Categories

Outcome Category	Description	Client Group
Quality of Life	Reduced quality of life due to substance abuse.	Adults and Youth
Mortality	Loss of life due to substance abuse, related to suicide versus all other causes.	Adults and Youth
Health Care System		
Outpatient Care	Visits to an outpatient facility due to substance abuse.	Adults and Youth
Hospitalization	Time in inpatient hospital care due to substance abuse.	Adults and Youth
Emergency Department	Visits to an emergency department due to substance abuse.	Adults and Youth
Crime		
Violent Crime	Violent crime perpetrated due to substance abuse.	Adults and Youth
Property Crime	Property crime perpetrated due to substance abuse.	Adults and Youth
Other Crime	Other crime perpetrated due to substance abuse.	Adults and Youth
Employment	Lesser employment due to substance abuse.	Adults
Work Loss	Absenteeism and presenteeism due to substance abuse[2].	Adults
High School Completion	Lesser high school completion due to substance abuse.	Youth
Postsecondary Completion	Lesser postsecondary completion due to substance abuse.	Youth

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[1] We focus on studies that were chosen as relating specifically to addiction recovery and exclude more general sources of data that inform multiple program models.

[2] Absenteeism refers to days absent from work due to substance abuse. Presenteeism refers to days spent working at reduced capacity due to substance abuse.

Social Return on Investment Model

We use a Social Return on Investment methodology to measure the impact of charitable activities. The SROI is an estimate of the total dollar value of social benefits that are realized as a result of a charity's programs divided by the charity's costs. Costs include program, administration, and fundraising costs, as well as the cost of goods in kind used in charitable activities and amortization on assets. Data informing the costs side of the SROI equation come from a charity itself, and generally are readily accessible. As such, we focus our research and this paper on the data informing the benefits side of the SROI equation.

The total dollar value of social benefits is the sum of the dollar values of often dozens of individual outcomes (or changes) brought about by a charity's programs. The calculation of the dollar value of a particular outcome requires knowledge of several pieces of information. We summarize these in Table II, providing examples in the context of addiction recovery.

Table II – Basic Components of Social Benefits Model

Model Component	Description	Example
Number of Clients	The total unique number of clients provided a service or involved in a program (i.e., the total number of clients where each client is counted only once).	The number of clients involved in a substance abuse treatment program (e.g., 100).
Baseline Distribution	The percentage of clients in one of potentially multiple, mutually exclusive groups which differ in some important way, leading to different outcomes.	In the context of quality of life, the percentage of clients with a mild versus a moderate or severe substance use disorder (e.g., 56 percent, versus 23 and 21 percent).
Marginal Success Rate	The percentage of clients who achieve an outcome, net of the percentage of clients who would have achieved the outcome anyway, even without the program.	In the context of treatment, the percentage of clients who achieve abstinence (sobriety), net of the percentage who would have achieved abstinence anyway (e.g., 6 percentage points).
(Annual) Outcome Value	The annual, per person dollar value of a particular change that has happened due to a program or service.	In the context of hospitalization, the average annual cost per person of additional days in inpatient hospital care due to a substance use disorder (e.g., $3,000).
Start and End Years	The number of years that must pass after completion of a program, 1) before the annual outcome value begins to take effect (start year), and 2) after which the annual outcome value is no longer considered (end year).	In the context of treatment, 1) the average number of years until the benefits of lesser substance usage are realized, and 2) the start year plus the expected duration of outcomes (e.g., 0 and 5).
(Annual) Drop-Off	The percentage of clients who initially achieve an outcome but lose it over time.	In the context of treatment, the annual percentage of newly abstinent people who relapse (e.g., 15 percent).
Baseline Attribution	The amount of credit a charity gets for a particular outcome, typically based on	The share of the total cost of a substance abuse treatment program

	its contribution to the total cost of a service or program.	borne by a focal charity (e.g., 100 percent).

In addition to the above, we consider various elements of outcome value depreciation over time. In this context, *attribution decay* accounts for the fact that, over time, other factors besides the initial intervention will contribute to a client's success, such that the original (baseline) attribution percentage should fall incrementally (we have chosen a rate of 10 percent per year). Similarly, *time discounting* is a standard adjustment in the field of economics to value outcomes that are achieved earlier in time more highly than those achieved later in time (we have chosen a discount rate of 3 percent per year). These adjustments apply to all programs.

An Example SROI

The total dollar value of social benefits of an addiction recovery program will change based on several factors. We identify in Table III the variables affecting the addiction recovery social benefits model.

Table III – Addiction Recovery Social Benefits Model Variables

Variable	Description	Example
Number of Clients	The number of clients served.	100
Geography	The province or territory wherein clients are served, or Canada as a whole.	Canada
Age Group	The age group of clients (adults or youth).	Adults
Gender	The gender of clients (female or male[3]).	Male
Age	The average age of clients.	35
Attribution	The portion of program costs borne by the focal charity.	100 percent
Type of Substance	The type of substance at the center of prevention or treatment efforts (alcohol, tobacco, cannabis, opioids, other CNS depressants, cocaine, other CNS stimulants, or other substances[4]).	Alcohol
Disorder Severity	The portion of clients with a mild, moderate, or severe substance use disorder.	56, 23, and 21 percent
Focus of Program	Prevention or treatment.	Treatment
Treatment Method	The type of treatment provided to clients (psychotherapy, 12-step program, or medication).	Psychotherapy
Change in Substance Use, Non-Abstinence	Among clients who do not achieve abstinence, the average decrease in substance use.	4 percent
Marginal Success Rate, Abstinence	The percentage of clients who achieve abstinence minus the percentage of clients expected to have achieved abstinence even without the program.	6 percentage points
Relapse Rate (Drop-Off)	Among clients who achieve abstinence, the percentage each year who relapse.	15 percent
Duration of Treatment Outcomes	The number of years treatment effects last for in the context of non-abstinence and abstinence.	1 and 5 years

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[3] Note that the binarization of this variable is for technical reasons, as we do not yet have research specific to non-binary individuals.

[4] Opioids include heroin, pain relievers, and synthetic drugs like fentanyl. Other CNS (central nervous system) depressants include sedatives, benzodiazepines, and barbiturates. Other CNS stimulants include amphetamine and methamphetamine. Other substances include hallucinogens and inhalants.

Intensity, Duration of Intervention	The average number of hours (or weeks[5]) of an intervention, per client.	16 hours

It is beyond the scope of this paper to identify all of the data that go into the impact model for an addiction recovery program, as each outcome category involves several specific values for each of the components of our model, described in Table II. As such, a full account of each outcome would overwhelm this paper. Instead, based on the information in Table III, we present final estimates of social benefits of an example addiction recovery program. In Appendix II we identify the types of data that inform the various components of our model. Some of these data are from program-specific research (e.g., arrest rates among individuals with a substance use disorder), while others are common to multiple program models (e.g., annual outcome values connected to high school completion).

As part of our process, we identify certain 'final' outcomes downstream from the outcome categories identified in earlier sections of this paper. We estimate the total social benefits of a program by summing the values of final outcomes. In cases where the same final outcomes are connected with multiple outcome categories, those with the greatest absolute values are included in the sum. This is to simplify the presentation of our findings and to account for potential double-counting in our model (e.g., overlapping values connected to different education outcomes). We present in Table IV the total social benefits of our example addiction recovery program. In Appendix I, we present our formula for bringing together all of the various components of our approach to valuing a particular final outcome – for example, in the context of addiction recovery, lesser risk of mortality from suicide.

Table IV – Total Social Benefits, Example Addiction Recovery Program

Outcome Category	Final Outcome	Total Social Benefits ($)
Quality of Life	Quality of Life, Mental Health	187,645
	Quality of Life, Physical Health	562,936
Mortality	Mortality, Suicide	24,518
	Mortality, All Causes	255,748
Health Care System	Public Systems, Health Care	66,337
Crime	Cash on Hand, Income (Employment Income)	~~5,058~~
	Crime Victim Costs	189,733
	Public Systems, Criminal Justice	16,575
	Public Systems, Income Tax	~~1,531~~
Employment		
Income	Cash on Hand, Income (Employment Income)	94,067
	Public Systems, Income Tax	31,269
Quality of Life	Quality of Life, Mental Health	~~5,056~~
Mortality	Mortality, All Causes	~~549~~
Work Loss		
Income	Cash on Hand, Income (Employment Income)	~~(2,293)~~
	Public Systems, Income Tax	~~(694)~~
Productivity	Productivity	(6,395)
		1,422,434

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[5] In the context of treatment by means of medication (e.g., methadone maintenance for an opioid use disorder) the duration of an intervention is measured in weeks. In the context of other interventions (e.g., treatment by means of psychotherapy, or prevention programs), the duration (or intensity) of a program is measured in hours.

Note: Numbers with strikethrough format do not factor into the sum total social benefits. These represent values of particular final outcomes that are common to multiple outcome categories, where only the greatest absolute value of a particular outcome is included in the sum. Negative values are in parentheses.

As can be seen in Table IV, the total social benefits of our example addiction recovery program is about $1,400,000, or $14,000 in short- and long-term benefits per client. The SROI to this example program would then be calculated by dividing the total social benefits by the total cost of the program. Thus, if the program costs $14,000 per client, the SROI would be 1.0. If it costs $2,800, the SROI would be 5.0. That is, $5 of social value created for every $1 of costs.

These estimates are based on a particular set of circumstances, and there is a wide range of possible results for addiction recovery programs. As identified in Table III, our addiction recovery model involves several variables, differences in any one of which will affect the estimate of total social benefits. Depending on the unique circumstances of and data available from a charity, estimates of the impact of a program could vary considerably. In particular, the onus is on charities to present evidence showing that the effectiveness of their program matches or exceeds what we have found through our research. When charity data are not available, we make conservative assumptions about things like the effectiveness of a program, such that specific estimates of total social benefits may be smaller than those in this paper.

Appendix I – Charity Intelligence Outcome Valuation Formula

As it relates to the total social benefits of a charity program, we calculate the total dollar value of a particular outcome, for all clients who are candidate for it, using the following formula.

$$TV = \frac{(ba \times c \times bd \times msr \times ov \times ((1-do) \times (1-ad))^{-ys} \times (((1-do) \times (1-ad) \times (1-td))^{ys} - ((1-do) \times (1-ad) \times (1-td))^{ye}))}{1 - ((1-do) \times (1-ad) \times (1-td))}$$

where:
TV is the total value of a particular outcome, for all clients
ba is baseline attribution
c is the total number of clients candidate for a particular outcome
bd is baseline distribution percentage
msr is the marginal success rate
ov is the annual per person value of an outcome
do is drop-off
ys is year start
ye is year end
ad is attribution decay
td is time discounting

Based on our example addiction recovery program, we estimate the total dollar value of lesser risk of mortality from suicide due to lesser substance usage. This value is a summation of two estimates, based on whether or not clients achieve abstinence. Below, we identify the data informing the components of our model for valuing an outcome, for clients who achieve abstinence. Our intention here is not to explain the derivation of these data, but just to illustrate how the formula for valuing a given outcome works.

Model Component	Value
Number of Clients	100
Baseline Distribution	100.0 percent
Marginal Success Rate	0.1 percent
(Annual) Outcome Value	$100,000
Start Year	18.3
End Year	43.8
Drop-Off	0.0 percent
Baseline Attribution	100.0 percent
Attribution Decay	10.0 percent
Time Discounting	3.0 percent

Inputting these data into the formula, we get:

$$= \frac{\left(100.0\% \times 100 \times 100.0\% \times 0.1\% \times \$100,000 \times ((1-0.0\%) \times (1-10.0\%))^{-18.3} \times (((1-0.0\%) \times (1-10.0\%) \times (1-3.0\%))^{18.3} - ((1-0.0\%) \times (1-10.0\%) \times (1-3.0\%))^{43.8})\right)}{1 - ((1-0.0\%) \times (1-10.0\%) \times (1-3.0\%))}$$

$$= \$21,227^{6}$$

The comparable value for clients who do not achieve abstinence, yet are at lesser risk of mortality from suicide, is $3,290. Summing these together, we get $24,518 for the total value of lesser risk of mortality from suicide.

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[6] The difference between this figure and what you would get by the formula is due to rounding in the provided data.

Appendix II – Types of Data Informing Social Benefits Model Components

Quality of Life

Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence. • The distribution of clients based on the severity of a substance use disorder – mild, moderate, or severe.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program.
(Annual) Outcome Value	• The annual cost per person of worse quality of life related to mental health due to a substance use disorder. • The annual cost per person of worse quality of life related to physical health due to a substance use disorder. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration or intensity of a program.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • In the context of prevention, the average age of clients. • In the context of prevention, the duration of a substance use disorder. • In the context of treatment, the duration of treatment outcomes.
(Annual) Drop-Off	• In the context of treatment, the annual percentage of individuals who achieve abstinence who relapse.
Baseline Attribution	• The charity's costs relative to the total cost of the program.

Mortality

Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program. • The lifetime difference in the percentage of people with and without a substance use disorder who commit suicide. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration of treatment outcomes relative to the number of years until suicide among individuals who commit suicide, and to the duration of a substance use disorder.
(Annual) Outcome Value	• The cost per person of a full year of lost life.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • The average age of clients.

	• The number of years from onset of a substance use disorder to suicide, among individuals who commit suicide. • Life expectancy in the general population. • The number of years of life lost due to all causes except suicide, among individuals with a substance use disorder.
(Annual) Drop-Off	*There is no drop-off value in the context of mortality. In the context of treatment, relapse among individuals who achieve abstinence factors into the marginal success rate.*
Baseline Attribution	• The charity's costs relative to the total cost of the program.
Health Care System	
Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program.
(Annual) Outcome Value	• The annual cost per person of additional visits to an outpatient health care facility due to a substance use disorder. • The annual cost per person of additional days in inpatient hospital care due to a substance use disorder. • The annual cost per person of additional emergency department visits due to a substance use disorder. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration or intensity of a program.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • In the context of prevention, the average age of clients. • In the context of prevention, the duration of a substance use disorder. • In the context of treatment, the duration of treatment outcomes.
(Annual) Drop-Off	• In the context of treatment, the annual percentage of individuals who achieve abstinence who relapse.
Baseline Attribution	• The charity's costs relative to the total cost of the program.
Crime[7]	
Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder.

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[7] For more information on crime, see the Crime Prevention summary paper.

	• In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program. • The annual difference in the percentage of people with and without a substance use disorder who are arrested for committing a violent, property, or other crime. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence.
(Annual) Outcome Value	• The annual costs per violent, property, or other crime leading to arrest, among adults versus youth.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • In the context of prevention, the average age of clients. • In the context of prevention, the duration of a substance use disorder. • In the context of treatment, the duration of treatment outcomes. • The age at which youth crime becomes adult crime.
(Annual) Drop-Off	• In the context of treatment, the annual percentage of individuals who achieve abstinence who relapse.
Baseline Attribution	• The charity's costs relative to the total cost of the program.
Employment[8]	
Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence. • The baseline distribution values associated with employment.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program. • The annual difference in the percentage of people with and without a substance use disorder who are employed. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • The marginal success rate values associated with employment.
(Annual) Outcome Value	• The annual values per person of outcomes associated with employment.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • In the context of prevention, the average age of clients. • In the context of prevention, the duration of a substance use disorder. • In the context of treatment, the duration of treatment outcomes.
(Annual) Drop-Off	• In the context of treatment, the annual percentage of individuals who achieve abstinence who relapse.
Baseline Attribution	• The charity's costs relative to the total cost of the program.

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[8] For more information on employment, see the Employment Programs summary paper.

Addiction Recovery

Work Loss

Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence. • The annual employment rate among individuals with a substance use disorder.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program.
(Annual) Outcome Value	• Among employed individuals, the annual cost per person of additional days absent from work due to a substance use disorder (absenteeism). • Among employed individuals, the annual cost per person of additional days working at reduced capacity due to a substance use disorder (presenteeism). • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration or intensity of a program.
Start and End Years	• In the context of prevention, the age at onset of a substance use disorder. • In the context of prevention, the average age of clients. • In the context of prevention, the duration of a substance use disorder. • In the context of treatment, the duration of treatment outcomes.
(Annual) Drop-Off	• In the context of treatment, the annual percentage of individuals who achieve abstinence who relapse.
Baseline Attribution	• The charity's costs relative to the total cost of the program.

High School Completion[9]

Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence. • The baseline distribution values associated with high school completion.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program. • The difference in the percentage of people with and without a substance use disorder who complete high school. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration of treatment outcomes relative to the number of years until high school completion.

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[9] For more information on educational attainment, see the Educational Support summary paper.

	• The marginal success rate values associated with high school completion.
(Annual) Outcome Value	• The annual values per person of outcomes associated with high school completion.
Start and End Years	• The start and end years of outcomes associated with high school completion.
(Annual) Drop-Off	*There is no drop-off value in the context of high school completion. In the context of treatment, relapse among individuals who achieve abstinence factors into the marginal success rate.*
Baseline Attribution	• The charity's costs relative to the total cost of the program.
Postsecondary Completion[10]	
Number of Clients	• The number of clients provided a prevention or treatment service.
Baseline Distribution	• In the context of treatment, the percentage of individuals who do and do not achieve abstinence. • The baseline distribution values associated with postsecondary completion.
Marginal Success Rate	• In the context of prevention, the difference in the percentage of individuals who do and do not participate in a substance abuse prevention program who develop a substance use disorder. • In the context of treatment, the difference in the percentage of individuals who do and do not participate in a treatment program who achieve abstinence. • The duration or intensity of a program. • The difference in the percentage of people with and without a substance use disorder who complete postsecondary. • In the context of treatment, lesser substance use among individuals who do not achieve abstinence. • In the context of treatment, the duration of treatment outcomes relative to the number of years until postsecondary commencement. • The marginal success rate values associated with postsecondary completion.
(Annual) Outcome Value	• The annual values per person of outcomes associated with postsecondary completion.
Start and End Years	• The start and end years of outcomes associated with postsecondary completion.
(Annual) Drop-Off	*There is no drop-off value in the context of postsecondary completion. In the context of treatment, relapse among individuals who achieve abstinence factors into the marginal success rate.*
Baseline Attribution	• The charity's costs relative to the total cost of the program.

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[10] Ibid.

Appendix III – Bibliography of Studies Used to Inform Addiction Recovery Model

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