



Findings 7

A SUMMARY OF OUTCOMES FOR THE *PER-PROTOCOL* POPULATION

INTRODUCTION

The Research Outcome Study in Ireland (ROSIE) is the first national, prospective, longitudinal, multi-site drug treatment outcome study in the country. The National Advisory Committee on Drugs (NACD) commissioned this research in 2002 as required by the National Drugs Strategy Action 99. The aim of the study was to recruit and follow opiate users entering treatment over a period of time documenting the changes observed. The contract was awarded to Dr. Catherine Comiskey and the National University of Ireland, Maynooth.

The study recruited 404 opiate users entering treatment. Outcomes presented in this document are for the 289 individuals who completed all three interviews -baseline interview at intake and the follow-up interviews at 1-year and 3-years.

Individuals who complete all planned aspects of a study are defined as the *per-protocol* group. An analysis of the data from the *per-protocol* group provides insights into experiences between 1 and 3 years post treatment intake.

Outcomes for the *per-protocol* group at intake, 1-year and 3-years for drug use, involvement in crime, injecting-related behaviour, physical and mental health and social functioning are presented in this paper. Statistically significant differences are given emphasis in this document.

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KEY MESSAGES

(Only statistically significant reductions are noted below, figures rounded)

- 404 opiate users were recruited to ROSIE at treatment intake. 97% (n=392) of the original interviewees were located at 3-years and 88% (n=357) successfully completed their final interview.
- 71.5% (n=289) completed interviews at all three time points and these are defined as the *per-protocol* group.
- 1.5% (n=6) of the study population had died at the 3-year follow-up interview stage. 0.5% (n=2) of the study population had died at the 1-year time point.
- 70% (n=201/289) of the *per-protocol* group were in some form of treatment at 3-years. 60% (n=173/289) were in methadone treatment at 3-years.
- Overall, significant reductions in heroin use were observed in the *per-protocol* group at 1-year and sustained at 3-years (from 81% to 47% and 47% respectively). Reductions in cannabis use, cocaine use and polydrug use were achieved at 1-year and sustained at 3-years.
- 29% (n=85) of the *per-protocol* population were abstinent from all illegal drugs at 3-years. The largest improvement was at 1-year and sustained at 3-years (from 7% to 29% and 29% respectively).
- Whilst significant reductions in injecting drug use were observed in the *per-protocol* population 3-years after treatment intake this had mainly occurred by 1-year and little change was observed in injecting-related risk behaviour across all periods.
- Significant reductions in criminal activity were observed in the *per-protocol* population at 1-year and these levels were sustained at 3-years.
- Results in the *per-protocol* population at 1-year and 3-years for a range of physical and mental health symptoms were mixed.

SUMMARY ALL OUTCOMES

DRUG USE OUTCOMES

- **Heroin use:** There was a reduction in the overall percentage of individuals reporting heroin use, from 80.6% at intake to 46.7% at 1-year. Similar usage levels were reported at 3-years. The frequency of heroin use also significantly reduced from 42.3 days in the last 90 days at intake, to 15.2 days at 1-year. There was a significant increase from 15.2 days at 1-year to 20.1 days at 3-years; however, this was still significantly lower than the frequency of usage at intake. The amount of heroin used also reduced significantly between intake (0.7g) and 1-year (0.2g), with little change between 1-year and 3-years.
- **Other drug use:** Reductions in the reported use of all target drugs (non-prescribed methadone, non-prescribed benzodiazepines, cocaine including crack, cannabis and alcohol) were seen at 1-year. The proportion reporting the use of these target drugs at 3-years was similar to 1-year, with the exception of non-prescribed benzodiazepines which increased significantly between 1- and 3-years. However, the proportions reporting use of non-prescribed benzodiazepines were significantly lower at 3-years than at treatment intake.
 - Reported use of cannabis reduced significantly from 65.3% at treatment intake to 52.8% at 1-year, with a further non-significant decrease to 50.7% at 3-years.
 - Reported use of cocaine, including crack, reduced significantly from 48.4% at treatment intake to 22.8% at 1-year, with a further non-significant decrease to 21.3% at 3-years.
 - Reported use of non-prescribed benzodiazepines reduced significantly from 43.7% at treatment intake to 23.2% at 1-year, with a significant increase at 3-years to 30.2%. This reported usage was still significantly lower than that reported at treatment intake.
 - Reported use of non-prescribed methadone reduced significantly from 44.4% at treatment intake to 14.2% at 1-year, with levels at 1-year and 3-years (12.5%) more or less the same.
 - Reported use of alcohol reduced significantly from 56.9% at treatment intake to 43.9% at 1-year, with levels at 1-year and 3-years (43.9%) approximately the same.

- Reductions in the frequency (mean days) of use of all target drugs were observed between intake and 1-year. At 3-years, this reduced frequency of use had been maintained for three of the target drugs. However, cannabis use had a further significant reduction, while frequency of heroin and benzodiazepines (non-prescribed) use each increased significantly. The frequency of usage observed at 3-years was still significantly lower than at intake.
- The overall percentage of individuals reporting polydrug use¹ decreased significantly from 77.5% at treatment intake to 49.5% at 1-year, with a further non-significant decrease to 45.3% at 3-years.
- **Drug abstinence:** Significant increases in the proportion of individuals reporting abstinence from all drugs (excluding alcohol and prescribed methadone) were observed between intake (6.7%) and 1-year (28.8%), with a further non-significant increase observed between 1-year and 3-years (29.4%).

INVOLVEMENT IN CRIME OUTCOMES

- The proportion of participants reporting involvement in all 12 categories of crime fell significantly between intake and 1-year. Ten of these 12 categories sustained these changes at 3-years, with the remaining two categories lower, although not significantly lower, than at intake.

RISK BEHAVIOUR OUTCOMES

- Significant improvements were evident in the proportions injecting any drug, the number of days injecting any drug, and number of times injecting on a typical drug-taking day in the last three months, between baseline and 1-year. These improvements were sustained at 3-years.
- At treatment intake, participants reported low rates of borrowing and lending of used injecting equipment. There were no significant changes in these behaviours across any time points.
- There were no significant changes in overdose rates.

PHYSICAL AND MENTAL HEALTH OUTCOMES

- A significant reduction in five of the ten physical health symptoms was observed between intake and 1-year. Three of these five reductions were sustained at 3-years, with one of the symptoms increasing to similar levels observed at intake and the remaining symptom increasing significantly at 3-years but still significantly lower at 3-years than at intake. Of the remaining five physical health symptoms, one was found to have a significant reduction in the proportion reporting experiencing the symptom at 3-years than at intake, while one was found to have a significant increase between 1-year and 3-years.

¹ The definition of polydrug use is concurrent drug use, meaning at least two substances are used during the same time period (NACD, 2007). We define polydrug use as the use of two or more illegal substances in the last 90 days, the time period for which drug use data was collected.

- A significant reduction in three of the five anxiety symptoms was observed between intake and 1-year; however, each of these symptoms increased significantly between 1-year and 3-years, returning to levels observed at intake. Further, one of the remaining two anxiety symptoms also increased significantly between 1-year and 3-years.
- A significant reduction in three of the five depressive symptoms was noted between intake and 1-year, with two of these three symptoms sustaining this reduction at 3-years. Of the remaining two depression symptoms, one reduced significantly between intake and 3-years.

TREATMENT STATUS

- 70% were in some form of treatment at 3-years.
- Of those in methadone treatment at baseline, 2.6% completed their index baseline treatment by 3-year follow-up, with 41.2% still attending their index treatment and 19.6% not completing their baseline methadone treatment. The remaining clients who were in methadone treatment at baseline transferred to either another treatment modality or setting.

EMPLOYMENT AND TRAINING

- Proportions currently working, employed at some time in the last three months, and on a training course over the last six months all increased significantly at each time point.
- The proportion who described themselves as usually not working fell significantly between intake and 1-year, with a further non-significant decrease at 3-years.

ACCOMMODATION

- Proportions living in the family home decreased significantly between intake and 1-year and this was sustained at 3-years, while the proportion owning their own house or flat or in rental accommodation increased significantly between intake and 1-year and these levels were sustained at 3-years.
- The proportion in a drug treatment residence decreased significantly between intake and 1-year and a further significant decrease was observed at 3-years.
- The proportion in insecure accommodation (including participants living in hostels, shelters, B&B's or with no fixed abode) decreased significantly between intake and 3-years.

CONTACT WITH SERVICES

- Of the four health services investigated, visiting a non-methadone GP was the only service where a significant increase in usage was observed between intake and 1-year.

- Contact with two of the four health services increased significantly between intake and 3-years.
- Of the four social support services investigated, usage of three of the services: social services, employment, training or education services and housing services increased significantly between intake and 1-year, with usage levels at 3-years also significantly higher than at intake for employment, training or education services and housing services. However, the proportion in contact with employment, training or education services was significantly lower at 3-years than at 1-year.

METHODOLOGY

1. STUDY DESIGN

ROSIE is a longitudinal observational study, which follows participants from the point of commencing a new treatment episode (treatment intake) and monitors progress at time anchored points; at intake, then at 1-year and 3-years after treatment intake. Between September 2003 and July 2004, the ROSIE study recruited 404 opiate users. The majority entered one of three index treatments: methadone maintenance/reduction (53.2%, n=215), structured detoxification (20%, n=81) and abstinence-based treatment (20.3%, n=82) and the remainder were recruited from needle exchanges (6.4%, n=26). These modalities were part of the tender brief from the NACD as they were considered to represent the most widely implemented interventions for opiate users in Ireland.

The 404 ROSIE study participants were recruited from both inpatient (hospitals, residential programmes and prisons) and outpatient settings (community-based clinics, health board clinics and GPs). Participants had to be over 18 years, commencing a new treatment episode, prepared to consent to the tracking/follow-up procedures, and willing to provide locator information. Treatment agencies participating in the study were purposively (not randomly) sampled to reflect drug treatment in Ireland and the known geographical spread of provision and range of services. In total, 44 agencies providing approximately 54 services located in rural, urban and inner-city areas of Ireland were involved in the study. In addition, a Research Advisory Group was established by the NACD to support and monitor the research project.

Participants were interviewed at the three time periods using a pre-prepared interview schedule, which examined key outcome measures including:

- Drug use (drug type, frequency, and quantity of drug use);
- General health (a 10-point physical and mental health assessment);
- Social functioning (employment, accommodation, involvement in crime);
- Harm (injecting behaviour & experience of overdose); and
- Mortality (participant/contact feedback and checking non followed-up participants against the General Death Register).

In addition to a lifetime measure, measures were taken for behaviours in the 90 days preceding interviews except for injecting related risk behaviour variables where use in the last 30 days was used. Individuals were asked about their use of 16 substances. This document focuses on the seven most

frequently reported problem drugs – referred to as target drugs (heroin, non-prescribed methadone, non-prescribed benzodiazepines, cocaine powder, crack cocaine, cannabis and alcohol)² and reports changes in use patterns at 3-years. For more detailed information on lifetime use and use at intake, see Cox & Comiskey (2007) and the baseline ROSIE report (http://www.nacd.ie/publications/treatment_rosie_summary.html).

2. FOLLOW-UP

Follow-up of participants was assisted by the provision of at least four contacts (locator information) for each person (including a drug treatment contact, family member, GP & others). A small remuneration was provided at 1-year and at 3-year follow-up to acknowledge the ongoing participation of the individual in the study.

As a result of extensive tracking efforts, 97% of all original participants were located at 3-year follow-up (n=392) and 88.4% (n=357) of participants successfully completed interviews. This is an improvement on the 12-month follow-up where 75% (n=305) of the original cohort completed full interviews. A total of 289 participants completed interviews at each stage – intake, 1-year and 3-years. At 3-years, a total of 3.5% (n=14) of participants did not wish to be interviewed, 3% (n=12) were not located and 1.5% (n=6) of participants were deceased, with 0.2% (n=1) in a coma. 3.5% (n=14) were located but not interviewed and of these participants, four individuals were living in another country and eight individuals were on a methadone programme. None of these individuals were in prison.

The follow-up rate in the study for participants who were interviewed and the location rate for those who were either located or interviewed at the 3-year follow-up time point exceeded all international standards achieved to date and completely reversed the usual trend of decreasing follow-up rates as time progresses.

Within ROSIE, the 3-year **mortality rate** was 1.5% (95% C.I.³: 0.5% - 3.2%). Six of the 404 participants died between the start of recruitment in September 2003 and the end of 3-year follow-up interview period in July 2007. Two of these deaths occurred within the 1-year follow-up period. The mortality rate for the population (2/404) at 1-year was 0.5% (95% C.I.: 0.06% - 1.78%).

2 In some instances, where appropriate, data with respect to cocaine powder and crack cocaine were combined for analysis.

3 C.I.: Confidence Interval.

3. STUDY LIMITATIONS

1. Although the findings presented here highlight positive outcomes for the *per-protocol* population they do not indicate a direct causal relationship between the treatment received and the outcomes observed.
2. The study did not randomly allocate participants to treatment settings/modality or employ a control group (drug users with similar profile not attending the index treatment).
3. Any individual behaviour change is the result of the interaction of three factors, the person, the environment and the intervention, all of which can influence outcomes but could not be controlled for in this study.

Within this findings paper, in order to keep tables of data clear and easy to read, changes from intake to 1 and 3-years for males and for females are not reported. Details on the effects of gender on outcomes observed at 3-years will be presented in the forthcoming Findings on predictors of outcomes. In addition gender is also addressed within Findings on polydrug use.

4. UNDERSTANDING THIS PAPER

The reader should be aware that the data presented in this paper includes all valid responses provided by the cohort who completed all three interviews: baseline, 1-year and 3-year. The statistical comparisons are made on matched data or dependent pairs, that is, only individuals who provided valid answers to each question at each time point under comparison were included in the analysis. Missing data were handled by excluding the cases from the particular analysis⁴. In terms of presenting statistical comparisons, time points with a common letter subscript are statistically significant while those with no common letter subscript are not statistically significant. Changes in all categorical variables were analysed using the McNemar test. Paired sample t-tests were performed when comparing sample means at two time points. Statistical significance can only be stated when tests have been carried out on the data to establish the degree of confidence with which it can be inferred that the differences in the observed findings are true and not due to sampling or other error. This is reported at a 5% level of probability, that is, a p-value of 0.05 or less is used for statistical significance.

It was noted within the analysis of the ROSIE *per-protocol* group that results observed for the full cohort were reflected by the *per-protocol* group thus providing additional supporting evidence for the positive outcomes found and presented in Comiskey, Kelly and Stapleton (2008). The corresponding outcomes for the full cohort at 3-years are presented in ROSIE Findings 5.

International drug treatment outcome studies typically measure levels of drug use, health, crime, mortality and social functioning variables to monitor the impact of treatments for problem drug use (see e.g. Gossop *et al*, 2002; Gossop *et al*, 2003; Hubbard *et al*, 2003; Darke *et al*, 2006; Schifano, 2006; Teesson *et al*, 2006).

⁴ The percentage totals presented in Tables 1-15 are calculated on the basis of valid responses.

DRUG USE OUTCOMES

International drug treatment outcome studies typically measure levels of drug use, health, crime, mortality and social functioning variables to monitor the impact of treatments for problem drug use (see e.g. Gossop *et al*, 2002; Gossop *et al*, 2003; Hubbard *et al*, 2003; Darke *et al*, 2006; Schifano, 2006; Teesson *et al*, 2006). The ROSIE analysis examined changes in:

- The percentage of individuals reporting the use of each drug type.
- Drug using frequency (mean number of drug using days over the previous 90 days).
- Average quantity of each drug consumed on a typical drug using day.
- Drug abstinence rates.

Table 1 shows the proportions using each target drug as reported at treatment intake, 1-year and 3-years. Reductions in the proportions using each drug, proportions using alcohol and the proportions engaging in polydrug use between treatment intake and 1-year were found to be significant. These reduced levels were maintained between 1-year and 3-years with the exception of benzodiazepines, which displayed a significant rise in the proportion using between 1-year and 3-years. However, the proportion using at 3-years was still significantly lower than at intake to treatment.

Table 1: Drug use at treatment intake, 1-year and 3-years

Drug use in last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Heroin	80.6 ^{ab}	229	46.7 ^a	135	46.7 ^b	135
Cannabis	65.3 ^{ab}	175	52.8 ^a	151	50.7 ^b	146
Cocaine including crack	48.4 ^{ab}	140	22.8 ^a	66	21.3 ^b	61
¹ Benzodiazepines	43.7 ^{ab}	124	23.2 ^{ac}	67	30.2 ^{bc}	87
² Methadone	44.4 ^{ab}	127	14.2 ^a	41	12.5 ^b	36
Alcohol	56.9 ^{ab}	153	43.9 ^a	126	43.9 ^b	126
³ Polydrug use	77.5 ^{ab}	224	49.5 ^a	143	45.3 ^b	131

¹ Refers to non-prescribed benzodiazepines.
² Refers to non-prescribed methadone.
³ Polydrug use defined as using two or more illegal drugs in the last 90 days.
a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant
c – matching ‘c’ denotes changes from 1-year to 3-years are statistically significant

Table 2 displays the mean number of days on which each drug was used as reported at each of the three time points: treatment intake, 1-year and 3-years. For each drug type as well as alcohol, analysis revealed significant reductions in the mean days used between treatment intake and 1-year follow-up. Further significant reductions were reported between 1-year and 3-years for cannabis. For both heroin and benzodiazepine usage, significant increases were found for the mean number of days used between 1-year and 3-years, however there was still a significant reduction between intake and 3-years for the usage of these two drugs.

Table 2: Drug using days at treatment intake, 1-year and 3-years

Mean days used in last 90 days	Intake	1-year	3-years
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Heroin	42.3 (35.3) ^{ab}	15.2 (27.6) ^{ac}	20.1 (32.3) ^{bc}
Cannabis	40.4 (40.3) ^{ab}	32.1 (39.8) ^{ac}	25.4 (36.0) ^{bc}
¹ Benzodiazepines	15.5 (29.3) ^{ab}	5.3 (15.9) ^{ac}	9.2 (23.2) ^{bc}
² Methadone	13.2 (24.6) ^{ab}	4.0 (16.1) ^a	2.0 (8.7) ^b
Cocaine including crack	9.0 (19.8) ^{ab}	3.8 (13.9) ^a	3.6 (13.5) ^b
Alcohol	13.6 (23.2) ^{ab}	9.3 (20.0) ^a	9.7 (20.4) ^b

¹ Refers to non-prescribed benzodiazepines.
² Refers to non-prescribed methadone.
a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant
c – matching ‘c’ denotes changes from 1-year to 3-years are statistically significant

Table 3 illustrates the mean quantity of each drug consumed on a typical drug using day as reported at treatment intake, 1-year and 3-years. Analysis revealed a significant reduction in the average quantity of all drugs consumed between treatment intake and 1-year, with the exception of cannabis which significantly reduced between intake and 3-years. These reductions were mostly maintained between 1-year and 3-years with the exception of benzodiazepines. For this drug, a significant increase was observed between 1-year and 3-years with levels of usage returning to levels similar to those observed at intake.

Table 3: Mean quantity of drugs consumed at treatment intake, 1-year and 3-years

Mean amounts used per day in last 90 days	Intake	1-year	3-years
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Heroin (grams)	0.7 (0.8) ^{ab}	0.2 (0.6) ^a	0.2 (0.4) ^b
Cannabis (joints)	7.1 (15.9) ^b	5.6 (21.3)	3.8 (11.4) ^b
Cocaine (excluding crack) (grams)	0.9 (2.3) ^{ab}	0.3 (1.1) ^a	0.3 (0.8) ^b
¹ Benzodiazepines (mg)	38.4 (107.5) ^a	23.8 (124.1) ^{ac}	40.7 (147.1) ^c
² Methodone (ml)	25.4 (39.2) ^{ab}	7.5 (27.8) ^a	7.6 (24.8) ^b
Alcohol (units)	8.5 (12.4) ^{ab}	6 (14.2) ^a	5.6 (10) ^b

¹ Refers to non-prescribed benzodiazepines.

² Refers to non-prescribed methadone.

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant

b – matching ‘b’ denotes changes from intake to 3-years are statistically significant

c – matching ‘c’ denotes changes from 1-year to 3-years are statistically significant

Crack cocaine was excluded due to inconsistency in how the data was reported.

These cost figures are based on:

Heroin: 1 bag costing €20 and containing on average 0.113g at treatment intake, 1 bag containing on average 0.1g costing €20 at 3-years.

Cocaine: 1 gram costing €110 at treatment intake, the same quantity costing €70 at 3-years.

Cannabis: 1 ounce costing €110 at treatment intake, the same quantity costing €198.45 at 3-years (or a joint costing approximately 39c at treatment intake, and approximately 70c at 3-years).

Source: Costs advised through private communication (O’Brien, An Garda Síochána).

Table 4 shows the proportions that are drug free (not using any illegal drugs) at treatment intake, 1-year and 3-years. A significant increase in the drug free proportions was evident between treatment intake and 1-year and this increase was sustained at 3-years.

Table 4: Drug free at treatment intake, 1-year and 3-years

Drug free in last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Drug free (not using any illicit drug excluding alcohol and prescribed methadone)	6.7 ^{ab}	19	28.8 ^a	83	29.4 ^b	85

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant

MORTALITY RATE

Mortality is not analysed for the *per-protocol* population, since, by definition, the cohort has completed all three interviews. However, page four gives a summary of the mortality rate and further details can be found in ROSIE Findings 5.

INVOLVEMENT IN CRIME

Table 5 presents the proportion of individuals reporting participation in each category of crime at treatment intake, 1-year and 3-years. Between intake and 1-year, a significant reduction in the proportion committing each type of crime was noted. With the exceptions of theft from a vehicle and criminal damage, each of the crimes was committed by a significantly lower proportion of the population at 3-years than at intake, with levels at 3-years similar to those at 1-year. The proportion reporting theft from a vehicle, and committing criminal damage at 3-years was slightly higher than at 1-year and not significantly lower than at intake.

Table 5: Crimes committed at treatment intake, 1-year and 3-years

Crime committed in last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Selling/supplying drugs	31.0 ^{ab}	81	10.8 ^a	31	10.8 ^b	31
Theft from a person	11.8 ^{ab}	31	2.5 ^a	7	1.7 ^b	5
Theft from house/home	6.9 ^{ab}	18	2.5 ^a	7	3.1 ^b	9
Theft from shop/commercial property	19.1 ^{ab}	50	8.3 ^a	24	7.6 ^b	22
Theft from a vehicle	8.0 ^a	21	3.2 ^a	9	4.2	12
Theft of a vehicle	7.9 ^{ab}	21	1.8 ^a	5	2.1 ^b	6
Handling stolen goods	26.2 ^{ab}	68	7.3 ^a	21	10.4 ^b	30
Fraud/forgery/deception	10.8 ^{ab}	28	1.4 ^a	4	2.8 ^b	8
Assault	7.7 ^{ab}	20	2.8 ^a	8	2.8 ^b	8
Criminal damage	6.9 ^a	18	1.7 ^a	5	3.8	11
Soliciting	4.6 ^{ab}	12	1.1 ^a	3	0.7 ^b	2
Breach of the peace	7.7 ^{ab}	20	1.8 ^a	5	2.8 ^b	8

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant

INJECTING-RELATED RISK BEHAVIOUR

Table 6 shows injecting drug use in the last 30 days as reported at treatment intake, 1-year and 3-years. Analysis showed significant reductions in the proportions injecting any drug, injecting heroin, injecting cocaine, and injecting benzodiazepines from treatment intake to 1-year. The observed proportions injecting remained relatively constant between 1-year and 3-years.

Table 6: Injecting drug use at treatment intake, 1-year and 3-years

In the last 30 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Injected any drug	45.6 ^{ab}	131	28.7 ^a	83	26.7 ^b	77
Injected heroin	43.3 ^{ab}	125	26.3 ^a	76	25.0 ^b	72
Injected cocaine powder	21.1 ^{ab}	61	9.0 ^a	26	8.0 ^b	23
Injected benzodiazepines	12.1 ^{ab}	35	2.8 ^a	8	4.5 ^b	13

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant

Table 7 displays the mean number of days injected and mean number of times injected per day as reported at treatment intake, 1-year and 3-years. Analysis revealed significant reductions in both the mean number of days and the mean number of times injecting per day between intake and 1-year. These reported levels remained more or less the same between 1- and 3-years.

Table 7: Mean days/times injected at treatment intake, 1-year and 3-years

In the last 30 days	Intake	1-year	3-years
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Days injected	20.8 (32.3) ^{ab}	8.9 (22.3) ^a	10.4 (25.7) ^b
Times injected on typical day	1.8 (4.2) ^{ab}	0.8 (2.6) ^a	0.8 (1.8) ^b

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant

Table 8 presents data on injecting-related risk behaviour at treatment intake, 1-year and 3-years. At intake, a low proportion of participants reported injecting-related risk behaviour (i.e. the borrowing/lending, reusing of used injecting equipment). The proportions engaging in injecting-related risk behaviour did not change significantly.

Table 8: Injecting-related risk behaviour at treatment intake, 1-year and 3-years

In the last 30 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Borrowed used needle/syringe	4.5	12	2.8	8	3.5	10
Lent used needle/syringe	3.8	10	3.5	10	3.5	10
Re-used own needle/syringe	14.7	34	12.4	35	16.0	45

OVERDOSE

Table 9 presents data on overdoses within the last 90 days as reported at treatment intake, 1-year and 3-years. The proportions did not change significantly during the study, although a small reduction in the proportion reporting overdose was noted between intake and 1-year and a slight increase was observed between 1- and 3-years.

Table 9: Overdose at treatment intake, 1-year and 3-years

In the last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Overdose	7.2	20	3.9	11	5.2	15

PHYSICAL AND MENTAL HEALTH OUTCOMES

Table 10 presents data on physical health symptoms experienced over the last three months as reported at treatment intake, 1-year and 3-years. Analysis revealed a significant decrease in proportions experiencing five symptoms (poor appetite, tiredness/fatigue, joint/bone pains, muscle pains, tremors/shakes) between treatment intake and 1-year, with poor appetite, joint/bone pains and muscle pains each maintaining this decrease at 3-years. Tiredness/fatigue increased significantly between 1-year and 3-years with the proportions reporting this symptom at 3-years similar in size to the proportions reporting the symptom at intake. The proportion reporting tremors/shakes at 3-years increased significantly from 1-year but was still significantly lower than the proportion reporting the symptom at baseline. The proportion of clients reporting nausea/feeling sick decreased significantly between intake and 3-years, while the proportions reporting numbness/tingling symptoms increased significantly between 1-year and 3-years.

Table 10: Number and proportion experiencing physical health symptoms at treatment intake, 1-year and 3-years

Symptoms experienced over last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Poor appetite	72.3 ^{ab}	193	60.1 ^a	167	55.8 ^b	158
Tiredness/fatigue	72.4 ^a	194	62.8 ^{ac}	174	70.0 ^c	198
Nausea/feeling sick	40.1 ^b	107	32.5	91	33.1 ^b	94
Stomach pains	37.2	99	33.6	94	37.9	107
Difficulty breathing	29.9	79	24.6	69	29.0	82
Chest pains	22.2	59	18.2	51	19.4	55
Joint/bone pains	37.5 ^{ab}	100	25.4 ^a	71	26.2 ^b	74
Muscle pains	34.3 ^{ab}	91	23.6 ^a	66	23.6 ^b	67
Numbness/tingling	22.5	60	17.1 ^c	48	28.5 ^c	80
Tremors/shakes	28.8 ^{ab}	75	15.8 ^{ac}	44	22.9 ^{bc}	65

a – matching ‘a’ denotes changes from intake to 1-year are statistically significant
b – matching ‘b’ denotes changes from intake to 3-years are statistically significant
c – matching ‘c’ denotes changes from 1-year to 3-years are statistically significant

Table 11 presents data on mental health symptoms experienced over the last three months as reported at treatment intake, 1-year and 3-years. Analysis revealed a significant decrease in proportions experiencing each of three different symptoms of anxiety (feeling tense, suddenly scared for no reason, nervousness/shakiness inside) between intake and 1-year. The proportions reporting each of these symptoms increased significantly between 1-year and 3-years, thus the proportions between intake and 3-years were similar. The proportion reporting feeling fearful also increased between 1-year and 3-years, however the proportion reporting feeling fearful between intake and 3-years did not change significantly.

In terms of depressive symptoms, there was a significant reduction in the proportion feeling lonely and the proportion having thoughts of ending their lives between intake and 1-year, with these proportions more or less the same between 1- and 3-years. The proportion at 1-year who reported experiencing feelings of worthlessness was significantly lower than at baseline. An increase in the proportion experiencing feelings of worthlessness, although not significant, was evident between 1- and 3-years. Finally, a significant reduction in the proportion feeling hopeless about the future was evident between intake and 3-years. Non-significant reductions in the proportion reporting feeling hopeless about the future were noted between intake and 1-year.

Table 11: Number and proportion experiencing mental health symptoms at treatment intake, 1-year and 3-years

<i>Symptoms experienced over last 90 days</i>	Intake		1-year		3-years	
	%	n	%	n	%	n
Anxiety symptoms						
Feeling tense	65.3 ^a	169	50.4 ^{ac}	134	66.2 ^c	184
Suddenly scared for no reason	34.6 ^a	90	24.9 ^{ac}	67	34.8 ^c	98
Feeling fearful	42.8	107	35.1 ^c	93	46.8 ^c	131
Nervousness or shakiness inside	43.0 ^a	110	32.8 ^{ac}	87	41.9 ^c	117
Spells of terror or panic	24.0	63	24.7	66	24.3	68
Depressive symptoms						
Feeling hopeless about the future	57.1 ^b	144	49.4	132	46.6 ^b	131
Feeling of worthlessness	53.8 ^a	136	42.2 ^a	113	46.8	131
Feeling no interest in things	59.4	152	53.2	142	53.7	151
Feeling lonely	59.8 ^{ab}	150	50.0 ^a	132	49.1 ^b	137
Thoughts of ending your life	25.9 ^{ab}	64	17.9 ^a	49	17.8 ^b	50
<p><i>a</i> – matching ‘a’ denotes changes from intake to 1-year are statistically significant</p> <p><i>b</i> – matching ‘b’ denotes changes from intake to 3-years are statistically significant</p> <p><i>c</i> – matching ‘c’ denotes changes from 1-year to 3-years are statistically significant</p>						

TREATMENT STATUS

Table 12 shows that 70% (n=201) of the *per-protocol* population was in some form of treatment at 3-years. Of these individuals, 86% (n=173) were in methadone treatment at 3-years.

Table 12: Treatment status of participants at 3-years

Current treatment status	%	n
In treatment at 3-years	70.0	201
Of those in treatment, proportion in methadone modality at 3-years	86.0	173

EMPLOYMENT AND TRAINING

Table 13 presents the proportions of individuals on training courses, currently employed, usually not working in the last three months, and employed at some time in the last three months as reported at treatment intake, 1-year and 3-years. Analysis revealed a significant increase in the proportion of clients undertaking training courses over the last six months between intake and 1-year, with further increases, although not significant, between 1-year and 3-years. The proportions currently employed and employed at some point in the last three months each increased slightly between intake and 1-year, and significant increases for each of these categories were noted between 1- and 3-years. Finally, there was a significant reduction in the proportion of clients who were usually unemployed over the last three months between intake and 1-year with further non-significant reductions between 1- and 3-years.

Table 13: Employment and training at treatment intake, 1-year and 3-years

	Intake		1-year		3-years	
	%	n	%	n	%	n
Training courses over last six months	14.9 ^{ab}	43	29.2 ^a	84	33.2 ^b	96
Currently employed	15.0 ^b	43	20.1 ^c	58	31.3 ^{bc}	90
Employed at some point in last three months	20.5 ^b	58	22.1 ^c	64	33.0 ^{bc}	95
¹ Not working	46.5 ^{ab}	133	35.6 ^a	103	29.1 ^b	84

¹ Refers to participants' usual occupations over the last three months i.e. what their employment status was for most of the time.

a – matching 'a' denotes changes from intake to 1-year are statistically significant

b – matching 'b' denotes changes from intake to 3-years are statistically significant

c – matching 'c' denotes changes from 1-year to 3-years are statistically significant

ACCOMMODATION

Table 14 shows the participants' accommodation over the previous three months as reported at treatment intake, 1-year and 3-years. Analysis revealed a significant decrease in the proportion of participants who were living in the family home between intake and 1-year with further non-significant decreases noted between 1- and 3-years. These reductions were matched by increases in the proportion of candidates in their own house/flat or rental accommodation. Significant decreases were noted in the proportions in drug treatment residences between intake and 1-year with further significant reductions between 1- and 3-years. Finally, a significant reduction was found between the proportion in insecure tenure at intake and at 3-years.

Table 14: Accommodation at treatment intake, 1-year and 3-years

¹ Accommodation over last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Family home	48.4 ^{ab}	135	34.6 ^a	100	30.1 ^b	87
Drug treatment residence	31.1 ^{ab}	88	8.3 ^{ac}	24	1.7 ^{bc}	5
Own house/flat or rental accommodation	37.1 ^{ab}	105	45.7 ^a	132	50.2 ^b	145
Prison	8.5	24	8.3	24	8.3	24
² Insecure tenure	10.3	29	9.3	27	8.0	23
³ Homeless	14.5 ^b	41	12.1	35	10.0 ^b	29

¹ Categories not mutually exclusive

² Insecure tenure home of friends.

³ Homeless includes participants living in hostels, shelters, B&B's with no fixed abode.

a – matching 'a' denotes changes from intake to 1-year are statistically significant

b – matching 'b' denotes changes from intake to 3-years are statistically significant

c – matching 'c' denotes changes from 1-year to 3-years are statistically significant

SERVICE CONTACT

Table 15 presents the medical and social support service contact for participants as reported at treatment intake, 1-year and 3-years. In terms of medical service usage, there was a significant increase in the proportion visiting a non-methadone GP between intake and 1-year. Significant increases in the proportion attending a hospital and staying overnight, and the proportion visiting an out-patient department/receiving community treatment were evident between intake and 3-years.

In terms of social support service usage, significant increases were noted for proportions having contact with social services between intake and 1-year. Significant increases were also noted for both the proportion in contact with employment, training or education services and the proportion having contact about housing issues between intake and 1-year, as well as intake and 3-years. However, while the proportion having contact about employment, training or education increased significantly between intake and 3-years, the proportion having contact at 3-years was significantly lower than that at 1-year.

Table 15: Contact with services at treatment intake, 1-year and 3-years

Services received in last 90 days	Intake		1-year		3-years	
	%	n	%	n	%	n
Attended hospital and stayed overnight	9.8 ^a	28	11.1	32	15.9 ^a	46
Attended Accident and Emergency	17.1	47	17.3	50	22.1	64
Visited a GP (not methadone GP)	34.6 ^a	91	46.0 ^a	133	42.2	122
Visited an out-patient department/ received community treatment	13.9 ^a	38	20.1	58	22.1 ^a	64
Social support contacts in last 90 days						
Had contact with social services	6.1 ^a	17	11.5 ^a	33	10.4	30
Had contact about employment, training or education	10.0 ^{ab}	26	42.9 ^{ac}	123	30.8 ^{bc}	89
Had contact about social welfare	32.3	86	28.9	83	26.4	76
Had contact about housing issues	14.9 ^{ab}	40	31.4 ^a	90	27.0 ^b	96
<p><i>a – matching 'a' denotes changes from intake to 1-year are statistically significant</i></p> <p><i>b – matching 'b' denotes changes from intake to 3-years are statistically significant</i></p> <p><i>c – matching 'c' denotes changes from 1-year to 3-years are statistically significant</i></p>						

CONCLUSIONS

The *per-protocol* rate of 71.5% and the follow-up and interview rates of 97% and 88.4% respectively obtained at 3-years from the full cohort of 404 recruited, were exceptionally high by international standards. In comparison, the National Treatment Outcome Research Study (NTORS) in England and Wales decided at 4-5 years to select a stratified random sub-sample of 650 participants from a sample frame of 894 individuals extracted from the full original cohort of 1077 recruits. Despite the use of this smaller sub-sample, the follow-up interview rate attained was 76.3% (496/650) (Gossop *et al*, 2003). ROSIE follow-up rates were also high in comparison with the Australian Treatment Outcome Study (ATOS), who achieved a follow-up interview rate of 76% (469/615) at 2 years (Darke *et al*, 2006). The achievement of a follow-up rate that is considerably higher than the international standard provides researchers with greater confidence in the final results observed for the ROSIE cohort at 3-years.

Results observed for the *per-protocol* group reflected those observed for the full cohort at 3-years. Reductions in the proportions using a range of target drugs were sustained between 1- and 3-years. Similar results were observed in NTORS (Gossop *et al*, 2003) and ATOS (Darke *et al*, 2006). However, in addition, within the ROSIE study *per-protocol* cohort it was observed that the proportion, frequency and quantity of alcohol use decreased significantly between intake and 1-year and this decrease was sustained at 3-years. Results on cocaine use, including crack, reflected those observed for the full cohort. The reported use of cocaine powder and crack cocaine, when analysed as one variable, reduced significantly from intake to 1-year and this reduction was sustained at 3-years.

In contrast to the sustained reductions observed above, the significant reduction in the use of benzodiazepines observed at 1-year within the ROSIE *per-protocol* cohort was not sustained at 3-years. In fact, a significant increase was observed in proportions using between 1- and 3-years. That said, the proportion using at 3-years was still significantly lower than the proportion using at intake. This result was also observed for the full cohort.

Abstinence rates at 3-years within the ROSIE *per-protocol* and full cohorts were the same at 29.4%, despite differences at intake: the *per-protocol* group had an abstinence rate of 6.7%, while the full cohort intake abstinence rate was 9.3%. Per Comiskey, Kelly and Stapleton (2008), abstinence rates within NTORS were not directly comparable. This is often the case with international treatment outcome studies, due to differences in study design and methodology.

With regard to crime outcomes, the ROSIE *per-protocol* group reflected the full cohort and also reflected the outcomes observed in both NTORS and ATOS, with significant reductions in crime observed at 1-year being sustained at 3-years.

In terms of health, outcomes varied and no clear picture of health was observed. Within the *per-protocol* group, positive outcomes observed at 3-years in terms of significant reductions in poor appetite, feeling nausea, joint/bone pains, muscle pains and tremors/shakes were in line with those observed for the full ROSIE cohort. However, significant negative outcomes for tiredness/fatigue and numbness/tingling were observed between 1- and 3-years for the *per-protocol* group. Again within this group, it was observed that some anxiety symptoms decreased between intake and 1-year, but these significantly increased again from 1- to 3-years with levels returning to those observed at intake. With regard to depressive symptoms, the results were again mixed with some reductions sustained and some not.

In summary, the results for the *per-protocol* group reflected those observed for the full ROSIE cohort. Results indicate that in Ireland treatment for opiate use has a positive and sustained effect not only on drug use but on alcohol use, drug related crime and on social functioning variables. While this is very encouraging, results for the physical and mental health symptoms continue to be mixed with no clear positive picture of health outcomes emerging either for the full or *per-protocol* group. Based on these findings, there is a need for further targeted research into the long-term impact of treatment for opiate use in Ireland on the health and well being of the individual.

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