Longitudinal trajectories of heroin use

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Australian Treatment Outcome Study: 10 years (2001–2014)

Funders and Collaborators

- All participants who give their time and experiences.
- AOD treatment agencies
- ATCA Membership: James Pitts, Garth Popple
- National Health and Medical Research Council (NHMRC)
- Australian Department of Health
- National Drug and Alcohol Research Centre
- NSW Ministry of Health
- NSW Pharmacy Guild
- NSW Users and AIDS Association
- Hepatitis NSW
- Australia and NSW Needle and Syringe Programs

ATOS Researchers

- Sarah Ellis
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- Sandra Fairbairn
- Dr Alys Havard
- Nicky Henderson
- Kate Hetherington
- Dr Christina Marel
- Sonja Memedovic
- Dr Louise Mewton
- A/Prof Katherine Mills
- Joanne White
- Evelyn Wilhelm
- Dr Anna Williamson
In 2001...

Shane Darke
Jo Ross
Maree Teesson
Alys Havard
Kate Hetherington & Anna Williamson
Kath Mills
The Australian Treatment Outcome Study (ATOS)

- A prospective, longitudinal cohort study
- One of the few studies focusing on heroin dependence

N=615

- 535 entering treatment
  - 201 entering MT
  - 201 entering detox
  - 135 entering resi rehab
- 80 not in treatment
Heroin use in Australia

In 2011-12, more people sought treatment for heroin use in Australia than any other illicit drug (n=65,952) (AIHW 2012).

Heroin dependence

- How persistent?
- How chronic?
- Relapsing condition? When?
Who are the ATOS participants?

<table>
<thead>
<tr>
<th></th>
<th>Baseline (N=615)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>66.2</td>
</tr>
<tr>
<td>Mean age</td>
<td>29</td>
</tr>
<tr>
<td>% Heroin dependent</td>
<td>97.6</td>
</tr>
<tr>
<td>Mean length of heroin use career (years)</td>
<td>9.6</td>
</tr>
<tr>
<td>Mean number of drug classes used</td>
<td>4.9</td>
</tr>
<tr>
<td>% In current treatment for opiate dependence</td>
<td>87.0</td>
</tr>
<tr>
<td>% Major depression</td>
<td>24.6</td>
</tr>
<tr>
<td>% Current PTSD</td>
<td>29.4</td>
</tr>
</tbody>
</table>
ATOS follow-up

Baseline: 100% (n=615)
3-mths: 89% (n=549)
1-yr: 81% (n=495)
2-yr: 76% (n=469)
3-yr: 70% (n=429)

Number of interviews over time:
- Baseline: 615
- 3-mths: 549
- 1-yr: 495
- 2-yr: 469
- 3-yr: 429
ATOS follow-up

Baseline (n=615)
3-mths (n=549)
1-yr (n=495)
2-yr (n=469)
3-yr (n=429)
11-yr (n=431)

N=63 (10.2)

% Interviewed
% Deceased
N Interviewed

Wave
Where have we found them?

Baseline interviews 2001-2002

11-year interviews 2011-2013
What did we find at 1 year?
Did heroin use change in the first year?

- Predictors of less frequent heroin use
  - Less frequent use at baseline
  - More treatment days

HEROIN USE DAYS IN PRECEDING MONTH

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>19</td>
<td>2.6</td>
</tr>
<tr>
<td>DTX</td>
<td>23.4</td>
<td>5.5</td>
</tr>
<tr>
<td>RR</td>
<td>17.1</td>
<td>3.4</td>
</tr>
<tr>
<td>NT</td>
<td>21.8</td>
<td>10.3</td>
</tr>
</tbody>
</table>
Did criminal involvement change in the first year?

- Predictors of no criminal involvement
  - Not being criminally active at baseline
  - More treatment days
  - Fewer treatment episodes
Did mental health improve in the first year?

Severe psychological distress: SF-12

- Predictors of better mental health
  - Younger age
  - Better baseline mental health
  - More treatment days
  - Fewer treatment episodes

![Bar chart showing percentage improvement in severe psychological distress between baseline and 12 months for different groups (MT, DTX, RR, NT).]
What did it cost?

- Treatment at 12 months cost $6,187
  - Resulting in
    - 15.3 more heroin free days per month at twelve months, a 76% improvement.
    - 55% improvement in rates of abstinence and
    - 52% decrease in the numbers who committed a crime in the previous month.
Trajectories of heroin use

- We don’t know what happens over the long-term for people with heroin dependence.

- Are there indicators that can tell us what is likely to happen over the long-term for their heroin use?
<table>
<thead>
<tr>
<th></th>
<th>Baseline (N=615)</th>
<th>11-years (N=431)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>66.2</td>
<td>64.5</td>
</tr>
<tr>
<td>Mean age</td>
<td>29</td>
<td>40</td>
</tr>
<tr>
<td>% Crime main source of income</td>
<td>23.9</td>
<td>2.1</td>
</tr>
<tr>
<td>% Used heroin in past month</td>
<td>98.7</td>
<td>24.8</td>
</tr>
<tr>
<td>% Heroin dependent</td>
<td>97.6</td>
<td>15.1</td>
</tr>
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<td>Mean number of drug classes used</td>
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<td>46.6</td>
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<td>% Major depression</td>
<td>24.6</td>
<td>20.9</td>
</tr>
</tbody>
</table>
Past-month drug use at baseline and 11-years

<table>
<thead>
<tr>
<th>Drug Type</th>
<th>Baseline</th>
<th>11-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin</td>
<td>99%</td>
<td>25%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>85%</td>
<td>27%</td>
</tr>
<tr>
<td>Cannabis</td>
<td>68%</td>
<td>40%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>53%</td>
<td>32%</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>56%</td>
<td>48%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>48%</td>
<td>40%</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Other Opiates</td>
<td>30%</td>
<td>18%</td>
</tr>
<tr>
<td>Hallucinogens</td>
<td>29%</td>
<td>27%</td>
</tr>
<tr>
<td>No illicit drug use</td>
<td>9%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Trajectories of heroin use

Two stage process:

- Modelled trajectories of heroin use, and calculated the probability of belonging to a specific group
- Entering variables into the model to predict those pathways

Trajectory results

We found 6 pathways of heroin use over 11-years.
# Heroin use trajectories

<table>
<thead>
<tr>
<th>Trajectory</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Early decrease to maintained abstinence</td>
<td>16.2</td>
</tr>
<tr>
<td>2. Early decrease with early relapse</td>
<td>7.1</td>
</tr>
<tr>
<td>3. Early decrease with late relapse</td>
<td>14.4</td>
</tr>
<tr>
<td>4. Gradual decrease to near abstinence</td>
<td>19.1</td>
</tr>
<tr>
<td>5. Gradual decrease</td>
<td>21.5</td>
</tr>
<tr>
<td>6. No decrease</td>
<td>21.7</td>
</tr>
</tbody>
</table>
Early decrease to maintained abstinence

Probability

Year

0          1          2           3          4           5           6           7          8           9           10

Early decrease to maintained abstinence (mean)  
Early decrease to maintained abstinence (predicted)

16.2%
Early decrease with early relapse

Early decrease with early relapse (mean) vs. (predicted) over a period of 10 years. The graph shows a probability peak around year 7 with a value of 7.1%.
Early decrease with late relapse

14.4%
Gradual decrease to near abstinence

19.1%
Gradual decrease

21.5%

Year

Probability

Gradual decrease (mean)  Gradual decrease (predicted)
No decrease

21.7%

Probability

Year

No decrease (mean)

No decrease (predicted)
All trajectories of heroin use

Early decrease to maintained abstinence (mean)
Early decrease with early relapse (mean)
Early decrease with late relapse (mean)
Gradual decrease to near abstinence (mean)
Gradual decrease (mean)
No decrease (mean)
The importance of long-term follow-up

- Early decrease to maintained abstinence (mean)
- Early decrease with early relapse (mean)
- Early decrease with late relapse (mean)
- Gradual decrease to near abstinence (mean)
- Gradual decrease (mean)
- No decrease (mean)
Can we predict a person's trajectory?

- **Aim:** To examine factors associated with each trajectory.

- A series of multinomial logistic regressions were conducted on covariates hypothesised to be associated with heroin use trajectories.
Factors **not** associated with trajectories

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Drug use history</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sex, education</td>
<td>• No. drug classes used last month</td>
</tr>
<tr>
<td>• Main source of income</td>
<td>• Types of drugs used last month</td>
</tr>
<tr>
<td>• Homelessness</td>
<td>• History of IDU</td>
</tr>
<tr>
<td>• Prison history</td>
<td></td>
</tr>
<tr>
<td>• Past month criminal involvement at baseline</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical and mental health</th>
<th>Treatment history</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General and physical and mental health</td>
<td>• In current treatment</td>
</tr>
<tr>
<td>• ASPD</td>
<td>• Current treatment category</td>
</tr>
<tr>
<td>• BPD</td>
<td>• Index treatment category</td>
</tr>
<tr>
<td>• Current and lifetime PTSD</td>
<td>• No. previous rx episodes</td>
</tr>
<tr>
<td>• Major depression</td>
<td></td>
</tr>
<tr>
<td>• Ever attempted suicide</td>
<td></td>
</tr>
<tr>
<td>• No. traumas</td>
<td></td>
</tr>
</tbody>
</table>
Baseline predictors of trajectories

- Aged more than 30
- Been using heroin for less than 10 years
- Ever overdosed
- Severe mental health disability
- Had experienced rape
Aged more than 30

Significantly more likely to be in the *early decrease to maintained abstinence group*.
Used heroin less than 10 years

*Significantly more likely to be in the **early decrease with early relapse group**.*

![Graph showing probability over years for different groups.](image-url)
Ever overdosed

Significantly more likely to be in the **gradual decrease to near abstinence group**.
Severe mental health disability

Significantly more likely to be in the **early decrease with early relapse group**.
Significantly more likely to be in the early decrease with early relapse group, early decrease with late relapse group, or gradual decrease to near abstinence group.
Who follows this pathway?

21.7%
What did we find?

- Heroin dependence is often a chronic, recurring condition associated with complex trajectories.
- **More than 80%** of the cohort achieved some level of reduction in their heroin use.
- It is difficult to predict who will follow a chronic pathway.
- The critical factors guiding trajectories are:
  - Aged more than 30
  - Used heroin for less than 10 years
  - History of overdose
  - Ever been raped
  - Severe mental health disability
Future

Examining how treatment across the 11-year follow-up impacts upon a person’s trajectory

Continued follow-up of the ATOS cohort to examine the pathways of the group as they continue to age
Visit us at comorbidity.edu.au

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Mental Health and Substance Use

Thank you!