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**Patterns between tobacco use, cannabis use and drunkenness stages in the French population:
A multi-state model.**

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Patterns between tobacco use, cannabis use and drunkenness stages in the French population

A multi-state model

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A.Mayet, J-B Richard, C. Lavagna, S. Legleye   & the French Barometer group*

***R. Andler, C. Cogordan, C. Léon, R. Guignard, V. Nguyen-Thanh, A. Pasquereau, M. Robert.**

Introduction

- **Alcohol use: major public health issue**
  - **Associated to socializing and parties**
  - **Minimized by young people**
  - **New ways for use : premixes, binge drinking**
- **Drunkenness**
  - **Experiment in festive contexts**
  - **Associated with other substances use**
- **Substance use: a sequential process**
  - **Use stages for a given substance**
  - **Interactions between different substances**

Objectives

- **To describe the patterns between**
  - **Tobacco**
  - **Cannabis**
  - **2 drunkenness stages**
    - Accidental drunkenness (AD)
      - Following an alcohol use occasion
    - Expected drunkenness (ED)
      - Alcohol use occasion specifically aiming to get drunk

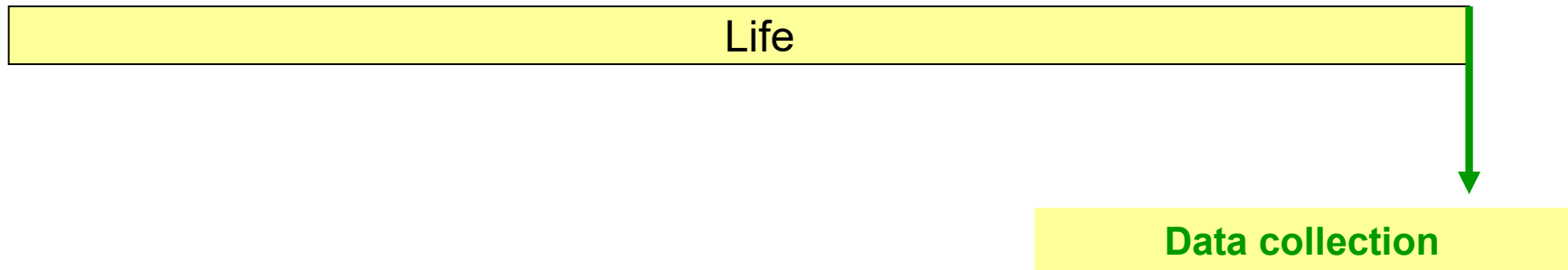- **Among French young adults**

Methods

Database

- **2017 French Barometer**
  - **Source: Santé publique France**

  - **Cross-sectional population-based survey**

  - **Drug use prevalences**

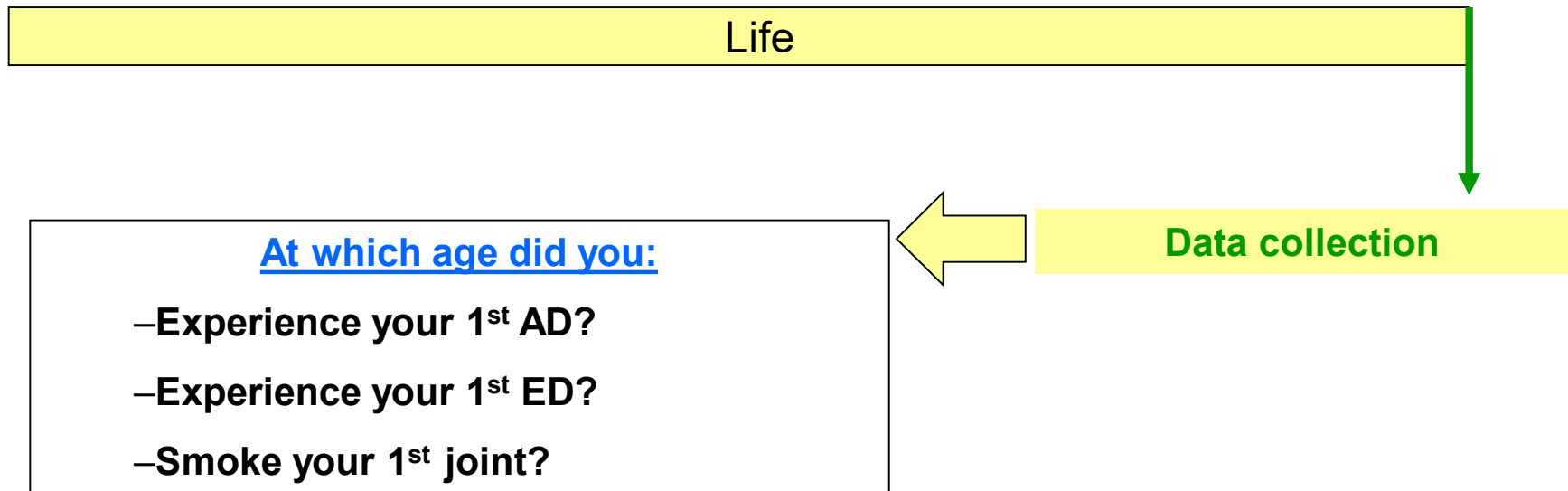 - **$\approx$ 25,000 subjects aged 18-75**

Study population

- **Who reported lifetime alcohol use**

- **18-40 year-old subjects**
  - **Homogeneity of results**
  - **Limitation of recall bias**

- **N = 7,601**

Reconstitution of a retrospective cohort
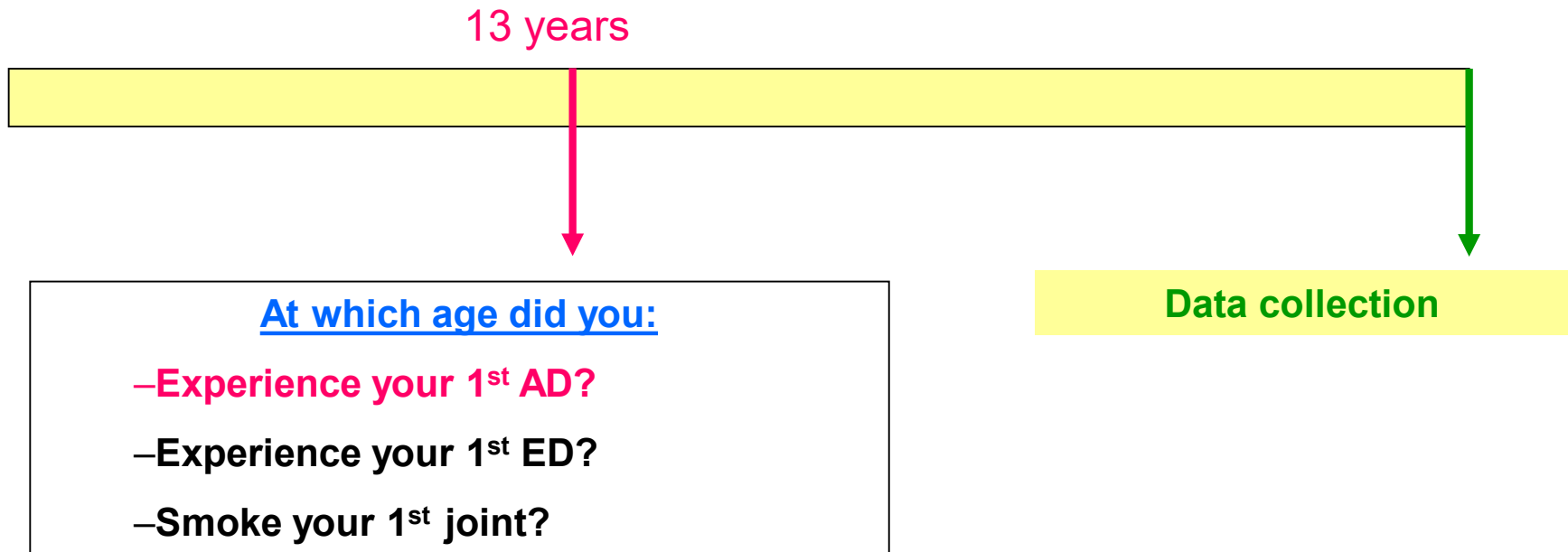
Life

Data collection

Reconstitution of a retrospective cohort

Life	

Data collection

At which age did you:

–**Experience your 1st AD?**

–**Experience your 1st ED?**

–**Smoke your 1st joint?**

Reconstitution of a retrospective cohort

13 years

At which age did you:

–**Experience your 1st AD?**

–**Experience your 1st ED?**

–**Smoke your 1st joint?**

Data collection

Reconstitution of a retrospective cohort

13 years   14 years

At which age did you:

–Experience your 1st AD?

–Experience your 1st ED?

–Smoke your 1st joint?

Data collection

Reconstitution of a retrospective cohort

13 years   14 years   17 years

At which age did you:

–Experience your 1st AD?

–Experience your 1st ED?

–Smoke your 1st joint?

Data collection
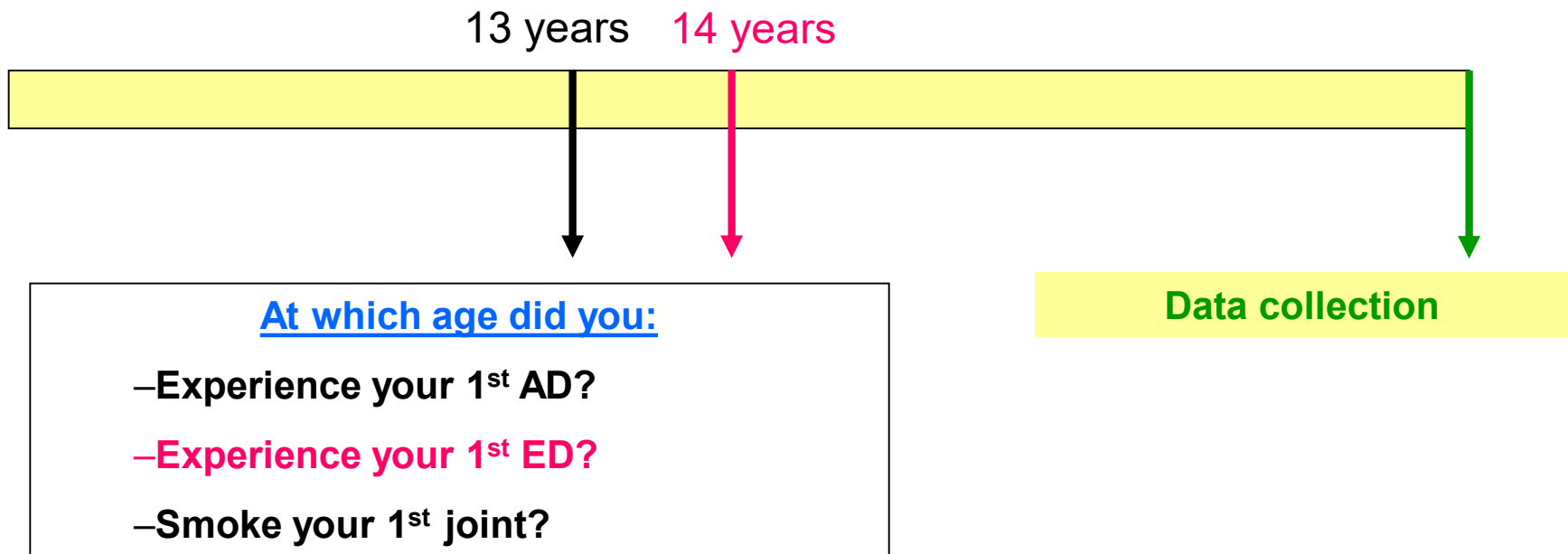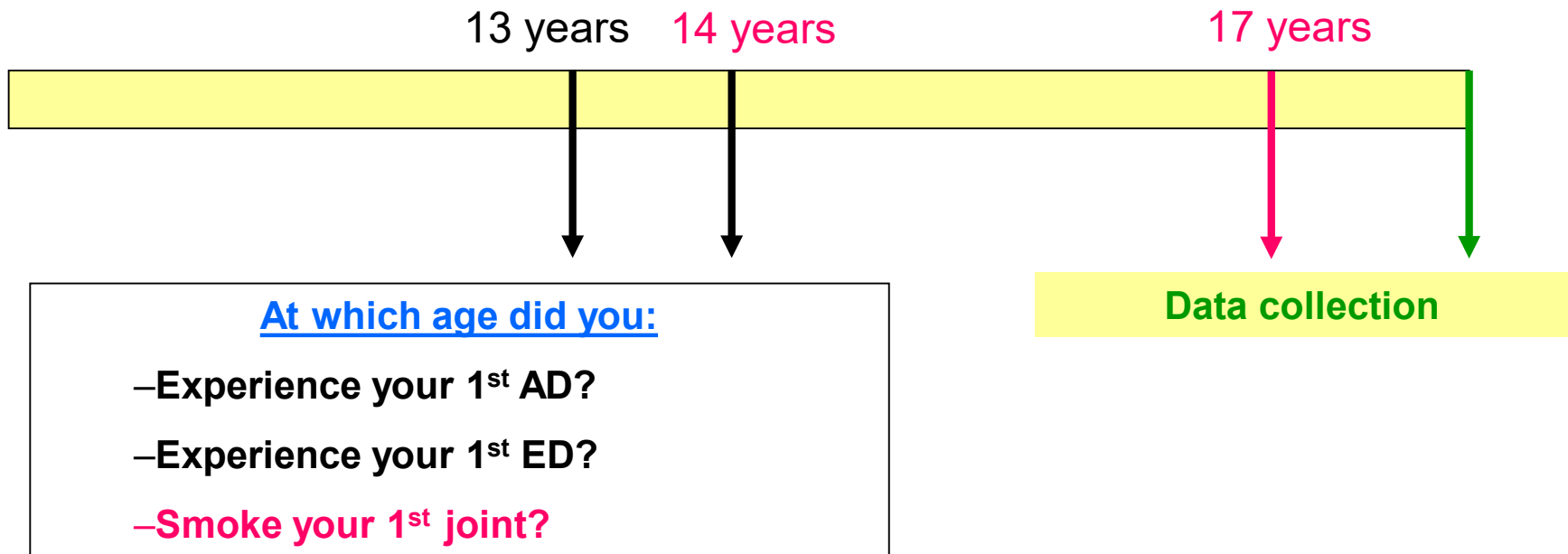
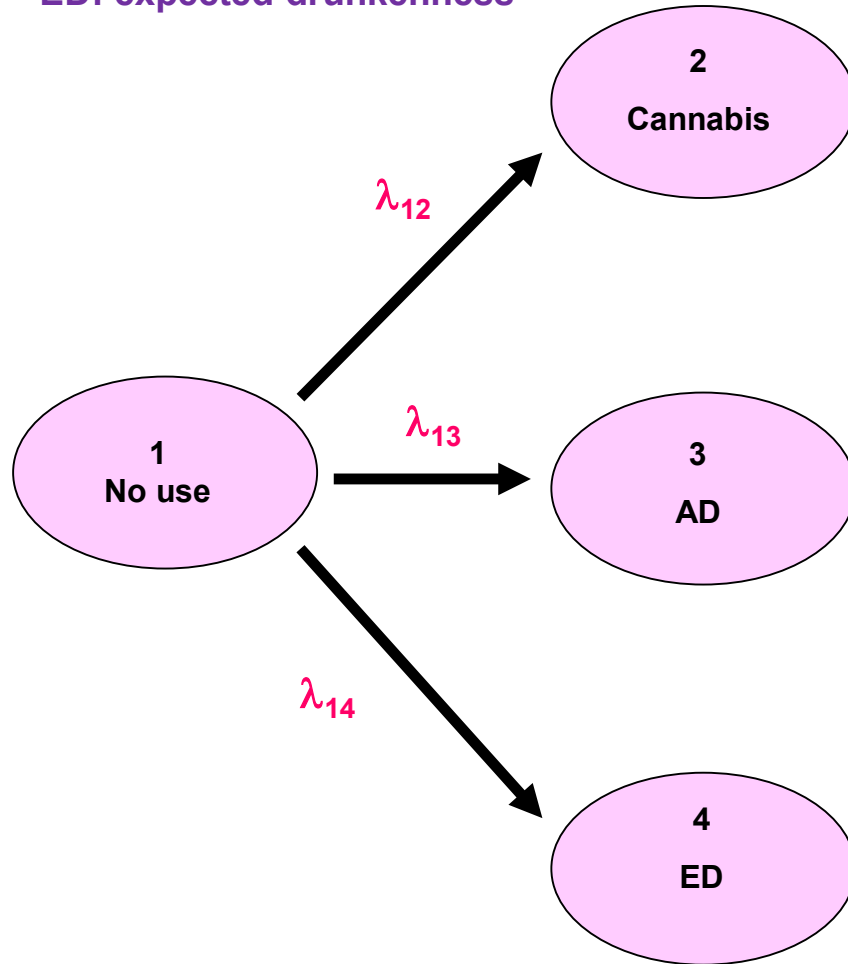# Study of initiation sequences: multi-state model (MSM)

- **Piecewise constant intensity Markov Model:**

  6 initiation states / 9 transitions

- **Estimation, for each transition**

  – **Probability of transition at 1 year**
  – **Effect of some covariates**
    - Gender (reference: women)
    - Education level (reference: < bachelor's degree)
    - Tobacco initiation (time-dependent variable)

Multi-state model
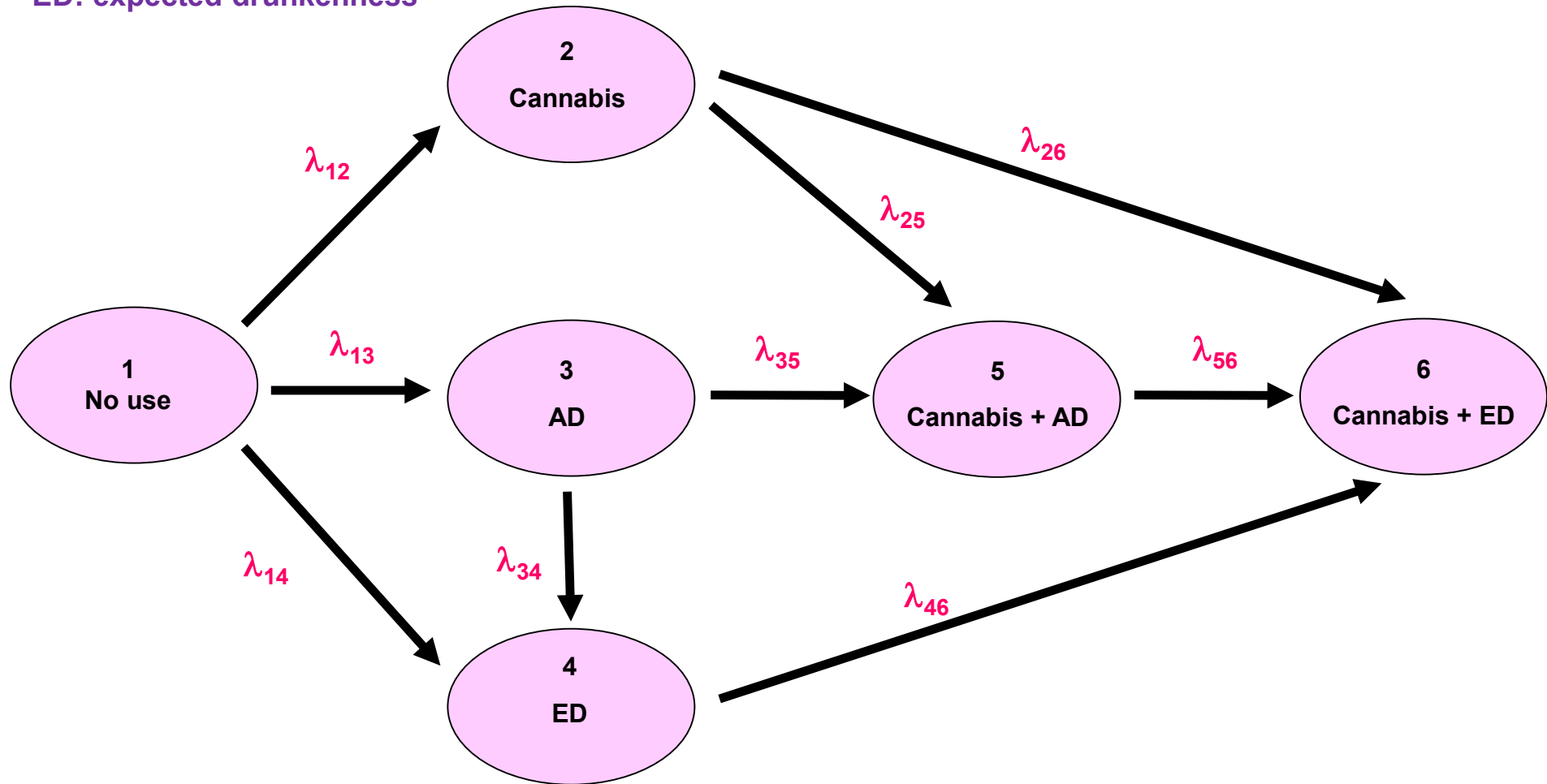
Multi-state model

AD: accidental drunkenness
ED: expected drunkenness

And then associations of events.

Multi-state model

AD: accidental drunkenness
ED: expected drunkenness
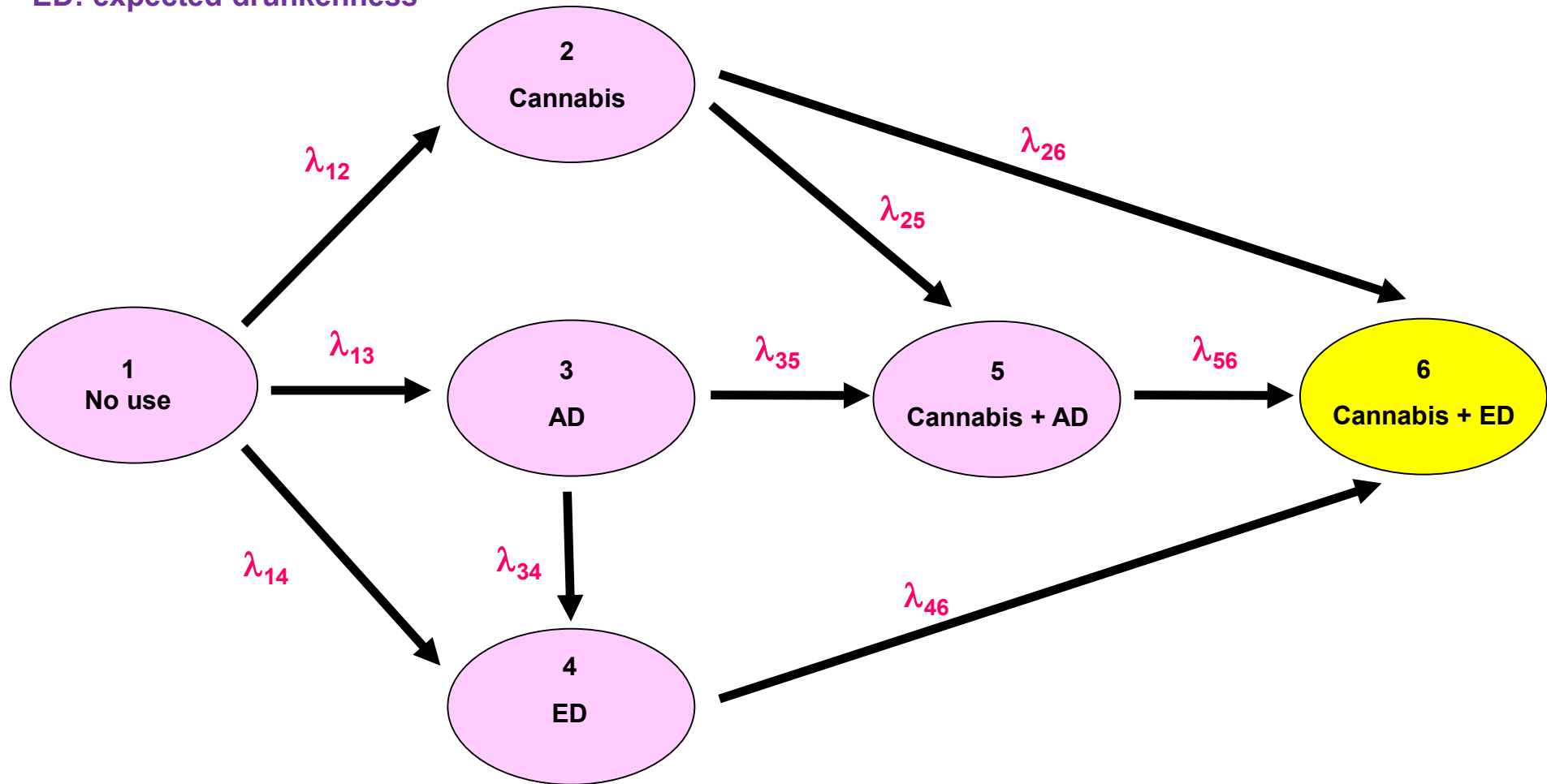
Final state: cannabis and ED.

Results

Population

- **7,601 poly-users aged 18-40**
- **50.4% women**
- **Mean age at initiation (years)**
  - **Tobacco:** 15.8 y
  - **Cannabis:** 17.6 y
  - **Accidental drunkenness:** 17.4 y
  - **Expected drunkenness** 18.3 y
- **Use status**
  - **Tobacco current use:** 41.0%
  - **Lifetime cannabis use:** 61.1%
  - **Lifetime AD :** 77.0%
  - **Lifetime ED :** 17.3%

Multi-state model

AD: accidental drunkenness
ED: expected drunkenness

2
Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=3 393
PT=1.3%
[1.1-.1.4] %

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

1
No use

N=175
PT=0.09%
[0.06-0.14] %

3
AD

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

5
Cannabis + AD

6
Cannabis + ED

N=114
PT=1.1%
[0.4-2.6] %

4
ED

N=207
PT=35.1%
[19.8-58.3] %
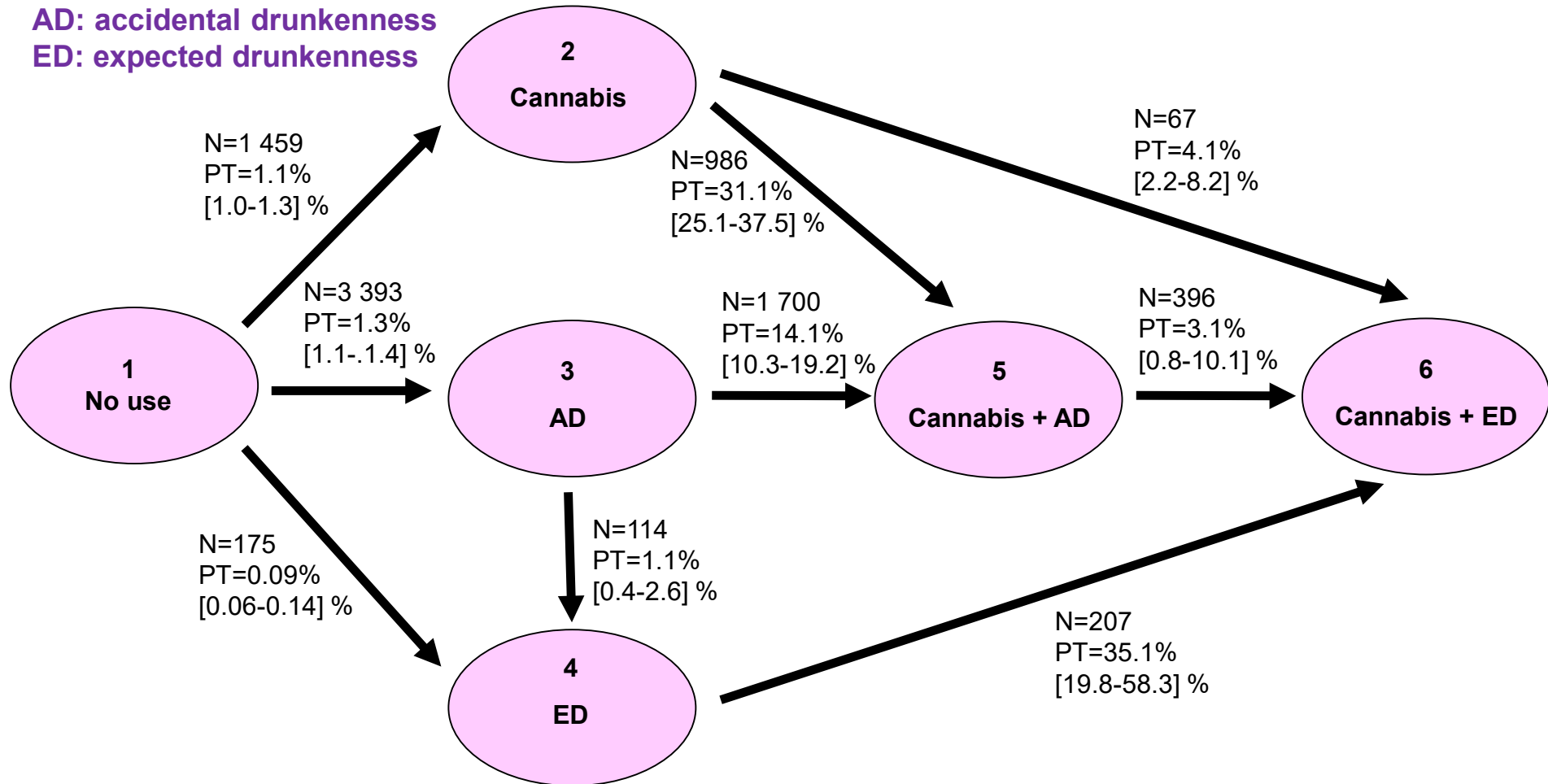
Estimation of transition probabilities

First event encountered

N=1 459
PT=1.1%
[1.0-1.3] %

N=3 393
PT=1.3%
[1.1-.1.4] %

N=175
PT=0.09%
[0.06-0.14] %

2
Cannabis

3
AD

4
ED

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

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No use

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Cannabis + AD

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Cannabis + ED

N=114
PT=1.1%
[0.4-2.6] %

N=207
PT=35.1%
[19.8-58.3] %
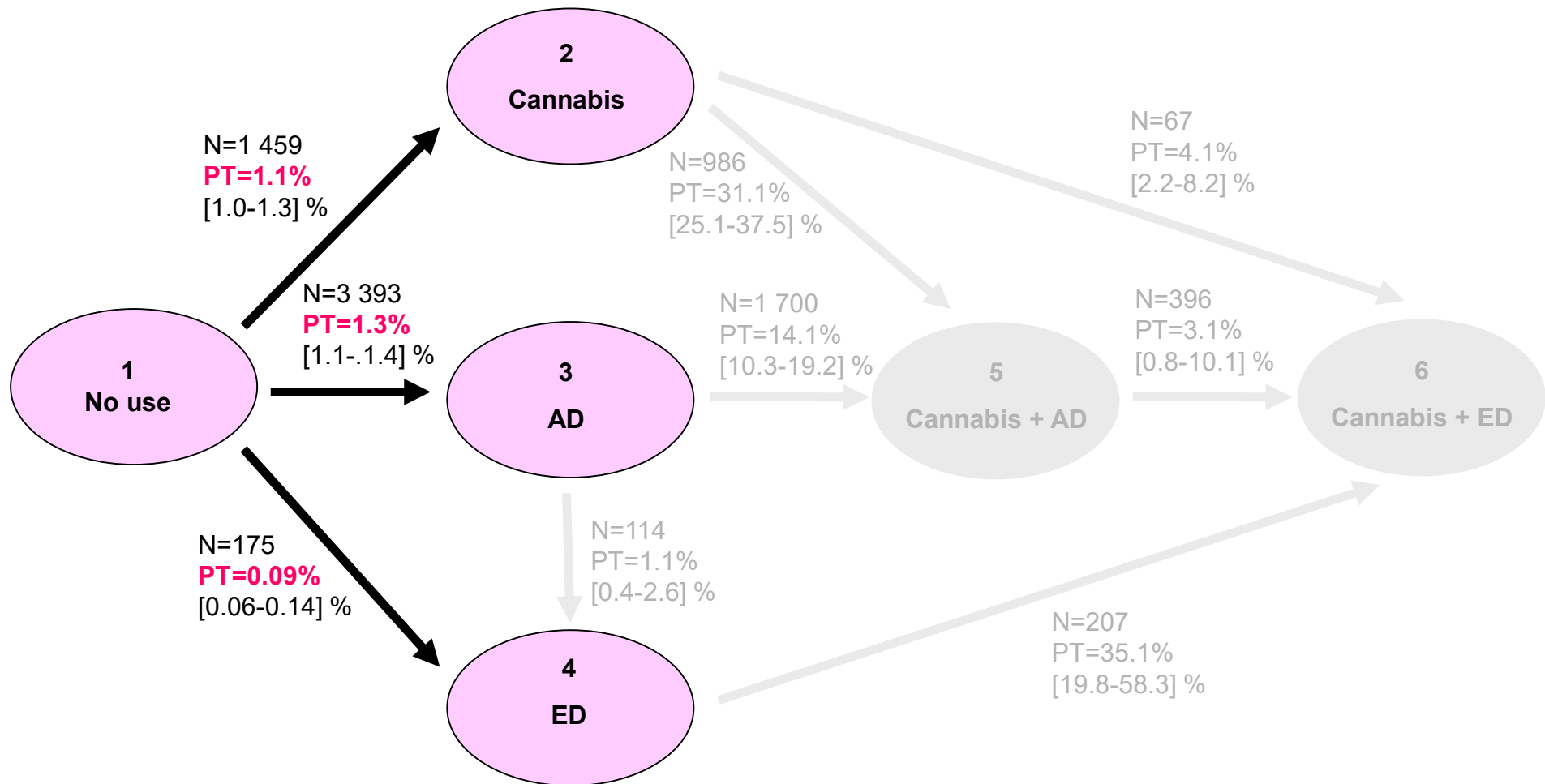
$P_{AD} = P_{Cannabis} >> P_{ED}$

Most frequent paths

2
Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

N=3 393
PT=1.3%
[1.1-.1.4] %

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No use

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AD

N=1 700
PT=14.1%
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Cannabis + AD

N=396
PT=3.1%
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Cannabis + ED

N=175
PT=0.09%
[0.06-0.14] %

N=114
PT=1.1%
[0.4-2.6] %

4
ED

N=207
PT=35.1%
[19.8-58.3] %
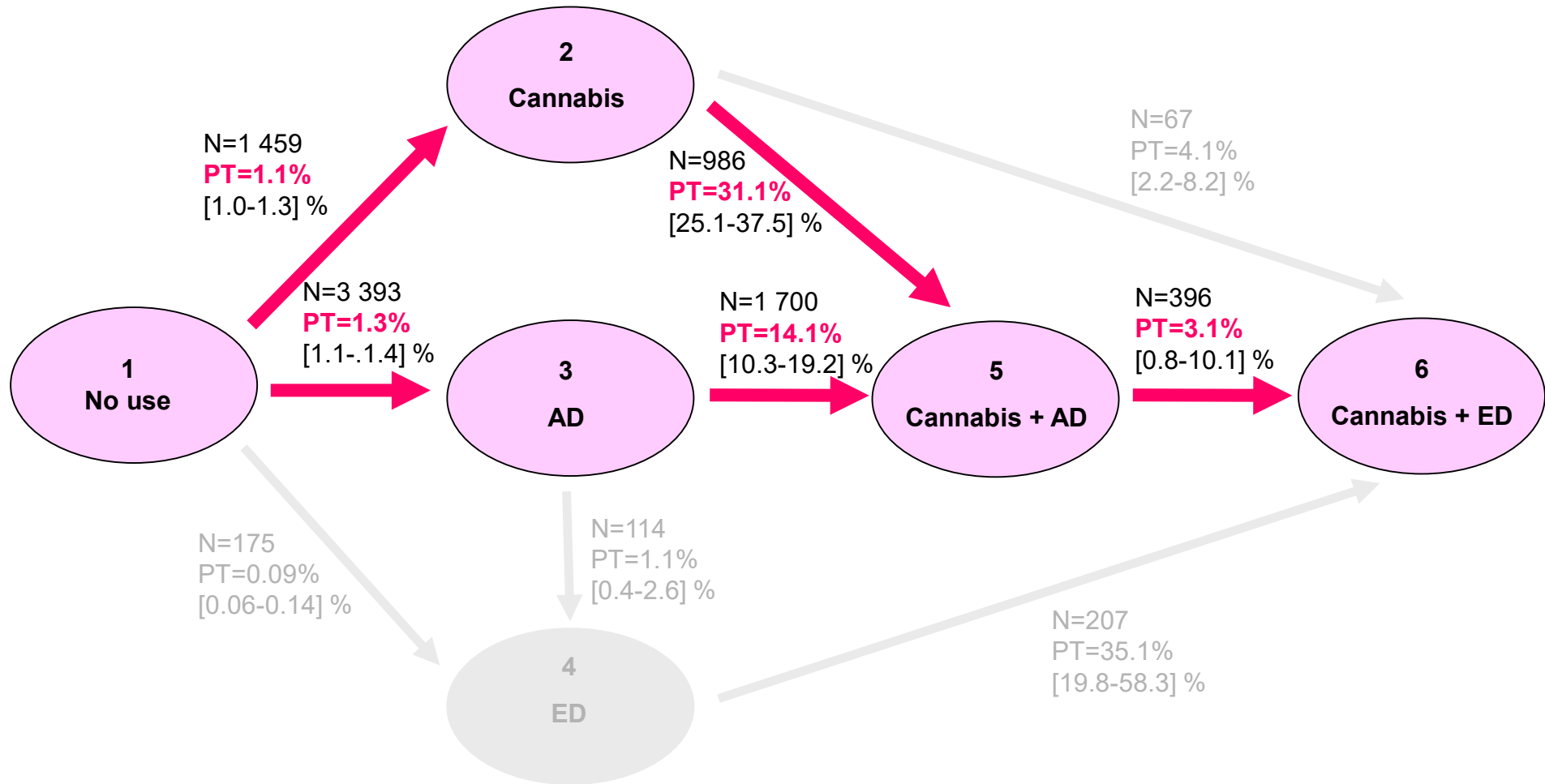
AD → Cannabis → ED

Cannabis → AD → ED

Transition to AD

2 Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=67
PT=4.1%
[2.2-8.2] %

N=986
PT=31.1%
[25.1-37.5] %

N=3 393
PT=1.3%
[1.1-.1.4] %

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

1 No use

3 AD

5 Cannabis + AD

6 Cannabis + ED

N=175
PT=0.09%
[0.06-0.14] %

N=114
PT=1.1%
[0.4-2.6] %

N=207
PT=35.1%
[19.8-58.3] %

4 ED
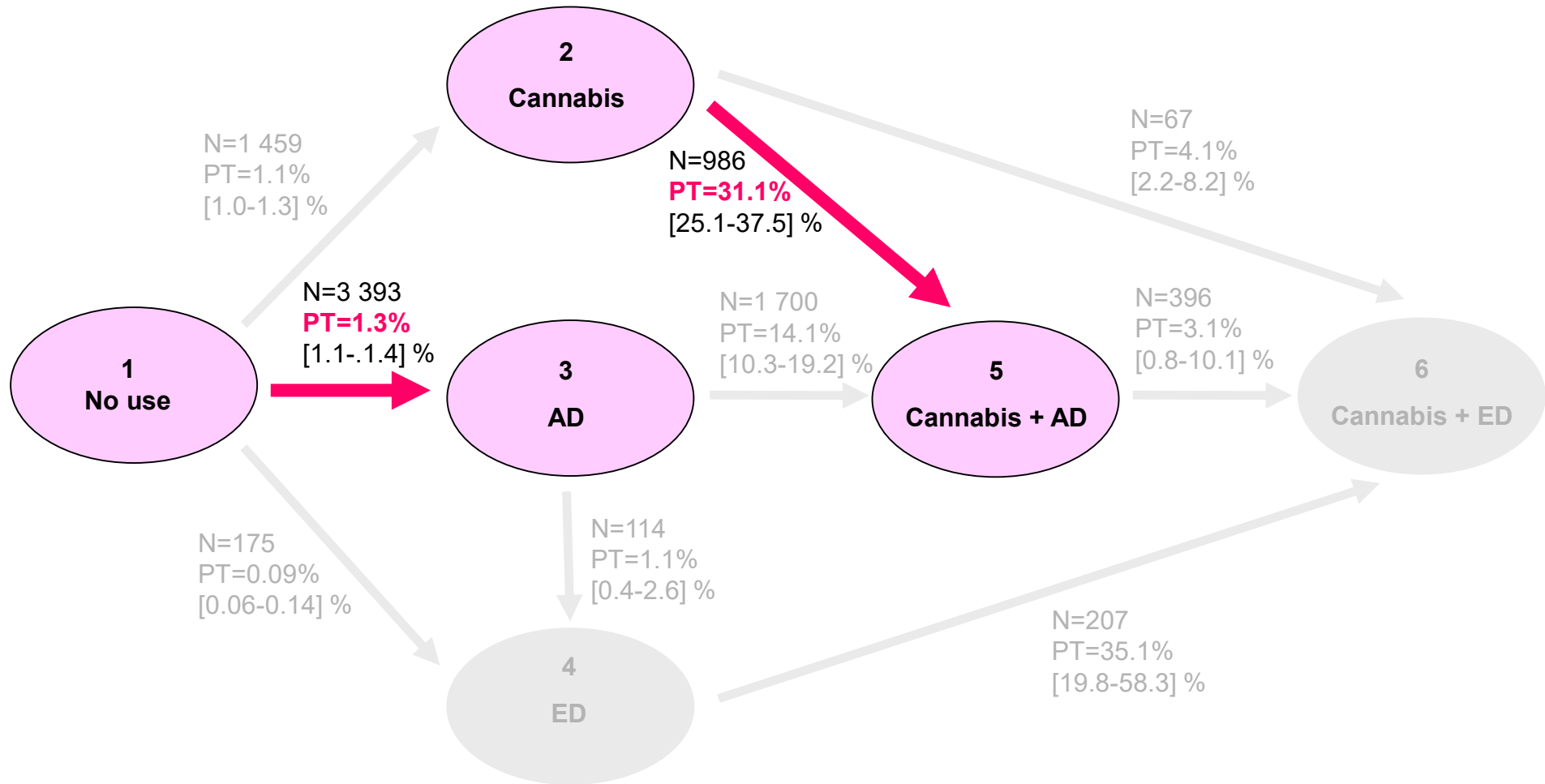
Previous cannabis use → 23.9 greater risk for AD

Transition to ED

2
Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=3 393
PT=1.3%
[1.1-.1.4] %

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

1
No use

3
AD

5
Cannabis + AD

6
Cannabis + ED

N=175
PT=0.09%
[0.06-0.14] %

N=114
PT=1.1%
[0.4-2.6] %

N=207
PT=35.1%
[19.8-58.3] %

4
ED
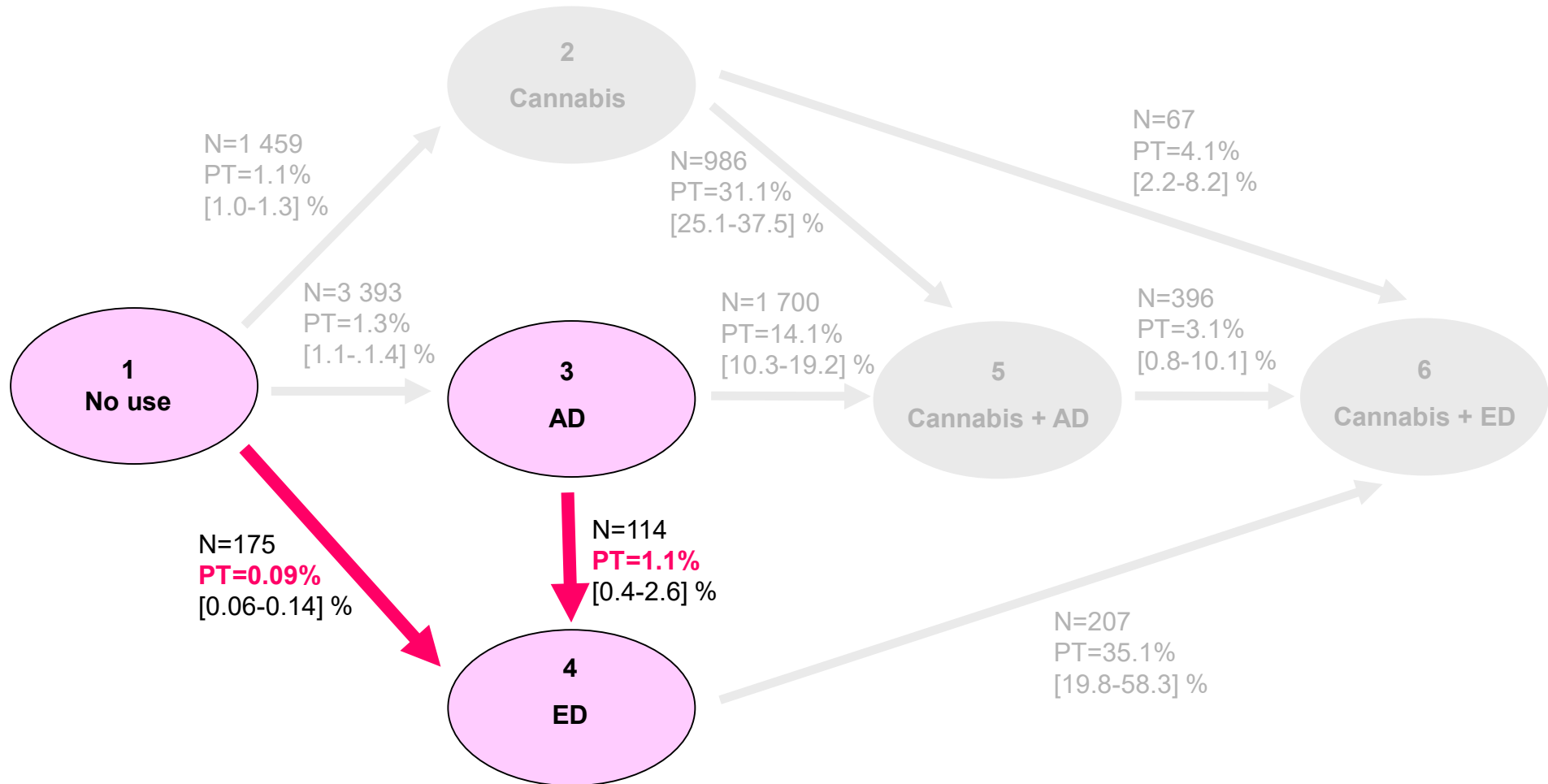
Previous AD → 4.6 greater risk for ED

Transition to ED

2
Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=3 393
PT=1.3%
[1.1-.1.4] %

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

1
No use

3
AD

5
Cannabis + AD

6
Cannabis + ED

N=175
PT=0.09%
[0.06-0.14] %

N=114
PT=1.1%
[0.4-2.6] %

N=207
PT=35.1%
[19.8-58.3] %

4
ED
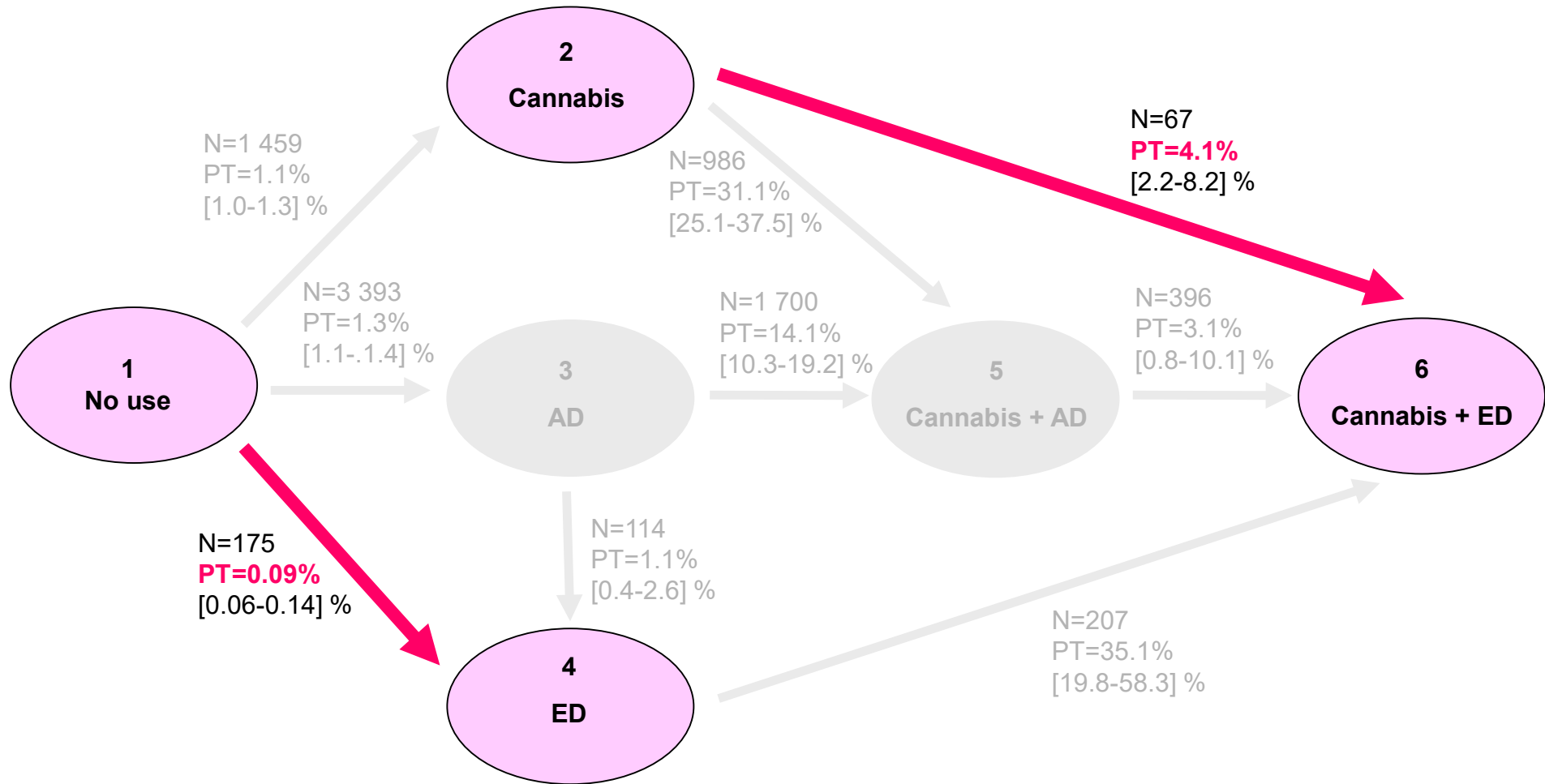
Previous cannabis use → 6.1 greater risk for ED

Transition to ED

2
Cannabis

N=1 459
PT=1.1%
[1.0-1.3] %

N=986
PT=31.1%
[25.1-37.5] %

N=67
PT=4.1%
[2.2-8.2] %

N=3 393
PT=1.3%
[1.1-.1.4] %

1
No use

3
AD

N=1 700
PT=14.1%
[10.3-19.2] %

N=396
PT=3.1%
[0.8-10.1] %

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Cannabis + AD

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Cannabis + ED

N=175
PT=0.09%
[0.06-0.14] %

N=114
PT=1.1%
[0.4-2.6] %

4
ED

N=207
PT=35.1%
[19.8-58.3] %
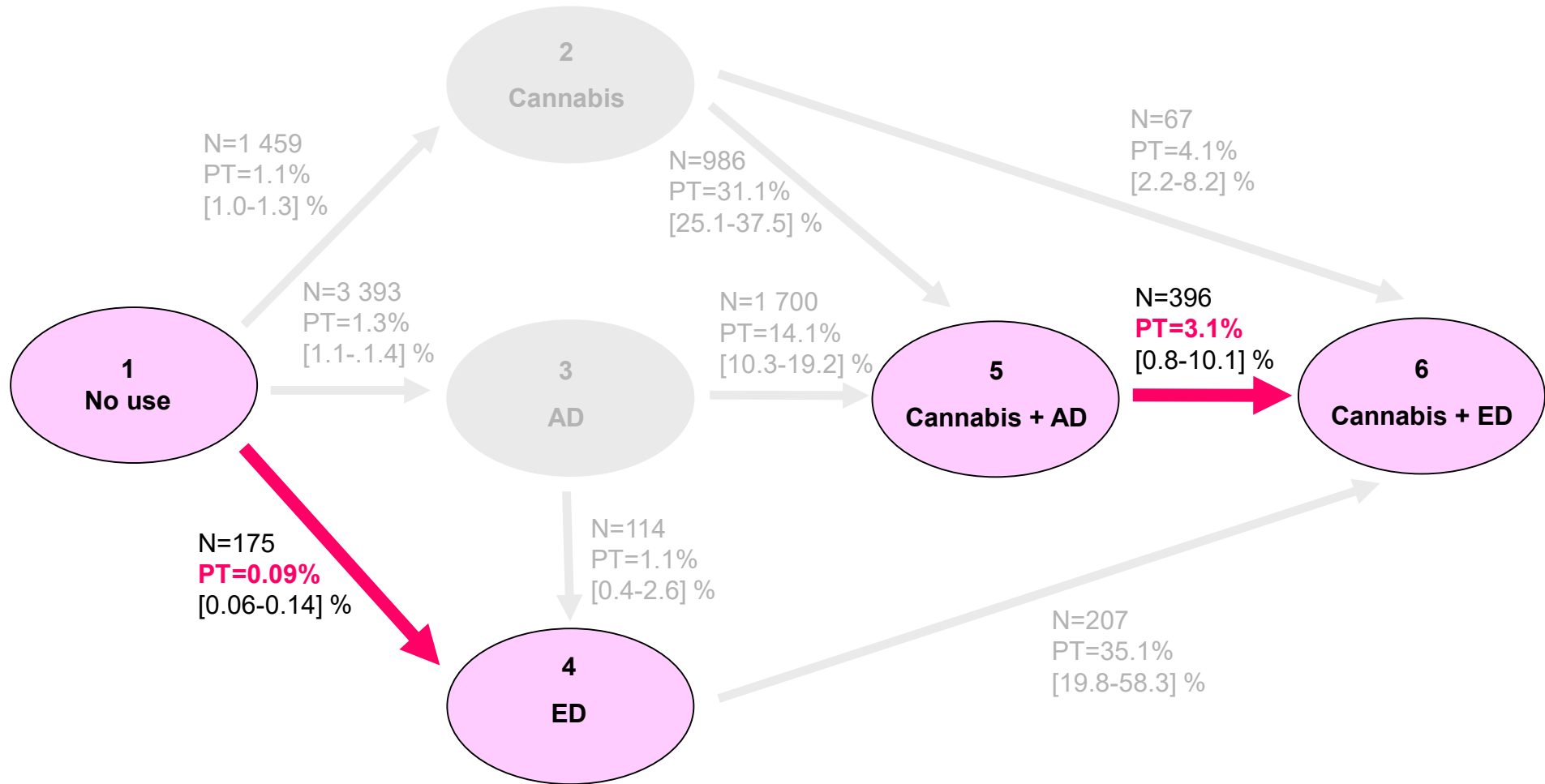
Previous cannabis use + AD → 11.2 greater risk for ED

Impact of tobacco initiation
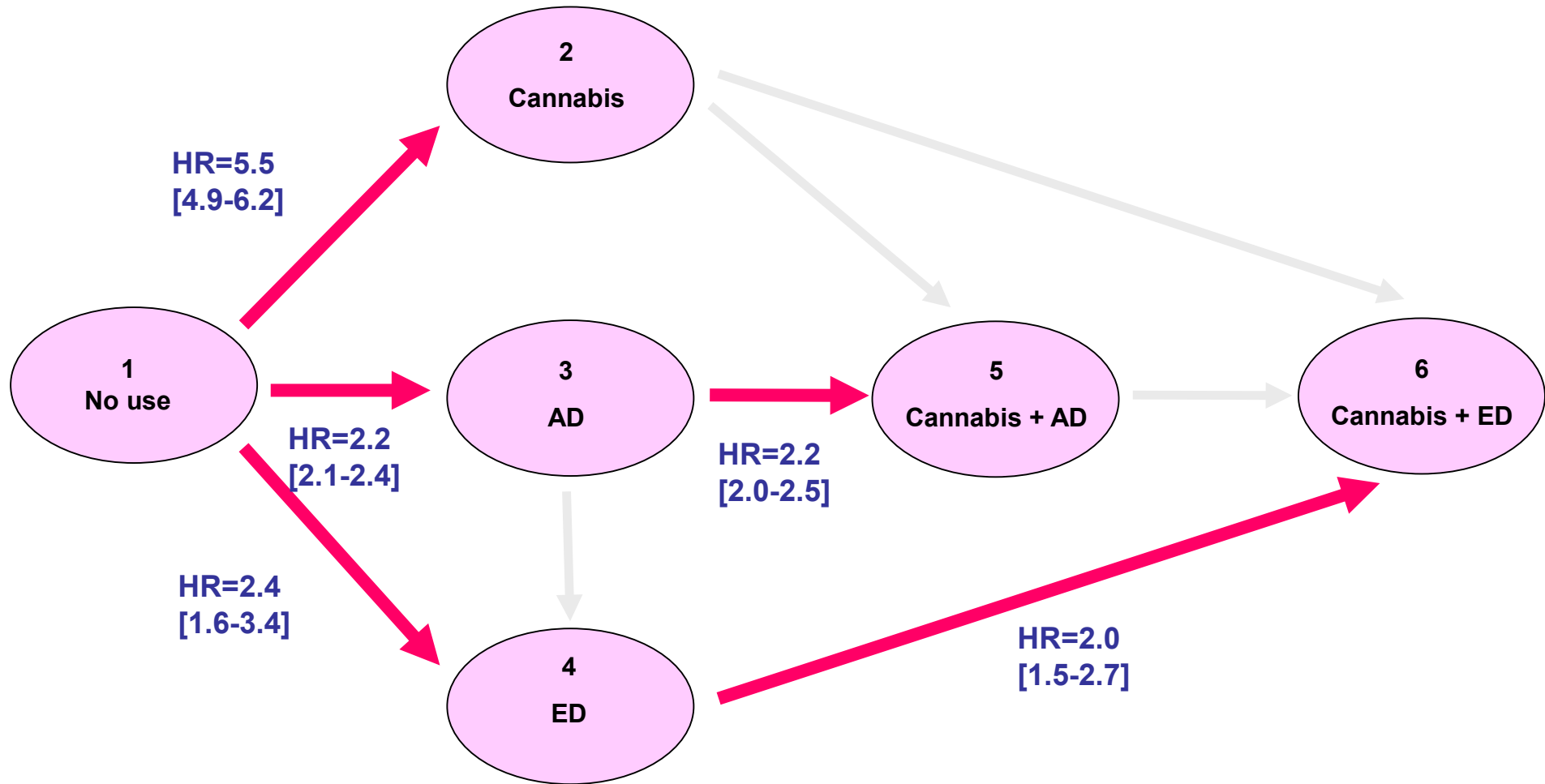
1 No use → **2** Cannabis
HR=5.5 [4.9-6.2]

1 No use → **3** AD
HR=2.2 [2.1-2.4]

1 No use → **4** ED
HR=2.4 [1.6-3.4]

3 AD → **5** Cannabis + AD
HR=2.2 [2.0-2.5]

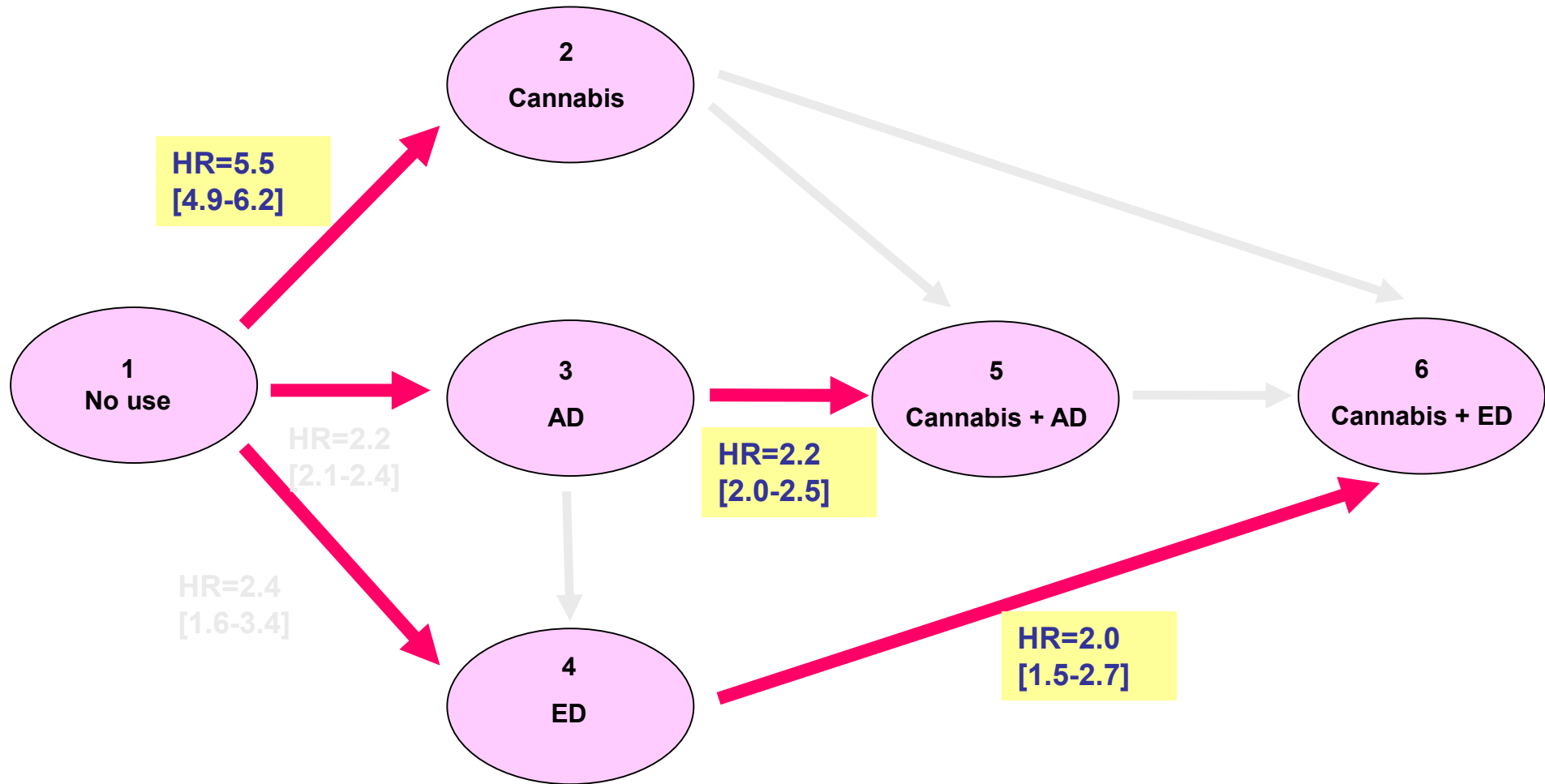**4** ED → **6** Cannabis + ED
HR=2.0 [1.5-2.7]
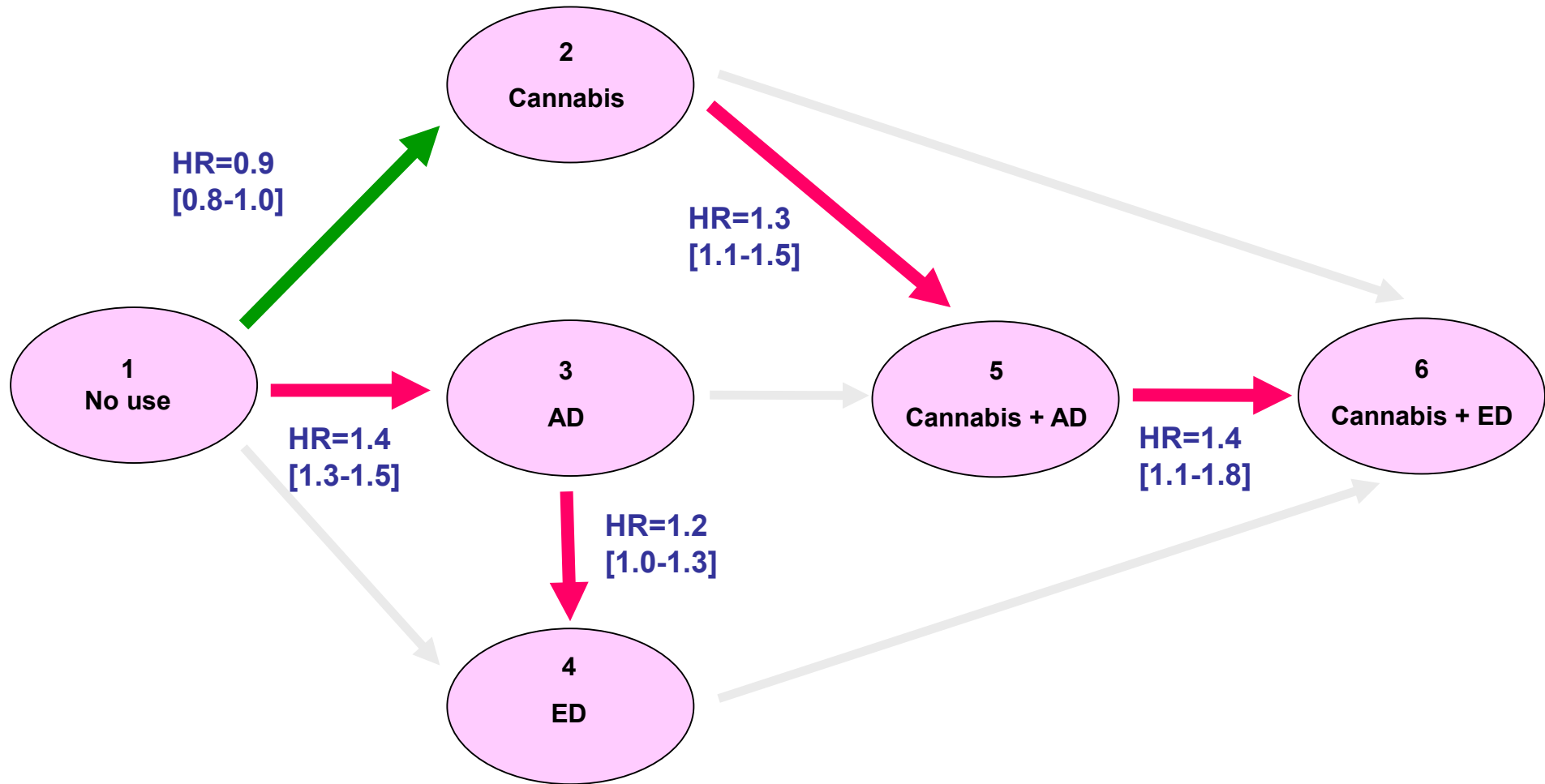
Impact of tobacco initiation
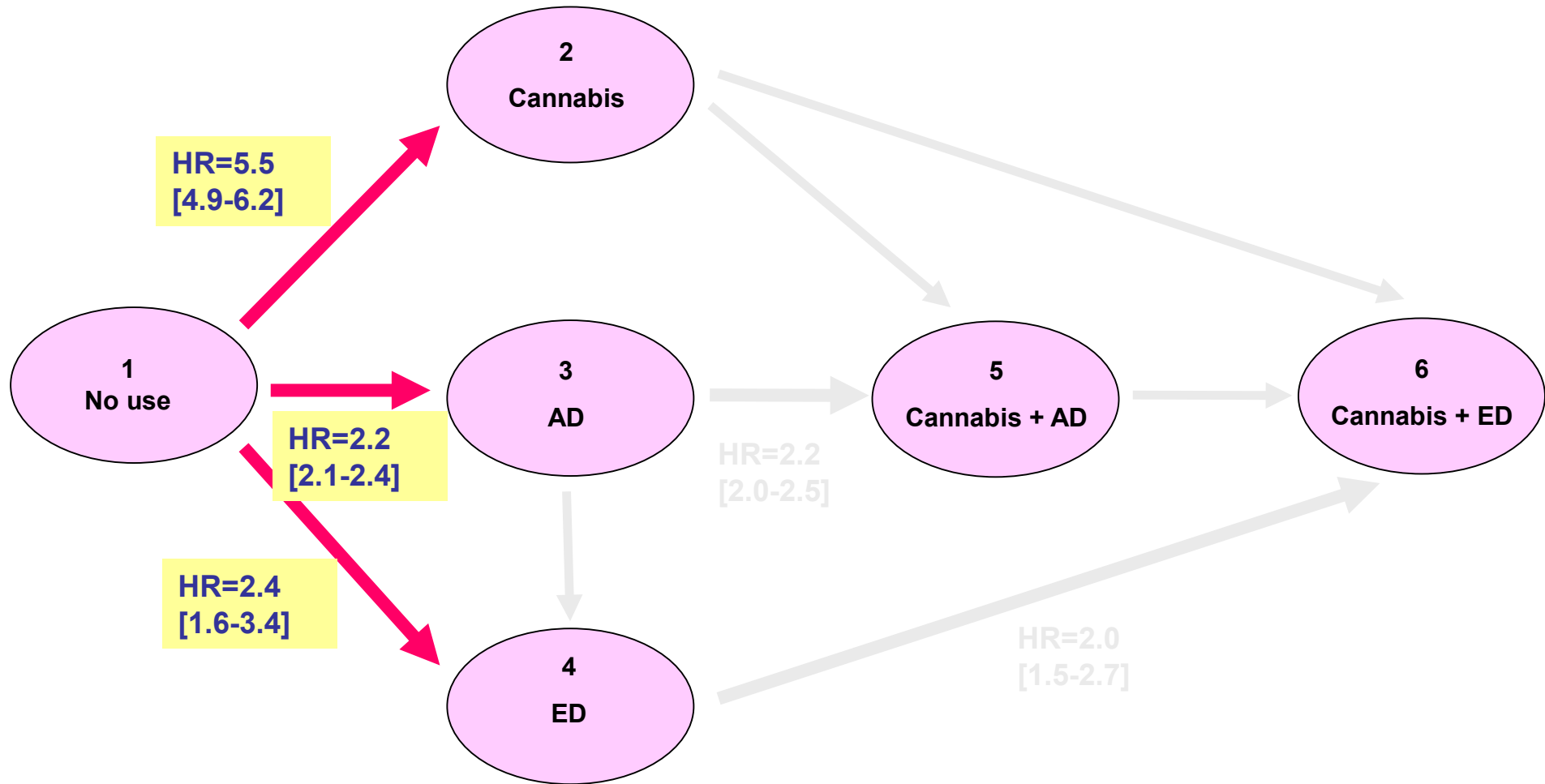
- **All primo-transitions**
- All transitions to cannabis

Impact of tobacco initiation

- All primo-transitions
- All transitions to cannabis

Impact of educational level

- **More educated : greater risk for AD → ED sequence**
- **Less educated : greater risk for cannabis primo-initiation**

Discussion

Main findings

- **AD precedes ED in most of cases**
  - **Greater risk for ED after AD**

- **Impact of concurrent substance use**
  - **Same risk for cannabis & AD primo-initiations**
  - **Tobacco leads to enter the use sequence**
  - **Cannabis : greater risk for AD and ED**
  - **Confirmation of association tobacco / cannabis**

- **Impact of educational level**
  - **Rôle of festive context (students) ?**

Conclusions

- **Alcohol use: follows a stage process**
  - **Increase in use intensity**
  - **Role of concurrent substance use**

- **ED: behaviour evoking binge drinking**
  - **Consequence of initial opportunity to use psychoactive substances in festive contexts?**

- **Multi state Model**
  - **Useful tool in addictology**
    - **It permits to model complex phenomons**
  - **Transitions could only be unidirectional**
    - **Data represented times of initiation of a substance or practice**

31