



Office for Health
Improvement
& Disparities

Using propensity score matching to expand the evidence base for IPS

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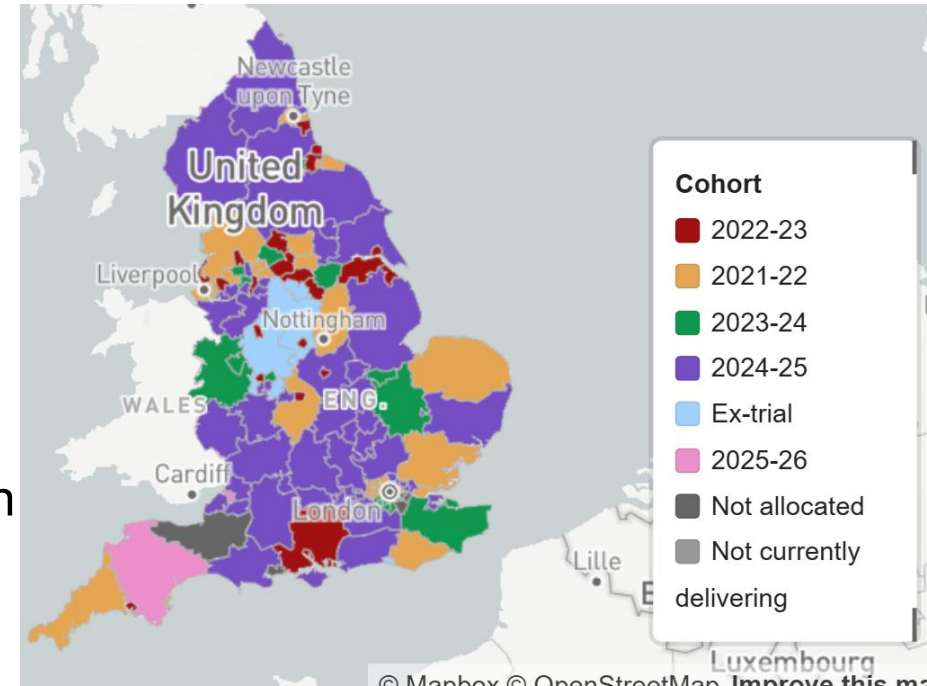
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September 2026

A short history of IPS in community treatment for substance use in England

- In 2015 the Government held an independent review of substance use and employment, framed around welfare benefit conditionality
- The review, published in 2016, identified IPS as a promising intervention but identified limited high-quality evidence of effectiveness, and recommended a large-scale randomised controlled trial, which became the IPS-AD trial – the first large, multi-site RCT of IPS in this setting
- Following the conclusion of the IPS-AD trial in 2021, the decision was made to expand access to IPS across England
- We currently have 100 teams covering about 97% of those in treatment for substance use in England. We will reach 100% coverage later this year when 5 final areas begin delivery



Why propensity score matching when we've already had an RCT?

- The IPS-AD trial was large and adequately powered, and RCTs are the gold standard – so why do we need more evidence?
- Two main reasons:
 - With a statistically significant but relatively modest difference between trial arms, we are still under considerable scrutiny
 - We have seen very substantial improvements in key IPS outcome metrics, including job start rate, time to first job start, and total days in employment. These improvements have extended to all substance groups, with the previously lower performing groups seeing the biggest improvements
- We need to understand more about the improved performance and the extent to which it might have been influenced by factors other than the quality and effectiveness of IPS delivery

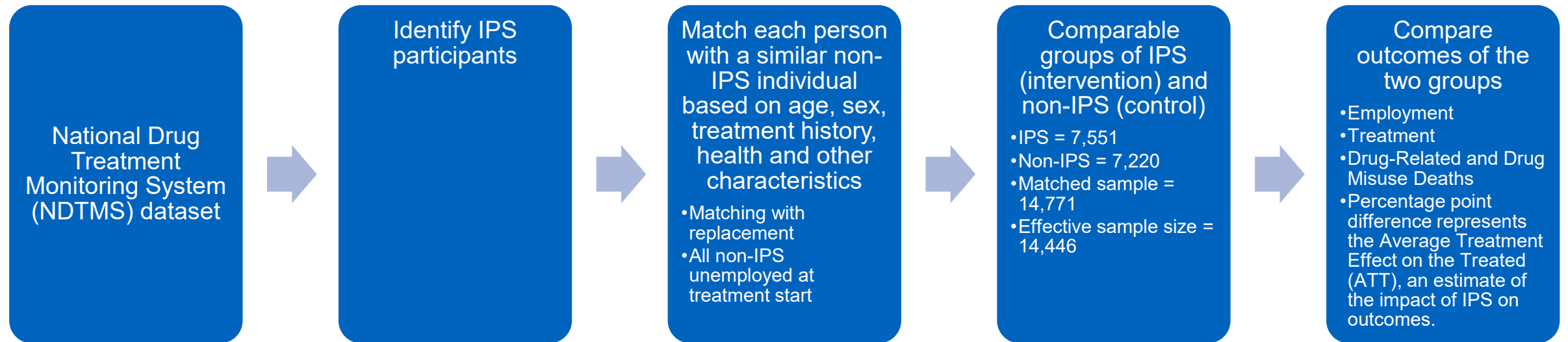
Before we go any further...

- This is a quasi-experimental approach to IPS analysis
- This analysis is proof of concept
- We verify employment outcomes of IPS in drug and alcohol treatment in England via HMRC
- The verified outcomes are our published and official analysis of our programme
- For methodological reasons it is not possible to verify the outcomes of our non-IPS (matched controls) using the same process
- The verified employment outcome is higher than presented here, but the patterns observed between the two analyses are consistent



Propensity score matching

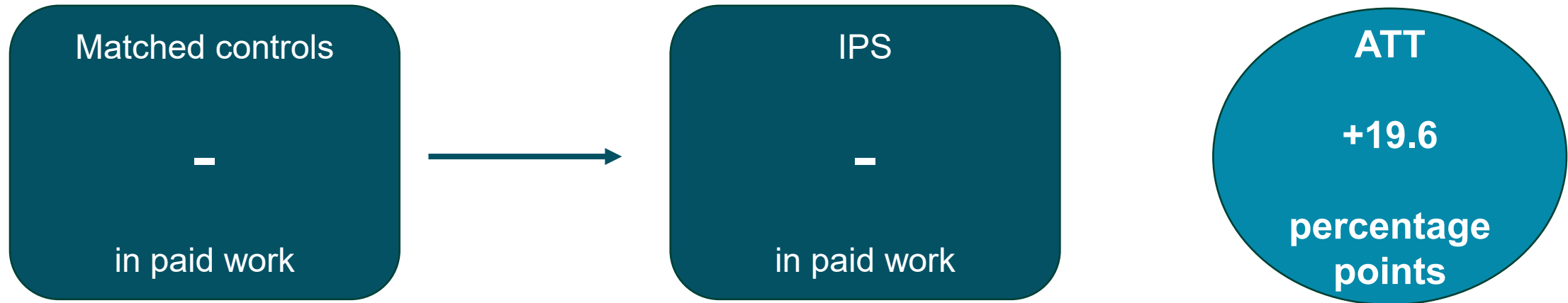
A method that creates a **comparable control group** by matching people with similar characteristics, helping to **estimate the impact of an intervention** when a randomised trial is not available.



Matching variables: Sex, age, ethnicity, main drug group, number previous treatment journeys, referral source, prescribing intervention, stable accommodation, physical health, psychological health, region and IMD decile

Employment (paid work)

IPS participation was associated with a 19.6 percentage point increase in paid work.



Note the percentages for matched controls and IPS have been redacted as the employment outcome used in this analysis is self report and unverified employment. The HMRC verified outcome is not available for the matched control group. If you would like to discuss the findings, please contact Claire Shaw claire.shaw1@dhsc.gov.uk

Self reported paid work in previous 4 weeks at latest Treatment Outcome Profile (TOP) assessment. Weighted propensity score matched analysis (n=14,601). ATT = +19.6 percentage points. OR = 3.73 (95% CI 3.41-4.09), $p < 0.001$.

Employment (paid work) – subgroup analysis

Note the percentages for matched controls and IPS have been redacted as the employment outcome used in this analysis is self report and unverified employment. The HMRC verified outcome is not available for the matched control group. If you would like to discuss the findings, please contact Claire Shaw claire.shaw1@dhsc.gov.uk

Employment gains were observed across all subgroups, ranging from +14.8 to +21.3 percentage points. The employment effect of IPS was consistent across age, sex and drug groups.

Subgroup	Matched controls (%)	IPS (%)	ATT (pp increase)
Overall	-	-	19.6
Age			
≤24	-	-	18.9
≥25	-	-	19.7
Sex			
Male	-	-	19.1
Female	-	-	21.3
Drug group			
Opiate	-	-	19.0
Alcohol only	-	-	20.0
Non-opiates and alcohol	-	-	18.7
Non-opiates	-	-	20.7
Criminal justice referrals	-	-	14.8

Effective treatment

IPS participation was associated with a 7.1 percentage point increase in effective treatment.



Effective treatment defined as remaining in treatment for ≥ 12 weeks or successfully completing treatment within 12 weeks. Weighted propensity score matched analysis ($n=14,771$). ATT = +7.1 percentage points. OR = 2.72 (95% CI 2.39-3.09), $p < 0.001$.

Treatment status

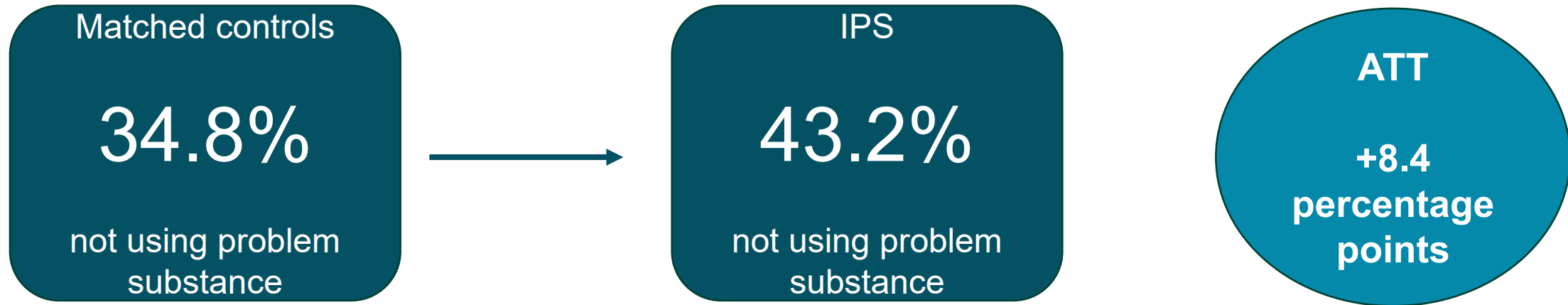
IPS participants experienced more favourable treatment trajectories than matched controls, with higher rates of successful completion and lower rates of unsuccessful exit and mortality.

Treatment status	Matched controls (%)	IPS (%)	ATT (pp)
Successful completion	37.9	45.8	+7.9
Still in treatment	26.5	28.2	+1.7
Unsuccessful exit	33.4	25.5	-7.9
Died	2.2	0.5	-1.7

Treatment status at end of treatment episode. Weighted propensity score matched analysis (n=14,762). Overall distribution differed significantly between groups ($\chi^2(3)=214.8$, $p < 0.001$).

Substance use

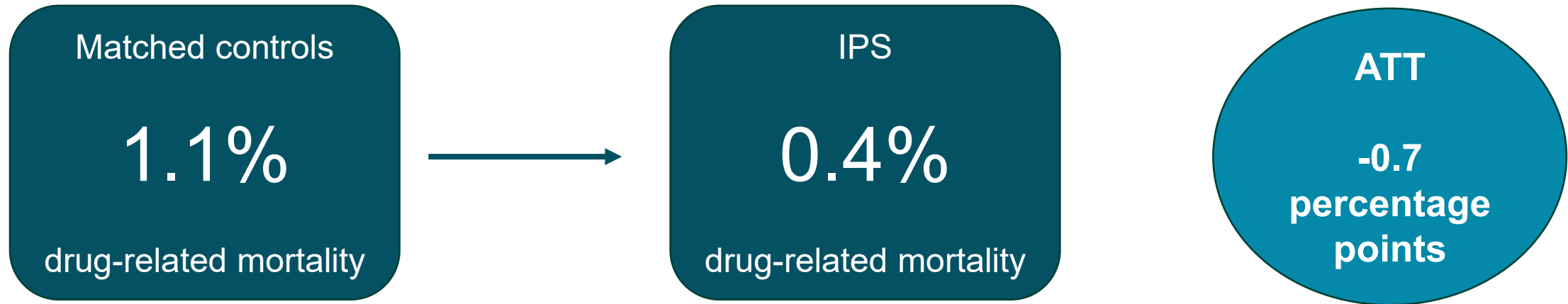
IPS participation was associated with an 8.4 percentage point increase in reporting no use of the measured problem substance.



Self-reported use of measured problem substance at latest TOP assessment. Weighted propensity score matched analysis (n=14,690). ATT = +8.4 percentage points. OR = 1.42 (95% CI 1.33-1.52), $p < 0.001$.

Drug-related mortality

IPS participation was associated with a 0.7 percentage point reduction in drug-related mortality. Mortality was rare in both groups, but deaths were significantly less common among people who received IPS.



Drug-related and drug misuse deaths combined into a single mortality outcome. Weighted propensity score matched analysis (n=14,771). ATT = -0.7 percentage points. OR = 2.81 (95% CI 1.84-4.27), $p < 0.001$. Drug-related and drug misuse deaths were derived from Office for National Statistics mortality data and linked within the matched analytical dataset.

Key analytical findings

IPS was associated with improved employment, treatment and recovery outcomes among people in alcohol and drug treatment

IPS participants had:

- Increased paid work
- Improved treatment effectiveness
- Higher treatment completion and lower unsuccessful exits
- Reduced problem substance use
- Lower drug-related mortality
- Positive employment outcomes across all subgroups

Can propensity score matching help expand the IPS evidence base?



YES

While **not a substitute for randomisation**, propensity score matching can generate **high-quality real-world evidence** and help organisations demonstrate the effectiveness and wider benefits of IPS at scale.

Strengths of our analysis

- Estimated IPS impact in a real-world setting without an RCT
- Achieved good balance between IPS and comparison groups
- Positive outcomes across employment, treatment, substance use and mortality – demonstrates broader IPS impact beyond employment
- Consistent employment benefits across key subgroups
- Scalable national evaluation using routine data
- Pattern of results were consistent with verified HMRC employment outcomes

Limitations

1. Observational study design

Although propensity score matching reduced differences between groups, the study was not a randomised controlled trial. Unmeasured factors may still have influenced both IPS participation and outcomes.

2. Matching can only adjust for observed characteristics

Residual confounding cannot be excluded. Matching achieved excellent balance across measured baseline variables. However, variables not recorded within the dataset could not be accounted for.

3. IPS participants included in the analysis may not represent all IPS participants

The final matched cohort represented a subset of the original IPS population. Participants excluded prior to matching or outcome analysis may differ from those included.

4. Employment outcome based on self-report

Comparative employment analyses used self-reported paid work recorded within TOP assessments. Verified HMRC employment data were not available for the matched IPS and control cohorts used in this evaluation.

5. Some outcomes relied on routine administrative data

Outcome quality depends on the completeness and accuracy of information recorded within treatment monitoring systems. Missing outcome data were excluded from individual analyses.

6. Results estimate impact for IPS participants

Findings represent the Average Treatment Effect on the Treated (ATT). Results therefore estimate the impact of IPS on people who received IPS and may not necessarily generalise to all treatment populations.

What do you need if you want to conduct PSM?

Theoretical basis	Baseline covariates (observed variables used for matching)
	Predictors of IPS engagement
	Employment and treatment outcomes
Data	Administrative; Clinical; Employment; Other
	Observed pre IPS for matching
	Observed post IPS for outcomes
Methodological understanding	Data definitions and measurement
	PSM methodology
	Balance and diagnostics
	Pitfalls and limitations
Analytical skills	PSM data preparation, diagnostic testing, matching and analysis
	Analytical software and coding skills

Target Trial Emulation (TTE)

RCTs are the gold standard for treatment comparisons, but they are not always possible.

THE IDEAL RCT

Design the fair comparison

Random assignment creates comparable groups

- Who can take part?
- Which treatments are compared?
- When do we start, and what outcome matters?

WITH OBSERVATIONAL DATA

Copy the trial design

No randomisation, but the same design questions

- Use the same eligibility rules
- Define groups at the same starting point
- Follow both groups in the same way

That step-by-step blueprint is Target Trial Emulation.

What matching cannot decide for us

PSM can balance measured differences, but it cannot make these design choices for us.

WHAT PSM DOES WELL

Balances measured characteristics between groups

ANALYSIS



SELECTION BIAS

Who is included?

Unclear eligibility can select different kinds of patients.



IMMORTAL-TIME BIAS

When does follow-up start?

Different start times can give one group guaranteed survival time.



MISCLASSIFICATION

How are groups defined?

Using future information can place patients in the wrong group.

TTE answers these design questions before the analysis begins.

Design first. Match second.

TTE and propensity-score matching strengthen different parts of the same study.

1 PICTURE THE RCT

Target trial

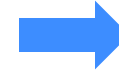
- Who is included?
- What choices are compared?
- When and what do we measure?



2 AVOID UNFAIR COMPARISONS

Better design

- The same starting point
- No group defined by future events
- Clear and consistent rules



3 COMPARE THE GROUPS

Analysis

Propensity-score matching

or weighting / regression,
depending on the question

TTE defines a fair comparison. PSM then improves balance between groups.

Links and contact details

January 2025 outcomes analysis (Sept 2025): [IPS for alcohol and drug dependence: data linkage outcomes 2025 - GOV.UK](#)

RAND Evaluation (Sept 2025): [Evaluation of Individual Placement and Support \(IPS\) in community drug and alcohol treatment services | RAND](#)

IPS-AD RCT outcomes (Feb 2024): [Superiority and cost-effectiveness of Individual Placement and Support versus standard employment support for people with alcohol and drug dependence: a pragmatic, parallel-group, open-label, multicentre, randomised, controlled, phase 3 trial – ScienceDirect](#)

Comparison IPS-AD RCT and national expansion outcomes (July 2026): [SSPH+ | From randomised trial to national implementation: employment outcomes from individual placement and support in english alcohol and drug treatment services](#)

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