**Poly-substance use, treatment completion, and contact with the justice system: a multistate analysis of treatments for substance use disorders between 2010-2019, Chile**

# Background (456)

Evidence shows that substance use disorders (SUD) are related to criminality, such as reincarceration1, arrests2, and violence3. People with SUD also tend to use more than one substance (PSU)4, both licit and generally illicit, over an established timeframe5.

People with PSUs tend to have more problems in various dimensions than single users. It is related to poorer treatment outcomes and a greater SUD severity6,7. Additionally, the PSU prevalence tends to be higher among users in contact with the criminal justice system (CCJS)8,9. Research conducted in North America, Europe, and Australia has shown that using multiple substances leads to a higher mortality rate10, is related to post-traumatic stress disorder11, and increases the risk of relapse compared to single substance use10,12.

Research on PSU in Latin America is considerably limited13. Furthermore, and like many studies in the global north, high-risk populations have often been overlooked14. An analysis of data from independent studies conducted in six Latin American countries found that 21% of participants were PSU, and males, people aged 18-34 years, from Chile, Uruguay, and Argentina were more likely to report PSU after adjusting for age and sex14. Studies conducted in hard-to-reach populations in Chile have associated PSU with school drop-out, unemployment, sexual risk, and antisocial behaviors15–17.

One major issue highlighted in the literature is the role of treatment in patients’ substance use trajectories. Completing treatment is associated with better outcomes, but completion rates may be influenced by patient characteristics18–20. A US veterans’ sample study showed that completing SUD intensive-outpatient treatment lowered the likelihood of CCJS21, while another study found that prior SUD treatment is protective against CCJS22. Analyses must consider differences in treatment goals, patient characteristics, resource availability, and SUD severity profiles, which may affect the relationship between PSU, treatment completion, and CCJS23–25.

Although the relationship between SUD and CCJS is well documented in the global north, little is known about the effect of treatment outcomes among people with PSU in other contexts. This study aims to estimate the mediating effects of completing SUD treatment on the link between PSU and CCJS among adult patients admitted to SUD treatment programs in Chile during 2010-2019. Understanding this relationship could inform effective prevention and intervention strategies for PSU and provide insight into the effectiveness of SUD treatment in reducing the risk of CCJS among individuals with baseline PSU in Chile. This study contributes to a growing literature on the importance of addressing longitudinal dynamics in SUD patients.

# Research questions, aims, and hypothesis

* **Research question:** What are the mediating effects of completing SUD treatment on the connections between baseline PSU and CCJS in Chile in the short (six months), middle (1 year), and long term (3 years)?
* **Aims:** Estimate the mediating effects of completing SUD treatment on the relationship between PSU at admission and CCJS among adult patients admitted to SUD treatment programs in Chile during 2010-2019. Specific: To describe the role of PSU on CCJS (1), to compare the risk of CCJS system between poly and single-substance users (2), and to estimate the combined effects of exposure to PSU and treatment outcome on the CCJS.
* **Hypothesis:** Baseline PSU is related to lower treatment completion rates (1), baseline PSU is related to a greater risk of CCJS (2), vulnerable patients have a differential risk of CCJS associated with treatment completion, and PSU and treatment completion will be antagonistically related to an increased risk of CCJS (3).

# Methodology

This research design is a retrospective cohort based on the administrative data's record linkage. The study will use data from Chilean SUTs programs and Prosecutor’s Office (PO) through a deterministic linkage process. The study is exempted from ethics review as it uses de-identified data. The exposure variable will be the baseline PSU (using more than one main substance among alcohol and illicit drugs at admission to SUD treatment)26.and the outcomes will be SUD treatment outcome (complete vs. dropout or spelled by misconduct) and CCJS (offense that led to a condemnatory sentence). The study will control for various confounding variables related to substance use, demographics, and social factors through inverse probability weights. Patients were weighted by the inverse probability of PSU based on several predictors and these weights will be truncated at the 1st and 99th percentiles27. The illness-death multistate model allows for transitions between admission and treatment outcome, treatment outcome and CCJS, and admission and CCJS (without completing treatment). We will then calculate the Aalen-Johansen estimator for transition probabilities at 6 months, 1 and 3 years28. Secondary analyses will focus on mediation, estimating the effects of PSU given treatment outcome at 6 months, 1 and 3 years using a standard time-to-first-event approach. Proportions mediated will be estimated using the bootstrap method. We also plan to run separate analyses in patients admitted to outpatient vs inpatient treatment. Preliminary markdowns are available at bit.ly/3w9wygJ.

# Project milestones

* **Progress report:** It will include: a theoretical framework and descriptive analyses exploring the connections between PSU, SUT outcome, and CCJS.
* **Paper:** Sent to a Substance Abuse, Criminology or Public Health international journal before the months 12 of the study.
* **Presentation in Scientific meetings:** Our goal is to present this study at least at one international conference such as the Society for Epidemiologic Research or similar, and in possible scientific community activities organized either by Universidad de Chile or other national institutions.

# Research team

Our research team has experience in public health and criminology and has skills in the use of large datasets in substance use epidemiology, program and policy evaluation, and treatment research (See Table 1). Previously, part of the team collaborated on SUT policy analysis publications.

**Table 1. Research team.**

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Role | Expertise | Time spent |
| Andrés González | P.I. | Ph.D. student (School of Public Health, Universidad de Chile). He has worked as technical staff in research related to occupational health and SUD treatments. He has been working on the Treatment patients dataset since 2019, collaborating with Dr. Castillo-Carniglia in several papers | *6 hours per week* |
| José Ruiz-Tagle | Co-I | Ph.D. student (Public Policy, Universidad Mayor). He has worked in research projects related to substance use treatments. He also has been working on the dataset on Treatment patients since 2019 along with Dr. Castillo-Carniglia. He collaborated in the analysis of several papers linked to SUD. | *3 hours per week* |
| Mariel Mateo | Co-I | Ph.D. student (School of Criminology and Criminal Justice, Griffith University, Australia). She coordinated the first Outcome Study of Substance Use Treatment in Chile and led the Drug research area in the Justice and Society Studies Centre (Pontificia Universidad Católica) between 2015 and 2019. | *2 hours per week* |
| *Álvaro Castillo-Carniglia* | Sup | Ph.D., Associate professor, and Director of the Ph.D. Programme in Public Policy, Universidad Mayor. He has a background in epidemiology and his main research areas are the measurement of SUDs in the population. He has co-directed several theses in public health related to treatment dropouts and readmissions. | *2 hours fortnight* |
| *Note: P.I.: Principal Investigator; Co-I: Co-Investigator; Sup.: Supervisor.* | | | |

# Timeline

Based on the work carried out in the 2022 intramural fund, we will delve into the transformation and processing of data following a longitudinal perspective of nested events by subjects. Additionally, a significant amount of time will be devoted to discussing and implementing knowledge of causal inference involved in the analysis. The process is summarized in Figure 1.

**Figure 1. Gantt chart of activities involved in research progress.**

Imagen que contiene Tabla

Descripción generada automáticamente

# Budget

Funds will be used to cover expenses for attending international conferences and for a virtual computer (e.g., an annual subscription to DataCamp Teams). The cost of attending international conferences is between 2,000-4,000 USD29, thus the funds should cover a significant portion of these expenses. Also, it can be used for workshops, manuscript editing (if needed), and as an incentive for the researchers.

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