# The Effect of Drug Consumption Among Adolescents on Crime Rates in Chile:
## A Community Level Approach.*

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**Abstract**

The relationship between adolescent drug use and crime rates is a complex and multifaceted issue that has been studied across various social sciences. In the field of economics, there is a lack of literature analyzing this relationship at the municipal level, particularly regarding the potential impact of adolescent drug use. Using data provided by the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption and the Criminal Analysis Study Center, we found a positive relationship between cocaine, base paste, and inhalant use and the incidence of crimes per hundred thousand inhabitants at the municipal level. These results are more pronounced in municipalities with a high prevalence of adolescent labor. These findings highlight the need to address adolescent drug use issues at the municipal level, in order to develop public policies that consider the existing heterogeneity across the country.

**JEL Codes**: O15, I18, I31, K42.
**Keywords**: Drug consumption; Adolescents; Crime Rates; Municipalities.

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# 1 Introduction

Both drug use and crimes committed by young people have been growing concerns worldwide, and particularly in Chile. This study aims to explore this relationship at a regional level within the country, providing a more detailed and contextualized view of the issue.

International literature has demonstrated a significant correlation between drug use and crime. A study by Bennett et al. (2008) based on a meta-analysis with data from the United States and Europe found that the probability of committing a crime is between 2.8 and 3.8 times higher among those who have used drugs compared to those who have not. The three drugs most commonly associated with crime are crack, heroin, and cocaine.

In the Chilean context, a study by Valenzuela and Larroulet (2010) provided estimates on the connection between drugs and crime using Goldstein's tripartite model. This model recognizes three modalities through which drug use and abuse can be attributed to criminal behavior: systemic attribution (crimes occurring within the illegal drug market), psychopharmacological attribution (crimes committed under the influence of drugs), and economic-compulsive attribution (crimes committed with the purpose of obtaining drugs).

This document aims to expand on these findings by examining the effects of adolescent drug use at a regional level in Chile. Naturally, we could expect to observe an increase in the number of crimes within the municipalities of our country, which could be explained by factors such as psychological issues, family support, social vulnerability, among others. In doing so, this study hopes to provide valuable information to inform public policies and interventions aimed at addressing this issue.

The structure of this document is as follows: Section 2 presents the data to be used, while Section 3 displays the relevant descriptive statistics for the analysis. Subsequently, Section 4 outlines the methodology to be implemented, Section 5 illustrates the results, and Section 6 presents the robustness checks. Finally, Section 7 summarizes the discussion and provides conclusions.

# 2 Data

To analyze the effect of adolescent drug use on crime rates at the municipal level, I use data from the "*Estudio de Drogas en Población Escolar*" (School Population Drug Study, hereafter referred to by its acronym ENPE) conducted in 2019. This study aims to estimate the level of drug and alcohol consumption among students from eighth grade to twelfth grade. The National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption (SENDA, for its Spanish acronym: *Servicio Nacional para la Prevención y Rehabilitación del Consumo de Drogas y Alcohol*) is responsible for conducting a field survey every two years for both public and private schools nationwide (SENDA, 2019). One of the most notable features of this survey is its longevity, which allows us to analyze the evolution of school drug use since 1995.

Considering the analysis period, each surveyed student received a questionnaire[1] aimed at characterizing their family relationships, the environments in which they live and interact (home, school, friendships), their perceptions of the risks of consuming legal and illegal substances, direct drug use among students, and additional information. Our analysis will focus on drug use with a high potential for abuse and both physical and psychological dependence among students. This includes substances such as cocaine, base paste, and inhalants[2]. Finally, considering the consumption of these drugs over the past 12 months, an indicator variable was constructed to signal whether a person has used any of these three substances. This variable was then aggregated at the municipal level to obtain the number of drug-consuming students. To account for the heterogeneity of municipalities, this indicator was deflated by the population size at the municipal level.

For data on the number of reported crimes at the municipal level, I use the database provided by the *Centro de Estudios de Análisis Delictual* (Criminal Analysis Study Center, hereafter referred to by its acronym CEAD), which operates under the Under Secretary for Crime Prevention. This center reports the annual crime rate per hundred thousand inhabitants at the municipal level, taking into account municipal heterogeneity. The crimes included are those with significant social impact[3], do-

[1] A graphical representation of the question used for this analysis can be viewed in Figure A.1 in the Appendix.

[2] SENDA defines "inhalants" as any "liquid or volatile substances that release vapors inhaled through the nose or mouth", including neoprene, toluene, ether, acetone, poppers, paints, and others.

[3] Theft, homicide, rape, assault, burglary, and robbery with violence.

mestic violence, incivilities, and other incidents reported by both the National Police (Carabineros) and the Investigations Police of Chile. It is important to note that this rate only includes crimes with formal complaints and those committed in flagrante delicto.

Finally, I incorporate a range of data sources identified in the literature as potential factors explaining the relationship between the likelihood of committing criminal acts and drug use. Data from the National Socioeconomic Characterization Survey (CASEN) are used to provide indicators of household income and multidimensional poverty at the municipal level. Additionally, data from the National Board of School Assistance and Scholarships (JUNAEB) is utilized, specifically the Student Vulnerability Index (IVE), which measures the risk of school dropout at the municipal level.

# 3 Descriptive and Summary of Statistics

From the data collected at the municipal level, Table 1 presents the descriptive statistics at the national level for our variables of interest. From this, we can observe that, for the analyzed period, the ENPE survey was conducted in only 135 of the 346 municipalities in Chile, which represents an increase of 13 municipalities compared to the survey conducted in 2017.

Considering this sample, I found that on average, there were 7,649 reported crimes per hundred thousand inhabitants, with the municipality of *Aysén* reporting the fewest crimes and the municipality of *Santiago* reporting the most. On the other hand, the rate of hard drug use is relatively low, averaging 0.7% nationally, with *El Monte* and *Independencia* having the lowest and highest drug use rates, respectively. This is quite significant, as it is expected that a 1 percentage point increase in adolescent drug use rates could have a substantial impact on the number of crimes per hundred thousand inhabitants, which will be explored further in this document.

In terms of municipal development indicators, the multidimensional poverty rate at the municipal level is 21%, the average household income is $310,000 chilean pesos (CLP), and the average Student Vulnerability Index (IVE) within the analyzed municipalities is 88%.

For each of these cases, there is a large standard deviation, reflecting the significant heterogeneity at the municipal level for each of these indicators. This result will later pose a problem for our esti-

mates, as it will directly affect the variance of the errors as well as the consistency of our estimator. To partially address this issue, clustered standard errors at the municipal level will be used when performing statistical inference.

**Table 1**
Summary of statistics (national level).

| | N | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|---|
| Crime rate per 100,000 inhabitants | 135 | 7.649 | 4.651 | 422 | 48.329 |
| Rate of hard drug consumption (%) | 135 | 0.691 | 0.352 | 0.095 | 1.889 |
| Municipal multidimensional poverty rate (%) | 135 | 21.777 | 7.677 | 3.384 | 51.377 |
| Household income by municipality (CLP) | 135 | 310.837 | 125.458 | 130.230 | 845.789 |
| Student vulnerability index (%) | 135 | 88 | 5.490 | 64 | 97 |

**Source**: Produced by the author using data from the National Socioeconomic Characterization Survey, the National Board of School Assistance and Scholarships, the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption, and the Criminal Analysis Study Center (2019).

# 4 Empirical Approach

Considering the potential endogeneity issues that may arise when analyzing the effect of drug consumption among adolescents on crime rates at the municipal level, I will use the Instrumental Variables model proposed in equation 1.

$$\begin{aligned} Crime_i &= \beta_0 + \beta_1 \hat{Drug}_i + X_i\gamma + \varepsilon_i \\ \hat{Drug}_i &= \alpha_0 + \alpha_1 ALR_i + \eta_i \end{aligned} \tag{1}$$

Where $X_i$ is a vector of municipal controls, $ALR_i$ is our instrument and represents the adolescent labor rate within municipality $i$, and $\hat{Drug}_i$ is our variable of interest.

For the validity of our estimation, it is necessary to meet the assumptions of relevance and exogeneity of our instrument. Regarding relevance, a correlation test shows that our instrument $ALR_i$ is strongly correlated with the variable of interest $Drug_i$ (with a correlation coefficient of 0.66), which is later confirmed by the F-test presented in the first stage of $F(1, 133) = 24$ in the results section.

This would suggest that municipalities where students in grades 8 through 12 work more tend to have higher rates of drug consumption.

For the assumption of exogeneity, I conduct a Durbin-Wu-Hausman (DWH) test, commonly used in the literature to assess the null hypothesis that there is no correlation between our instrument and the error term. Given the null hypothesis that our instrument is exogenous, the F-statistic (where $F(1,133) = 1,91$) indicates that we cannot reject the null hypothesis. Thus, we can infer that municipal crime rates are not explained by a direct increase in student employment, but rather by an increase in drug consumption. Intuitively, this might be expected, as while higher child labor could be associated with poorer socioeconomic conditions (which might lead to crime), the additional income from employment could reduce the necessity to engage in criminal activities for survival.

# 5 Results

The results of these estimations are presented in Table 2. Columns 1 and 2 show the estimates using the ordinary least squares method, while Column 3 presents the estimates using the instrumental variables method.

From Column 1, we can observe a positive and statistically significant relationship between the rate of drug consumption among adolescents and the number of crimes committed per 100,000 inhabitants. Specifically, a 1 percentage point increase in the adolescent drug consumption rate is associated with an increase of 0.72 standard deviations in municipal crime rates. Conversely, in municipalities with no adolescent drug consumption issues, the crime rate per 100,000 inhabitants is negative, at -0.5. Despite the large standard deviation, these results are statistically significant at the 99% level.

Although the magnitude of the effect on our variable of interest is quite high, it is important to remember that the average adolescent drug consumption rate is only 0.7%, so large changes in the dependent variable are to be expected. Furthermore, given that in the absence of adolescent drug consumption our estimate lacks logical sense, we might anticipate the presence of omitted variable bias due to the exclusion of relevant indicators of student vulnerability at the municipal level.

Column 2 analyzes the effect of adolescent drug consumption rates, incorporating controls for household income by municipality, multidimensional poverty, and students vulnerability at a municipal level. From this analysis, it can be observed that including these controls did not significantly alter the coefficient of interest. Thus, a 1 percentage point increase in adolescent drug consumption is associated with an increase of 0.72 standard deviations in the number of crimes per 100,000 inhabitants. Considering student vulnerability, a 1 percentage point increase is associated with a decrease of 0.09 standard deviations in crime rates. An important result is observed in the constant term; with this new specification, it is noted that in the absence of adolescent drug consumption, the crime rate is 6.8 per 100,000 inhabitants. This level confirms the presence of omitted variable bias due to not accounting for vulnerability controls.

Considering the potential endogeneity issues that might affect the estimation of our model, it is observed that through the instrumental variables strategy, the impact of adolescent drug consumption increased substantially. Using the municipal child labor rate as an instrument, we find that a 1 percentage point increase in drug consumption is associated with an increase of 1.33 standard deviations in crimes per 100,000 inhabitants. These results are statistically significant at the 99% level. Numerically, this increase corresponds to an additional 6,201 crimes per 100,000 inhabitants, which could be interpreted as a shock where the municipality of *Chimbarongo* has the same crime rate as *Quinta Normal*, *Recoleta*, or *San Miguel*. Regarding the other coefficients of interest, the results are similar to those obtained using ordinary least squares.

# 6 Robustness Check

Using crime statistics related to the number of cases filed in local police courts at the municipal level during 2019, Table 3 presents the results of the robustness check. These data are provided by the various courts through administrative records from the country's police forces, which are subsequently compiled by the National Statistics Institute (INE, for its Spanish acronym: *Instituto Nacional de Estadísticas*). These statistics offer a perspective on the flow of crime during the initial stage of the criminal process. Considering that the data reported by CEAD provide an indicator of reported complaints rather than arrests, this analysis will only include cases filed for criminal

**Table 2**
The effect of adolescent drug consumption on crime rates in Chile.

| Dependent variable | OLS | | IV |
|---|---|---|---|
| *Crime rate per 100,000 inhabitants* | (1) | (2) | (3) |
| Rate of hard drug consumption (percentage) | 0.722*** | 0.720*** | |
| | (0.238) | (0.228) | |
| Municipal adolescent labor rate (percentage) | | | 1.333*** |
| | | | (0.340) |
| Municipal multidimensional poverty rate (percentage) | | 0.017 | 0.023 |
| | | (0.014) | (0.014) |
| Household income by municipality (standard deviations) | | -0.044 | 0.007 |
| | | (0.115) | (0.115) |
| Student vulnerability index | | -0.087*** | -0.082*** |
| | | (0.025) | (0.024) |
| Constant | -0.499*** | 6.781*** | 5.813*** |
| | (0.185) | (2.174) | (2.171) |
| Observations | 135 | 135 | 135 |
| R-Squared | 0.06 | 0.20 | 0.23 |

**Note**: The instrument used in Column (3) corresponds to the municipal adolescent labor rate (the first stage can be seen in Table A.1 in the appendix). Clustered standard errors at the municipal level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. **Source**: Produced by the author using data from the National Socioeconomic Characterization Survey, the National Board of School Assistance and Scholarships, the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption, and the Criminal Analysis Study Center (2019).

activities[4].

The results presented show a statistically significant effect of a similar magnitude to that observed in Table 2. Using the instrumental variables strategy, it is found that a 1 percentage point increase in the rate of hard drug consumption is associated with an increase of 1.2 standard deviations in crimes per 100,000 inhabitants, while controlling for municipal vulnerability levels. On the other hand, in the absence of drug consumption, the municipal crime rate would average 10.5 per 100,000 inhabitants. I expect that the results in the absence of drug consumption would be higher than those observed using CEAD data. This is because crime statistics provided by local police courts encompass a broader range of types of crimes not included in the previous sample.

Thus, the results presented in this section provide compelling evidence regarding the effect of adolescent drug consumption at the municipal level. As observed, this impact is stronger in municipalities

[4]This statistic includes crimes such as violations of court orders, crimes against public faith, crimes against order, crimes against individuals such as homicides, assaults, or defamation, crimes against private property, traffic offenses, among others.

**Table 3**
Robustness check with data on the number of cases filed in local police courts.

| Dependent variable | OLS | | IV |
|---|---|---|---|
| *Crime rate per 100,000 inhabitants* | (1) | (2) | (3) |
| Rate of hard drug consumption (percentage) | 0.679* | 0.774** | |
| | (0.344) | (0.309) | |
| Municipal adolescent labor rate (percentage) | | | 1.187** |
| | | | (0.470) |
| Municipal multidimensional poverty rate (percentage) | | 0.055*** | 0.059*** |
| | | (0.019) | (0.019) |
| Household income by municipality (standard deviations) | | 0.094 | 0.128 |
| | | (0.156) | (0.158) |
| Student vulnerability index | | -0.145*** | -0.142*** |
| | | (0.034) | (0.034) |
| Constant | -0.293 | 11.114*** | 10.463*** |
| | (0.266) | (2.950) | (3.001) |
| Observations | 135 | 135 | 135 |
| R-Squared | 0.03 | 0.27 | 0.27 |

**Note**: The instrument used in Column (3) corresponds to the municipal adolescent labor rate (the first stage can be seen in Table A.1 in the appendix). Clustered standard errors at the municipal level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. **Source**: Produced by the author using data from the National Socioeconomic Characterization Survey, the National Board of School Assistance and Scholarships, the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption, and the National Statistics Institute (2019).

with a high presence of adolescent employment.

# 7 Discussion and Final Remarks

This study has explored the relationship between adolescent drug use and crime rates at the municipal level in Chile. Using data provided by the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption and the Criminal Analysis Study Center, I have identified a statistically significant positive relationship between the use of hard drugs, such as cocaine, base paste, and inhalants, and the number of crimes per hundred thousand inhabitants in Chilean municipalities.

These results have persisted even after controlling for socioeconomic factors such as household income levels, multidimensional poverty, and household income by municipality, suggesting that the relationship between adolescent drug use and crime cannot be explained solely by economic variables. Additionally, I employed an instrumental variables approach to address potential endo-

geneity issues, and these results support the notion that adolescent drug use has a substantial impact on crime rates.

These findings have important implications for public policy formulation aimed at addressing adolescent drug use in Chile. The need to tackle this issue at the municipal level becomes evident, especially in municipalities with a high prevalence of student labor. This underscores the importance of considering the existing heterogeneity across the country when developing prevention and treatment strategies.

In summary, this study contributes to our understanding of the complex relationship between adolescent drug use and crime rates, highlighting the importance of addressing this challenge from a local perspective to effectively inform public policies aimed at reducing drug use and crime among adolescents in Chile.

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# A Apéndice

**Figure A.1**
Questionnaire on drug consumption in the School Population Drug Study (2019)

ENPE 2019 Questionnaire

**Questions:**
50b. How many times have you used *cocaine* in the past 12 months?
56b. How many times have you used *base paste* in the past 12 months?
61b. How many times have you used *inhalants* in the past 12 months?

**Answers:**

| Never | 1-2 | 3-5 | 6-9 | 10-19 | 20-39 | 40 or more |
|---|---|---|---|---|---|---|
| (0) | (1) | (2) | (3) | (4) | (5) | (6) |

**Table A.1**
Effect of adolescent labor on drug consumption.

| **First Stage: Hard drug consumption (%)** | (1) |
|---|---|
| Adolescent labor rate (percentage) | 0.482*** |
| | (0.055) |
| Municipal multidimensional poverty rate (percentage) | -0.007* |
| | (0.003) |
| Household income by municipality (standard deviations) | -0.037 |
| | (0.037) |
| Student vulnerability index | -0.004 |
| | (0.008) |
| Constant | 0.796 |
| | (0.648) |
| Observations | 135 |
| R-Squared | 0.457 |
| F Test | 24.000 |

**Note**: Clustered standard errors at the municipal level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. **Source**: Produced by the author using data from the National Socioeconomic Characterization Survey, the National Board of School Assistance and Scholarships, the National Service for the Prevention and Rehabilitation of Drug and Alcohol Consumption, and the Criminal Analysis Study Center (2019).