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Young adult substance use following involuntary job loss

Abstract

This paper uses data from the Panel Study of Income Dynamics to study the relationship between job displacement and substance use among young adults. Results show that displacement is associated with increases in the probability of smoking cigarettes and drinking and the intensity of consuming alcohol and marijuana. Men, whites, and those who live with family/friends at the time of displacement are more likely to use hard drugs after job loss. Findings suggest that government policy designed to aid displaced workers should contain provisions to anticipate and respond to substance use disorders that may arise, particularly among younger job losers.

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1 Introduction

The displacement literature has long recognized that the costs of worker dislocation extend far beyond permanent earnings losses and short-run increases in employment instability. Job loss is associated with reductions in health, not only for the affected worker (Schaller & Stevens 2015), but also the person's spouse (Jolly 2022). Displacement increases spousal labor supply (Stephens 2002), the probability of divorce (Banzaf 2018), and it decreases the odds of receiving health insurance coverage (e.g. Jolly & Phelan 2017). This paper uses a sample of young adults between 17 and 28 years old to study the relationship between job displacement and substance use. The results presented in this analysis will, therefore, provide additional evidence on another potential cost of displacement, which is important for designing efficient policies aimed at helping those who suffer from this type of involuntary job loss.

It is possible that job displacement reduces the probability or intensity of substance use. If cigarettes, alcohol, and other drugs are normal goods, then the earnings losses associated with job loss should reduce consumption of these substances. Job loss that results in unemployment also leads to a reduction in work-related social gatherings where alcohol, and the social pressure to consume alcohol/other substances, is present (Arcaya et al. 2014).

On the other hand, displacement may increase consumption of cigarettes, alcohol, and other drugs. Job loss resulting in unemployment increases the amount of leisure time. To the extent that alcohol and other drug usage is a leisure-time activity, the increase in non-market-based time may lead to increases in substance use (Latif 2014). Latif (2014) notes how unemployment may alter time preferences towards the present, which may lead to increased substance use as individuals place less weight on the future health effects of such usage. Labor market instability correlates to weak ties to conventional institutions, such as family and friends, that foster positive behavioral growth (Hartnagel 1996). The deterioration of positive social ties may lead to delinquent behavior, such as illicit drug use. The negative mental health effects associated with displacement (Strully 2009; Schaller & Stevens 2015; Jolly 2022) may further lead to the consumption of cigarettes, alcohol, or other drugs, as a coping mechanism. In fact, the earlier literature finds that job displacement increases the probability and/or intensity of substance use, which implies that the mechanisms suggesting that job loss increases substance use outweigh those that would reduce it (Gallo et al. 2001; Falba et al. 2005; Eliason & Storrie 2009a, 2009b; Deb et al. 2011; Browning & Heineisen 2012; Black et al. 2015).¹

We contribute to this literature by using a sample of young adults between 17 and 28 years old. The job displacement literature traditionally focuses on individuals with at least moderate attachment to the labor market, which typically results in the use of samples that are relatively older, on average. This is true of the relevant literature cited above.² Gallo et al. (2001),

1 A large literature exists linking macroeconomic conditions and industrial decline to individual health outcomes and behavior, such as substance abuse. See Latif (2014), Hollingsworth, Ruhm, and Simon (2017), and Seltzer (2020) for extensive reviews of this literature. The earlier literature on the relationship between macroeconomic conditions and health has produced important findings. It lacks, however, in explaining potential underlying mechanisms as to exactly what leads to changes in health behavior and health outcomes during poor times. The reason for this is that, as noted by Arkes (2007, 2012) it does not link individual-specific events to individual-level outcomes.

2 The literature on macroeconomic conditions and substance abuse also typically focuses on samples of relatively older individuals. Arkes (2007, 2012) and Autor, Dorn, and Hanson (2019) are three exceptions. Using the National Longitudinal Survey of Youth 1997 (NLSY97), Arkes (2007) shows that marijuana and cocaine use increase during a weak economy as measured by state unemployment rates. Arkes (2012) shows that cigarette use among 15 to 24-year-olds increases during a poor economy. Autor et al. (2019) examine how increased exposure to international trade from China impacts marriage, fertility, and childhood outcomes for young adults aged 18 to 39. The authors find that men experience more deaths related to drug, alcohol, and HIV infections after trade shocks relative to women. Autor et al. (2019) note that the increase in HIV infections may be related to a rise in intravenous drug use associated with job loss.

Falba et al. (2005), and Deb et al. (2011) use data from the Health and Retirement Study, which is a sample of individuals who are at least 50 years old. The average age in Black et al.'s (2015) and Eliason and Storrie's (2009a) samples is 41 years old. Although Eliason and Storrie (2009b) do delineate their sample into age ranges of 20 to 34, 35 to 49, and 50 to 64, even the youngest age in their sample is only one year younger than the average age used here.

Estimating the relationship between job loss and substance use is important regardless of age because it aids in understanding the total costs associated with displacement. However, it is particularly important to understand this effect for younger workers, as cigarette, alcohol, and other drug use at young ages increases the likelihood of developing substance dependency and health problems, such as cancer, high blood pressure, liver cirrhosis, and mental disorders, later in life (Hartnagel 1996; Latif 2014). Additionally, substance use and dependency among young adults may lead to long-lasting developmental challenges as they transition into adult roles, such as marriage and parenting, for which they are not fully prepared, making it difficult to advance through their careers or complete formal education (Kelly and Vuolo 2018). Hartnagel (1996) notes how young drug abusers have difficulties coping with traditional adult roles. Finally, substance use and dependency at young ages may lead to labor market instability. Some researchers find that marijuana usage leads to lower wages (see Popovici and Frensh 2014 for a review). Okechukwu et al. (2019) find that marijuana use leads to future layoffs/firings, particularly as the intensity of usage increases. Results here will add to the literature's understanding of a mechanism through which job loss can lead to long-term negative health and developmental outcomes even if the displacement occurs while younger.³

An additional contribution of the analysis presented below is the focus on multiple substances, not just cigarettes and alcohol. The substances investigated here include traditional cigarettes (i.e. not electronic cigarettes), alcohol, marijuana, amphetamines, cocaine, barbiturates, tranquilizers, non-over-the-counter pain relievers (not including heroin), and narcotics. To our knowledge, not only is this the first paper to investigate displacement's potential effect on a broad range of substances across a single sample, but also it is the first try to link young adult involuntary job loss to the use of hard drugs such as amphetamines and narcotics. Hollingsworth et al. (2017) note how drug poisoning deaths increased 146 percent between 1999 and 2014. Therefore, results from this analysis will help in identifying a potential source that leads to hard illicit drug usage and the rise in death associated with it.

Results from the analysis show that the probability of smoking cigarettes and drinking alcohol, the number of alcoholic drinks per drinking session, and the number of times marijuana is used increases significantly after initial displacement. There is some heterogeneity based on gender, race, and whether someone is responsible for their own household at the time of job loss. Non-white job losers are more likely to begin smoking and consume more alcohol relative to their white counterparts; females are more likely to begin drinking compared to men. However, men and white workers are more likely to report using intense drugs such as cocaine and narcotics after job loss. Evidence suggests that women and non-whites experience somewhat worse labor market outcomes post-displacement when compared to men and

3 In fact, relative to older individuals with strong labor market attachments, little is known about the experiences of young adults suffering from involuntary job loss. Some research on labor market and health insurance outcomes following displacement does exist (Kletzer and Fairlie 2003; Jolly and Phelan 2015, 2017; Barnette, Odongo, and Reynolds 2020; Krolkowski, Zabek, and Coate 2020). Therefore, the results presented here will help add to the growing body of evidence of how involuntary job loss influences young adults and their health.

white job losers. Therefore, men and white workers may have an easier time affording expensive substances.

The paper proceeds by presenting the empirical model and describing the data used in the analysis. Section 3 discusses the results, Section 4 presents a series of tests for robustness of the main results, and Section 5 offers concluding remarks.

2 Data and Methodology

The data for this study come from the 2005 to 2019 survey waves of the Panel Study of Income Dynamics (PSID). The PSID began in 1968 and interviewed families and their split-offs (for example, children who grew up and formed their own families) annually until 1997, after which the survey became biennial. Therefore, while the period analyzed here spans 15 years, data exist from eight surveys. The PSID contains two supplemental surveys that specifically focus on young individuals. The first is the Child Development Supplement (CDS), which began in 1997 and focuses on children 12 years old and younger. The CDS gathered information on up to two children per household from the 1997 main PSID survey. The PSID follows these children until they turn 18 years old. Once the children turn 18, they transition to the second supplemental survey, called the Transition to Adulthood Supplement (TAS). The TAS focuses on those between 18 and 28 years old. An individual can be 17 and participate in the TAS as long as that person turns 18 during the calendar year. We use data specifically from the TAS for this paper. Our main sample includes young adults who were originally members of a family that responded to the main 1997 PSID survey and are between 17 and 28 years old during the survey period. To be included in the sample, individuals must respond to at least two surveys.

The general form of the estimated equation used throughout the analysis is

$$y_{it} = x'_{it}\beta_1 + \delta_1 D_{it}^{k \geq 0} + \alpha_i + \gamma_t + u_{it}. \quad (1)$$

Here, y_{it} is a measure of substance use for person i in period t . We examine displacement's potential effect on four specific substances: cigarettes, alcohol, marijuana, and non-over-the-counter pain relievers/narcotics. The PSID started gathering data on pain reliever/narcotics in 2015. Therefore, we only use the last three waves of the PSID when studying that drug. All years of the PSID are available for the other substances. We investigate substance use at the extensive and intensive margins. For the extensive margin, y_{it} is binary (use or not), and for the intensive margin, y_{it} will be a measure of how much of the substance is consumed in a given period. For the extensive margin, we estimate equation (1) as a linear probability model. When y_{it} measures the intensive margin, we restrict the sample to those who consume the substance.

We estimate equation (1) three times for alcohol usage. For the extensive margin, y_{it} equals one if the respondent currently uses alcohol and zero otherwise. The PSID also asks about the respondent's drinking frequency for those who report that they consume alcohol. For this type of intensive margin, y_{it} equals one if the respondent drinks at least several times per month and zero if the frequency is once per month or less. Finally, the PSID asks about the number of drinks a person consumes per drinking session.

Focusing on cigarettes, for the extensive margin, y_{it} equals one if the respondent currently smokes. When examining the intensive margin, the dependent variable equals the number of cigarettes smoked daily. For marijuana, the PSID does not ask if the respondent currently uses

the substance. Instead, the survey asks if the respondent has ever used marijuana. Therefore, when focusing on the extensive margin for marijuana, y_{it} equals one if the respondent reports ever using it and zero otherwise. Marijuana's intensive margin refers to the number of times the respondent used the substance during the previous 12 months. Unlike with alcohol and cigarettes, the PSID records the number of times the individual uses marijuana in intervals, such as 1-2 times, etc. When estimating the relationship between job loss and this measure of marijuana consumption, we replace the ordinal categories with the midpoint of the range.

The TAS gathers information for other substances people may use to cope with the stress involved with a large negative financial shock such as job displacement. These other substances include amphetamines, cocaine, barbiturates, and tranquilizers. Unfortunately, the sample sizes are too small to investigate each of these substances individually. To this end, we combine these drugs into one category and define y_{it} to equal one if an individual ever consumed one of these substances. Throughout, we will refer to this one category simply as *Other Drugs*. We do not investigate the intensive margin for this category of other drugs. As with marijuana, the PSID records consumption of these drugs as an interval response. Adding interval responses together for different categories into one unit of measurement is uninformative.

In equation (1), $D_{it}^{k \geq 0}$ is a job displacement dummy variable equaling one if person i reports an initial job loss in period t and zero otherwise. The superscript k indexes time relative to the first displacement, with period 0 being the survey year of reported job loss. Therefore, $D_{it}^{k \geq 0}$ equals one in every year after the first job loss, including the year of the first report.

The analysis defines displaced workers based on a question asked of all individuals who separated from their employer since the previous survey. The question asks why the separation occurred. If respondents state that the plant closed or they were laid-off/fired, then we classify them as displaced workers. The PSID asks this question for up to five jobs, and we record a displacement regardless from which job the individual reports an involuntary separation. Using this question to define displacement is common in the literature using the PSID (e.g. Stevens 1997; Stephens 2002; Lindo 2010). We require all displaced workers to be in the sample during the survey wave preceding the wave of the first reported job loss. The comparison group contains all non-displaced individuals. Estimates of δ_1 show the average annual effect displacement has on the measures of substance use discussed above. Since data on pain relievers/narcotics only exist starting in 2015, we limit the treatment group to those young adults who report a job loss in the 2017 survey wave or later when studying this substance.

The vector x_{it} contains a quadratic in age, the γ_t is a set of year fixed-effects, and the u_{it} is the random error term. Finally, the term α_i is an individual-specific fixed-effect that accounts for any time-invariant factors that may be correlated with substance use and the probability of experiencing displacement. Accounting for individual-specific fixed-effects is important for three reasons. First, the displacement literature suggests that those who suffer from involuntary job loss are inherently different from those who do not (e.g. Gibbons & Katz 1991). Second, it is possible for substantial measurement error to exist in self reports of substance use. If this measurement error is somehow related to the probability of job loss (i.e. if displaced workers are more likely to misreport their substance use when compared to their non-displaced counterparts), then the estimates will be biased. Finally, given the known health risks associated with substance use, it is reasonable to expect that those who use drugs and alcohol may have a higher risk tolerance relative to those who do not. These individuals may sort themselves into

occupations or industries that face a relatively higher risk of plant closings or laying off workers. Incorporating individual fixed-effects into the analysis accounts for these three factors.

The estimates of δ_1 from equation (1) show the average annual relationship between job loss and the consumption of the various substances investigated here. To understand better the persistence of this relationship, we alter equation (1) as follows:

$$y_{it} = x'_{it}\beta_1 + \sum_{k \geq -m} D_{it}^k \delta_k + \alpha_i + \gamma_t + u_{it}. \quad (2)$$

All variables are as before except for D_{it}^k . Here, D_{it}^k is a set of displacement dummy variables that equal one during each period relative to job loss. For example, D_{it}^0 equals one during the year of the reported initial displacement and zero otherwise. The estimates of δ_k show the inter-temporal effect displacement has on substance use. This equation is common when investigating displacement's potential effects on various outcomes over time (e.g. Jacobson et al. 1993; Couch & Placzek 2010). Importantly, trends in substance use for displaced and non-displaced workers should be equal in the absence of job loss. To assess the validity of the parallel trends assumption, we discuss the pre-displacement coefficients from equation (2) in the results section below.

Even if the parallel trends assumption holds, there are several factors that potentially impede our ability to identify the causal relationship between job loss and substance use. First, job displacement could be associated with differential rates of attrition due to its disruption to various labor market outcomes that could lead to survey non-response. Second, since the definition of job displacement used here includes layoffs/firings, and since firms have discretion over who to lay off and fire, the measure of job loss may not be truly exogenous. Furthermore, with this definition of job loss, reverse causality is possible. It is reasonable to expect that drug and alcohol usage leads to excessive absenteeism, which could be a potential cause of termination. Finally, as alluded to above, it is possible that displaced and non-displaced workers are inherently different in unobservable ways, and these differences may be correlated with the probability of job loss and substance use. If these unobservable characteristics are time-invariant, then α_i accounts for them. However, if these characteristics vary over time, then α_i is insufficient. We explore each of these factors in the robustness section below.

3 Results

3.1 Descriptive Statistics

Table 1 presents descriptive statistics (means and proportions) of selected variables based upon displacement status. We use only the first observation for each individual in the calculations. Traditionally in the displacement literature, researchers calculate descriptive statistics for the displaced sample using only pre-job loss observations, and they calculate statistics for the non-displaced sample using all person-year observations. Because the TAS is a cohort-based survey, the displaced sample artificially appears to be younger and less educated when compared to their non-displaced counterparts when calculating the descriptive statistics in that manner. Therefore, we present calculations once using only each person's first observation.

Table 1 shows that displaced and non-displaced young adults are similar in regard to age, current drinking status, the number of drinks per drinking session, proportion employed,

Table 1 Descriptive Statistics (means) of Selected Variables

	Non-Displaced	Displaced
Total Earnings ^{a,b}	\$3,564.65	\$2,218.23
Hours Worked ^b	15.99	21.38
Employed	56.03%	55.29%
Age	19.11	18.77
Female	54.90%	49.93%
White ^c	51.73%	36.51%
Responsible for Own Household	15.17%	15.13%
Education		
< High School	15.39%	13.86%
High School Degree/GED	23.97%	29.79%
Some College/Associates Degree	57.76%	56.12%
High School Plus Another Degree (not college)	0.12%	-
Bachelor's Degree	2.51%	0.23%
Master's Degree	0.25%	-
Currently Smoke	12.72%	21.77%
Number Cigarettes/Day	7.55	8.80
Currently Drink Alcohol	48.58%	46.50%
Drink at Least Several Times/Month	52.48%	50.43%
Number Drinks/Session	3.58	3.65
Ever Used Marijuana	40.17%	45.98%
Number of Uses of Marijuana previous 12 Months ^d	12.61	14.33
Ever Used Amphetamines, Cocaine, Barbiturates, or Tranquilizers	15.81%	15.95%
Ever Used Pain Relievers/Narcotics	30.32%	34.43%
Number of Uses of Pain Relievers/Narcotics previous 12 Months ^d	5.34	6.17
Total Number of Individuals	2,288	747

Notes: Sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. All calculations are means/proportions of selected variables. All years are used in the calculations. However, calculations only use the first observation in which an individual is observed.

a – Real 2018 dollars; b – equals the total across all five jobs; c – represents the modal report for race; d – midpoint of the range is used in the calculation

proportion responsible for their own household (i.e. not living with family/friends), and the proportion that report using amphetamines, cocaine, barbiturates, or tranquilizers. However, the displaced tend to have less education relative to the control group of non-displaced workers, and job losers are also less likely to be female and white. Those who eventually experience involuntary job loss work more hours per week and have higher rates of cigarette and marijuana use along every dimension. Furthermore, those who eventually experience displacement are more likely to report using pain relievers/narcotics. Given that the calculations in Table 1 restrict the displaced group to an observation that occurs pre-job loss, these statistics highlight the importance of using individual-level fixed-effects in the estimated equations presented above.⁴

⁴ When using all person-year observations to calculate averages across all substances, we find that usage increases at the extensive margin but not at the intensive margin regardless of displacement status. In other words, as young adults get older, they are more likely to begin using different substances; however, the intensity of usage remains relatively constant over time. This finding is in line with Kelly and Vuolo (2018) who mention that a characteristic of young adulthood is self-exploration, where part of this exploration process involves substance use.

3.2 Labor Market Outcomes

The analysis starts by examining the relationship between displacement and earnings and employment probabilities for young adult workers. Doing so is important. The earlier literature on displacement and substance use for older adults attributes the increase in alcohol and cigarette consumption to the financial stress caused by persistent earnings losses and employment instability associated with job loss. Therefore, it is important to understand if these young individuals experience the same types of labor market outcomes associated with displacement as with the traditionally older samples. If they do, then poor labor market outcomes associated with job loss could explain any increase in substance use among this younger demographic.

Results in panel A of Table 2 come from equation (1) when using real annual labor earnings, the log of annual earnings, and an employment binary variable as dependent variables. The table only presents the coefficient associated with the displacement dummy variable. The row labeled *After* refers to all post-displacement periods, including the year of the first reported job loss. The other coefficients are available upon request. We use both the level and natural

Table 2 Displacement's Effect on Labor Market Outcomes

	Earnings	Log Earnings	Employed
Panel A: Average Annual Effect			
After	-4,285.556*** (733.586)	-0.754*** (0.144)	-0.134*** (0.020)
R ²	0.17	0.16	0.08
N	10,816	8,460	10,816
# Individuals	3,039	2,863	3,039
Panel B: Event History			
At least t-6	2,083.255* (1,242.017)	-0.213 (0.286)	-0.018 (0.041)
t-4	1,721.573** (773.122)	0.364 (0.233)	-0.023 (0.027)
t	-2,745.970*** (624.354)	-0.743*** (0.166)	-0.167*** (0.023)
t+2	-4,545.250*** (957.543)	-0.635*** (0.209)	-0.106*** (0.027)
t+4	-7,065.855*** (1,407.884)	-0.482* (0.260)	-0.070** (0.033)
At least t+6	-8,929.685*** (2,181.589)	-0.399 (0.315)	-0.130*** (0.045)
R ²	0.17	0.17	0.09
N	10,816	8,460	10,816
# Individuals	3,039	2,863	3,039

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The coefficients in panel B are estimated relative to period t-2.

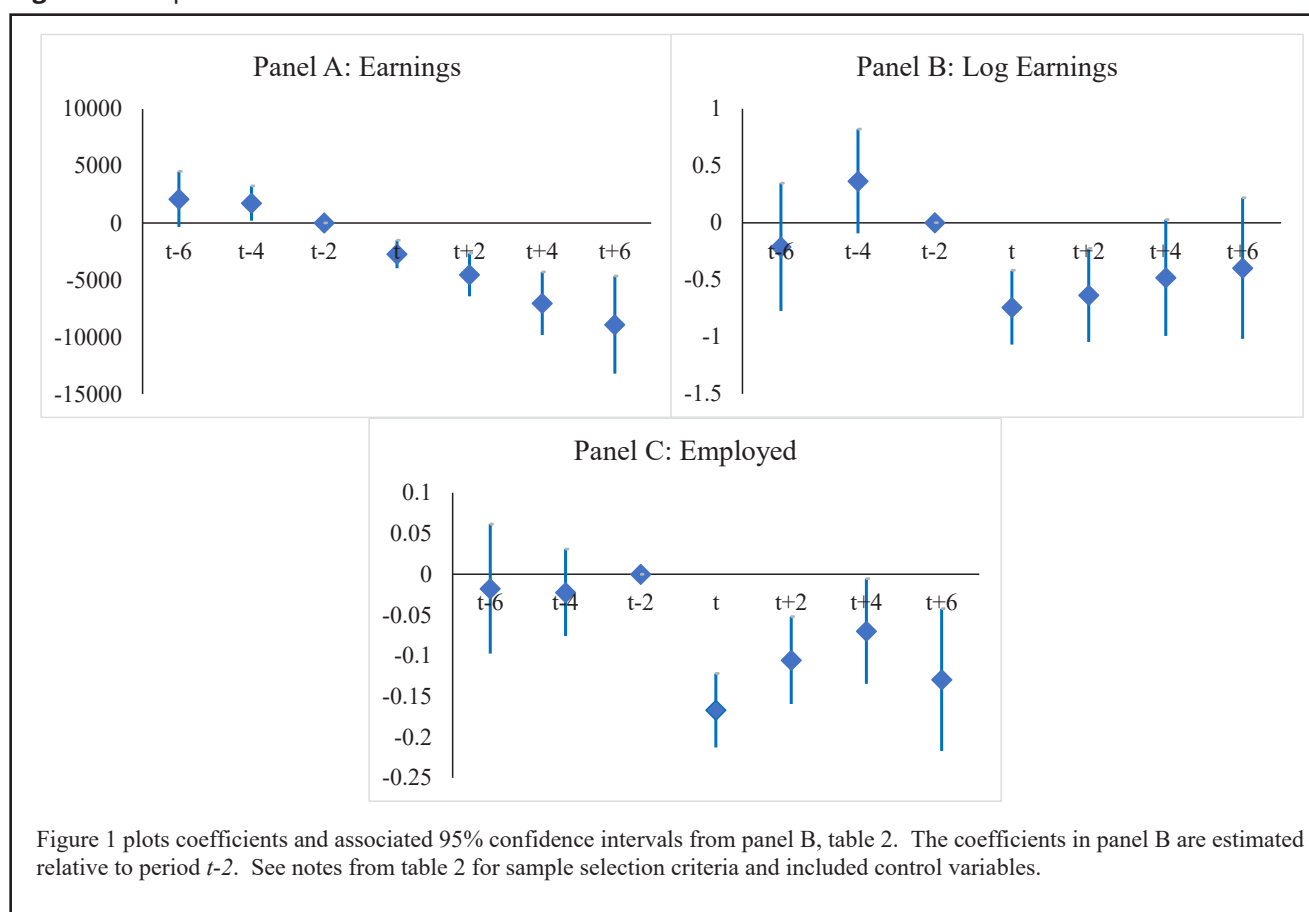
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

log of earnings to allow for labor market withdrawal in response to job loss. Estimates show that displacement does lead to significant declines in earnings and the probability of being employed. Earnings losses amount to approximately \$4,300. The corresponding loss is 53 percent when using the natural log of earnings. The displaced are also 13 percentage points less likely to be employed following job loss relative to their non-displaced counterparts.

The bottom panel of Table 2 presents estimates from the event history analysis shown in equation (2). As in panel A, only the coefficients associated with the displacement variables are shown. Here, the rows labeled *At least t-6* through *At least t+6* represent time relative to the first reported job loss, where period t is the year of displacement. Here, two years before displacement is the reference period. For ease of visualizing these results, we present graphs of these coefficients, along with a 95-percent confidence interval, in Figure 1.

Results suggest that earnings losses and declines in the probability of employment occur during the year of reported separation and remain significant for the entire follow-up period. The only exception to this is the coefficient for period $t+6$ in the log earnings equation. These results do suggest that job loss at younger ages is a true labor market shock as the pre-displacement coefficients for log earnings and employment are statistically insignificant. The pre-displacement coefficients associated with the real earnings regression are statistically significant. However, the coefficients are stable over time leading up to job loss and positive, suggesting that the group of job losers earn more than the comparison group pre-displacement.

Figure 1 Displacement's Effect on Labor Market Outcomes.



3.3 Displacement's Relationship with Substance Use

Table 3 presents estimates of displacement's potential relationship with substance use from equation (1). Panel A focuses on the probability of using particular substances. Results indicate that young adult job loss is statistically unrelated to the probability of using marijuana, narcotics/pain relievers, and other drugs such as amphetamines, cocaine, barbiturates, or tranquilizers. Each coefficient is relatively small in magnitude. In fact, the estimates for marijuana and pain relievers are negative. Displacement is statistically related to the probabilities of smoking and drinking. Involuntary job loss increases the probability of being a current smoker by 3.2 percentage points and a current drinker by 3.1 percentage points. Each estimate is significant, and each is economically large. The last row in panel A shows the average of the dependent variable during the pre-displacement period. Using this average as a base, the coefficients represent a 14.5 percent increase in the probability of smoking and a 5.6 percent increase in the probability of being a current drinker.

Panel B provides estimates of substance use at the intensive margin using equation (1). During this part of the analysis we restrict the sample to those who report using the substance in question. Recall that we do not estimate the effect of displacement on the intensity of using the *Other Drug* category because this category combines several drugs together, and the PSID measures usage of these drugs using interval responses. Results suggest that young adult job loss is unrelated to the number of cigarettes smoked per day, the probability of drinking several times per month, and the number of times one uses pain relievers/narcotics during the previous

Table 3 Displacement's Effect on Substance Use

Panel A: Extensive Margin					
	Currently Smokes	Currently Drinks	Ever Use Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/Narcotics
After	0.032** (0.013)	0.031* (0.018)	-0.016 (0.015)	0.010 (0.014)	-0.003 (0.037)
R^2	0.00	0.11	0.06	0.03	0.06
N	10,790	10,781	10,759	10,759	4,486
# People	3,039	3,039	3,039	3,039	2,004
Avg. Pre-Job Loss	0.22	0.55	0.47	0.18	0.40
Panel B: Intensive Margin					
	# Cigarettes per Day	Drinks Several Times per Month	# Drinks per Session	# Times used Marijuana past 12 Months	# Times used Pain Relievers/Narcotics past 12 Months
After	0.341 (0.551)	-0.030 (0.026)	0.463*** (0.128)	1.967** (0.827)	-2.167 (1.879)
R^2	0.02	0.05	0.03	0.03	0.04
N	1,721	6,883	6,825	5,320	1,419
# People	748	2,516	2,509	2,019	978
Avg. Pre-Job Loss	8.20	0.56	3.48	14.13	6.34

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

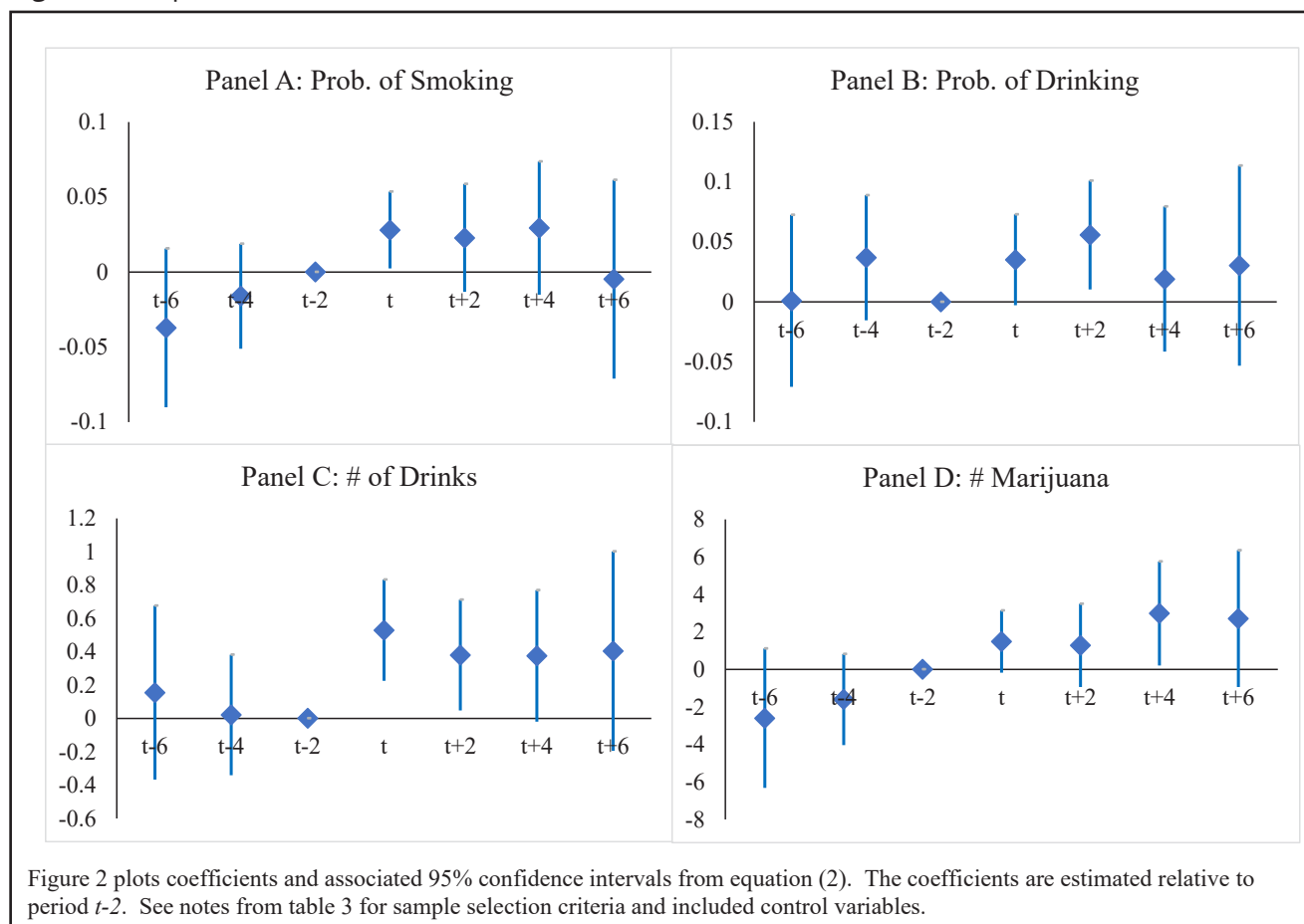
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

12-month period. In fact, the estimates for drinking several times per month and narcotics are negative. Displacement is statistically related to increases in marijuana usage and the number of drinks consumed per drinking session. The estimates are economically large, representing a 13 percent increase in the number of drinks per session and a 14 percent increase in marijuana usage when using the pre-job loss averages presented in the final row of panel B.

The results in Table 3 show that young adult job loss is statistically related to the probability of smoking, the probability of drinking, the number of drinks consumed while drinking, and the number of times marijuana is consumed during the previous 12 months. To explore the dynamic relationship between job loss and these four measures of substance use, we re-estimated equation (2) using these four measures as dependent variables. Results are presented graphically in Figure 2. Tables of the coefficients are available in appendix Table A-1.

Focusing on the probability of smoking, the results in Figure 2 suggest that the effect of displacement is immediate, occurring during the year of job loss. While the estimates during periods $t + 2$ and $t + 4$ lose precision, the coefficients remain elevated relative to those in the pre-job loss period, suggesting a medium-run effect of displacement on smoking. Figure 2 shows a similar result for the number of times marijuana is used. The effect of displacement is immediate, with the estimate during the year of job loss being significant at the 10-percent level. Unlike the case for smoking, the post-displacement coefficients associated with marijuana consumption grow over time, suggesting more of a long-run effect.

Figure 2 Displacement's Effect on Substance Use.



The causal evidence of the relationship between displacement and the probability of drinking is less convincing. The coefficients in periods t and $t + 2$ are significant. However, they are similar in magnitude to the coefficient in period $t - 4$. We observe stronger evidence with regards to the number of drinks consumed per drinking session. There is a statistically significant increase in the number of drinks consumed during the year of job loss. The post-displacement coefficients all remain high relative to those in the pre-job loss period, and they are significant until period $t + 4$. Therefore, while displacement *may* increase the probability of drinking, the evidence suggests that job loss does increase the intensity of alcohol consumption.

Thus far, the results show that young adult involuntary job loss is associated with long-run reductions in the probability of employment, averaging 13.4 percentage points. Results further show that displacement among young adults increases the probability of smoking and drinking, and the intensity of alcohol and marijuana consumption. It is natural to ask whether substance use after job loss leads to larger reductions in the probability of employment. We investigate this in two ways. First, we split the displaced sample into five separate groups based upon substance use at the time of job loss: those who smoke cigarettes, those who drink, and those who report ever using marijuana, pain relievers/narcotics, and other drugs. We then estimate equation (1) once for each treated group. The control group is the same for each regression. The dependent variable is the employment dummy variable. Results are available in panel A of appendix Table B-1 and provide mixed evidence with regards to substance use leading to larger employment losses. Post-displacement employment losses are larger than 13.4 for those who smoke during the survey of the reported job loss, who have ever used pain relievers, and for those who have ever used other drugs. Employment losses are smaller than average for current drinkers and those reporting ever consuming marijuana. Importantly, however, the estimates in appendix Table B-1 are all close in magnitude to those in Table 2. To facilitate meaningful comparisons to non-users at the time of job loss, we present estimates in panel B of appendix Table B-1 for those who report not using substances during the year of displacement.

The second way we investigate whether substance use leads to larger employment losses is by examining changes in substance use patterns. Specifically, we limit the treatment group to those who did not use substances during the survey wave prior to job loss but began using substances during the year of displacement. Results are in panel A of appendix Table B-2 and, again, offer mixed evidence. Those who start smoking, using marijuana, and pain relievers/narcotics have larger declines in the probability of employment relative to the average reported in Table 2. However, those who start drinking or using other drugs report smaller employment losses. As with appendix Table B-1, however, the estimates are similar to that in Table 2. Again, to facilitate meaningful comparisons to those who did not start using substances at the time of job loss, we present estimates in panel B of appendix Table B-2 for those who remain non-users during the wave prior to job loss and the wave of initial displacement.

3.4 Mechanisms

The purpose of this subsection is to investigate the potential mechanisms through which involuntary job loss may lead to increases in substance use among young adults. The first mechanism investigated here is financial support. It is possible that workers have personal savings

and checking accounts that they can access in the event of a job loss. If job losers have an established work history, then they may be able to access government support in the form of unemployment insurance. Finally, young adults may receive financial support from parents or other relatives during times of financial hardship. In fact, 88 percent of the displaced workers in this sample receive some sort of financial support during the survey wave of the first reported job loss. The relationship between financial support and substance use post-displacement is ambiguous. On the one hand, access to additional financial resources may lower the stress associated with job loss, which would decrease the likelihood of substance use as a coping mechanism. On the other hand, additional financial resources may make it easier to obtain cigarettes, drugs, and alcohol after displacement leading to an increase in usage.

To investigate the relationship between financial assistance and post-displacement substance use, we separate the sample of displaced workers into groups based upon whether they received aid during the year of job loss from parents/relatives, the government, or their own resources. Here, relatives provide assistance by helping to pay tuition, rent, or a mortgage, providing a personal loan, or paying for expenses.⁵ Governmental assistance includes Supplemental Security Income, Temporary Assistance to Needy Families (or other sources of welfare), or unemployment insurance. An individual's own resources include savings/checking accounts, owning stocks, mutual funds, investment trusts, money market accounts, government bonds, or certificates of deposit. We then re-estimate equation (1) separately for those who received help from relatives, the government, or their own resources. Results for substance use at the extensive and intensive margins are in Tables 4 and 5, respectively. Note that these financial aid categories are not mutually exclusive. For example, it is possible to receive help from parents/relatives and the government. Sample sizes are too small to focus on exclusively receiving one form of aid. Only 65 displaced workers receive help exclusively from their parents during the year of job loss, and only 19 receive help solely from the government. There are only 231 young adults that rely exclusively on their own resources.

Panel A in Table 4 focuses on displaced workers who receive help from parents/relatives. Results show that those who receive financial assistance from relatives have higher probabilities of smoking after displacement. The coefficient associated with the probability of drinking loses precision; however, this is most likely due to the smaller sample size of the treated group. Those who receive aid from the government are significantly more likely to begin smoking and using amphetamines, cocaine, barbiturates, or tranquilizers. Those who rely on their own resources during job loss are significantly more likely to begin smoking and drinking. When estimates in Table 4 are statistically significant, they are somewhat larger in magnitude when compared to the main results in panel A of Table 3. The only exception to this is the probability of smoking for those who rely on their own financial resources. This provides slight evidence that outside financial assistance may make it easier to afford different drugs and alcohol post-job loss.

Results in Table 5 show that displaced young adults who receive aid from relatives significantly increase marijuana consumption and decrease the probability of drinking several times per month. Receiving aid from the government leads to increases in the number of drinks consumed per session, and displaced young adults relying on their own resources significantly increase the number of drinks per session and their consumption of marijuana. As before,

⁵ This category also includes other forms of financial assistance not specifically defined by the PSID.

Table 4 Displacement's Effect on Substance Use by Type of Support – Extensive Margin

	Cigarettes	Alcohol	Marijuana	Other Drugs	Pain Relievers/ Narcotics
Panel A: Parental Support					
After	0.045** (0.019)	0.035 (0.023)	0.016 (0.020)	0.031 (0.019)	0.054 (0.054)
R^2	0.01	0.11	0.07	0.03	0.06
N	9,221	9,212	9,191	9,191	4,084
# Individuals	2,656	2,656	2,656	2,656	1,843
Panel B: Government Support					
After	0.084** (0.036)	-0.016 (0.048)	-0.043 (0.040)	0.073* (0.038)	-0.068 (0.116)
R^2	0.01	0.11	0.07	0.03	0.06
N	8,138	8,131	8,111	8,111	3,786
# Individuals	2,388	2,388	2,388	2,388	1,728
Panel C: Own Support					
After	0.030** (0.014)	0.040** (0.020)	0.006 (0.017)	0.023 (0.016)	-0.018 (0.039)
R^2	0.00	0.11	0.07	0.03	0.06
N	10,084	10,076	10,053	10,053	4,313
# Individuals	2,857	2,857	2,857	2,857	1,935

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. Parental support is parents/relatives helping to pay for tuition, rent, mortgage, other expenses not defined, or providing a personal loan. Government support includes SSI, TANF, or UI. Own support includes savings/checking accounts, stocks, mutual funds, investment trusts, money market accounts, government bonds, or certificates of deposits.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

when estimates are significant, they are slightly larger in magnitude compared to the main findings in panel B of Table 3. This is particularly true for marijuana consumption. Again, this provides transient evidence that financial assistance from outside resources can make affording substances easier after displacement, leading to increased usage. The exceptions to this are drinking after displacement when receiving aid from relatives or relying on one's own savings.

The final mechanism investigated here is the state of the economy at the time of displacement. Prior research shows that those who experience involuntary job loss during declining economic activity experience worse labor market outcomes relative to those who suffer displacement during expansions (e.g. Couch, Jolly, & Placzek 2011). Greater labor market instability may lead to higher rates of substance use for the reasons discussed in the introduction. To this end, we re-estimate equation (1) after limiting the treatment group to those displaced workers who experience an increase in their state's unemployment rate between the period two years before job loss to the year of displacement. We do not provide estimates for using pain relievers here. Recall that data on the usage of pain relievers only exists for three surveys, 2015, 2017, and 2019. During this period, there are only 14 displaced workers who experience an increase in the state unemployment rate and have data available on using pain relievers.

Table 5 Displacement's Effect on Substance Use by Type of Support – Intensive Margin

	# Cigarettes	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana in Previous 12 Months	# Times Used Pain Relievers in Previous 12 Months
Panel A: Parental Support					
After	0.614 (0.834)	−0.067* (0.035)	0.214 (0.152)	3.147*** (1.129)	−1.313 (2.667)
R^2	0.03	0.05	0.04	0.03	0.04
N	1,359	5,958	5,908	4,544	1,291
# Individuals	608	2,190	2,184	1,749	894
Panel B: Government Support					
After	0.539 (1.009)	0.066 (0.060)	0.679** (0.334)	2.389 (1.615)	−3.034 (2.231)
R^2	0.03	0.06	0.03	0.02	0.05
N	1,097	5,181	5,135	3,877	1,180
# Individuals	506	1,941	1,934	1,543	829
Panel C: Own Support					
After	0.034 (0.636)	−0.036 (0.028)	0.324** (0.135)	2.324** (0.903)	−2.030 (2.136)
R^2	0.02	0.05	0.03	0.03	0.04
N	1,503	6,508	6,455	4,937	1,363
# Individuals	661	2,368	2,362	1,882	939

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. See table 4 and text for descriptions of types of support.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Results from this analysis are in Table 6. When focusing on the extensive margin, the coefficients are somewhat larger than the main results, yet they are insignificant given the smaller size of the treated sample. When focusing on the intensive margin, it appears that displacement during poor economic times leads to a reduction in the probability of drinking several times per month and an increase in the number of drinks consumed when drinking.

3.5 Heterogeneity

The displacement literature suggests that gender and racial differences exist in individual outcomes after involuntary job loss. Jahromi and Callaway (2020) show that there is significant heterogeneity in earnings losses between men and women using the Displaced Worker Survey and a sample of workers with an average age of 42. Furthermore, the authors present evidence suggesting that gender differences are unequal through the earnings distribution. The authors do note that racial differences in earnings losses exist; however, these differences tend to be relatively small. In contrast, Kletzer and Fairlie (1998) show evidence that employment rates among displaced Black workers are significantly lower when compared to their white

Table 6 Displacement's Effect on Substance Use - Declining Economic Activity

Panel A: Extensive Margin				
	Currently Smokes	Currently Drinks	Ever Use Marijuana	Ever Use Other Drugs
After	0.032 (0.027)	0.052 (0.034)	0.018 (0.029)	0.040 (0.029)
R^2	0.00	0.11	0.07	0.03
N	8,585	8,577	8,559	8,559
# Individuals	2,492	2,492	2,492	2,492
Panel B: Intensive Margin				
	# Cigarettes per Day	Drinks Several Times per Month	# Drinks per Session	# Times used Marijuana past 12 Months
After	1.000 (0.949)	-0.077* (0.046)	0.597*** (0.230)	0.344 (1.426)
R^2	0.03	0.06	0.03	0.02
N	1,225	5,503	5,460	4,115
# Individuals	551	2,041	2,035	1,620

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those who experience an increase in their state's unemployment rate between the period before job loss and the year of displacement.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

counterparts. The gender and racial differences in post-displacement experiences may lead to gender and racial differences regarding substance use after involuntary job loss.

Similarly, it is possible that the relationship between job loss and substance use is different between those who are responsible for their own household at the time of displacement and those who reside with relatives or friends. Krolikowski et al. (2020) show that relatively younger displaced workers (those between 25 and 35 years old) experience smaller earnings losses after job loss when they live within the same Census tract as their parents.

This subsection explores heterogeneity in substance use across gender, race, and whether workers are responsible for their own household at the time of job loss. Here, we classify respondents as being responsible for their own household if the PSID identifies them as being a household head or the spouse/cohabitor of the household head. To investigate any potential differences in substance use post-job loss, we alter equation (1):

$$y_{it} = x'_{it}\beta_1 + \delta_1 D_{it}^{k \geq 0} + \varphi_1 D_{it}^{k \geq 0} * group_i + \alpha_i + \gamma_i + u_{it}. \quad (3)$$

Here, the variable *group* defines the group to which a person belongs. When investigating differential effects of displacement by gender, *group* equals one if the person is a female. When examining differences by race, *group* equals one if the respondent reports being white. Finally, to see if the effect of displacement differs by whether or not someone is responsible for their own household, *group* equals one if the individual is a household head or spouse/cohabitor with the household head at the time of job loss.

Table 7 Heterogeneity by Gender

Panel A: Substance Use at Extensive Margin					
	Cigarettes	Alcohol	Marijuana	Other Drugs	Pain Relievers
Men	0.041** (0.020)	0.004 (0.023)	−0.054*** (0.020)	0.043** (0.019)	0.062 (0.052)
Women	0.023 (0.015)	0.057** (0.025)	0.023 (0.021)	−0.024 (0.019)	−0.055 (0.048)
R^2	0.00	0.11	0.07	0.03	0.06
N	10,790	10,781	10,759	10,759	4,845
# Individuals	3,039	3,039	3,039	3,039	2,194
Sig. Different	No	No	1%	1%	10%
Men Avg.	0.275	0.595	0.567	0.208	0.319
Women Avg.	0.173	0.499	0.388	0.164	0.459
Panel B: Substance Use at Intensive Margin					
	Number Cigarettes	Drinks Several Times per Month	# Drinks per Session	# Times used Marijuana	# Times used Pain Relievers
Men	0.058 (0.755)	−0.023 (0.035)	0.635*** (0.187)	2.400** (1.097)	2.252 (3.118)
Women	0.748 (0.584)	−0.038 (0.037)	0.263* (0.152)	1.354 (1.123)	−4.685** (2.158)
R^2	0.02	0.05	0.03	0.03	0.05
N	1,721	6,883	6,825	5,320	1,595
# Individuals	748	2,516	2,509	2,019	1,095
Sig. Different	No	No	No	No	10%
Men Avg.	8.601	0.634	3.827	16.889	3.566
Women Avg.	7.598	0.472	3.091	10.350	7.799

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Results when investigating heterogeneity by gender are in Table 7, by race are in Table 8, and by whether someone lives on their own in Table 9. Panel A in each table investigates substance use at the extensive margin, whereas panel B focuses on the intensive margin. The rows of estimates in each panel represent the total effect of displacement on substance use for the group in question. For example, in Table 7, the row labeled *Men* shows estimates of δ_1 , and the row labeled *Women* presents estimates of $\delta_1 + \phi_1$. The final rows in each panel indicate whether the estimates are statistically different across the groups and each group's pre-treatment average.

We begin this subsection with a brief discussion of differences in labor market outcomes associated with involuntary job loss by gender, race, and living arrangements. Results from estimating equation (3) using various labor market outcomes as the dependent variable are in appendix Table C-1. The results suggest that non-white job losers experience significantly larger

Table 8 Heterogeneity by Race

Panel A: Substance Use at Extensive Margin					
	Cigarettes	Alcohol	Marijuana	Other Drugs	Pain Relievers
Non-White	0.053*** (0.015)	0.045** (0.022)	-0.020 (0.020)	-0.010 (0.016)	-0.052 (0.045)
White	-0.005 (0.021)	0.006 (0.027)	-0.009 (0.021)	0.042* (0.024)	0.094 (0.057)
R^2	0.01	0.11	0.06	0.03	0.06
N	10,783	10,774	10,751	10,751	4,844
# Individuals	3,036	3,036	3,036	3,036	2,193
Sig. Different	5%	No	No	10%	5%
White Avg.	0.298	0.677	0.532	0.360	0.384
Non-White Avg.	0.175	0.466	0.442	0.080	0.407
Panel B: Substance use at Intensive Margin					
	Number Cigarettes	Drinks Several Times per Month	# Drinks per Session	# Times used Marijuana	# Times used Pain Relievers
Non-White	0.635 (0.768)	-0.004 (0.038)	0.669*** (0.160)	2.621** (1.042)	-4.053* (2.203)
White	0.059 (0.668)	-0.060* (0.033)	0.209 (0.187)	1.057 (1.228)	0.626 (3.093)
R^2	0.02	0.05	0.03	0.03	0.05
N	1,717	6,878	6,820	5,317	1,595
# Individuals	747	2,514	2,507	2,018	1,095
Sig. Different	No	No	10%	No	No
White Avg.	9.589	0.628	4.088	13.941	3.566
Non-White Avg.	6.739	0.495	2.945	14.307	7.799

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

earnings losses than their white counterparts do regardless of whether the natural log of earnings or the level of earnings is the dependent variable. While the racial difference in employment probabilities is not significant, the point estimates suggest that non-whites do experience larger declines in the probability of being employed post displacement. When focusing on the natural log of earnings, female earnings losses tend to be statistically similar to male earnings losses. However, women suffer statistically larger earnings losses when examining the level of earnings. This is most likely caused by women leaving the labor market at higher rates relative to men after job loss. The results support this notion. While the gender difference is insignificant, women do have lower probabilities of employment after job loss than men do. The results based on whether displaced workers are responsible for their own household are interesting. Those who live on their own at the time of job loss experience smaller earnings losses relative

Table 9 Heterogeneity by Living Arrangements

Panel A: Substance Use at Extensive Margin					
	Cigarettes	Alcohol	Marijuana	Other Drugs	Pain Relievers
With Others	0.025 (0.015)	0.058*** (0.022)	-0.020 (0.020)	0.035** (0.017)	0.104** (0.051)
On Own	0.040** (0.020)	-0.003 (0.026)	-0.011 (0.021)	-0.021 (0.021)	-0.112** (0.047)
R^2	0.00	0.11	0.06	0.03	0.06
N	10,790	10,781	10,759	10,759	4,845
# Individuals	3,039	3,039	3,039	3,039	2,194
Sig. Different	No	10%	No	5%	1%
On Own Avg.	0.245	0.573	0.498	0.203	0.464
With Others Avg.	0.199	0.518	0.452	0.167	0.333
Panel B: Substance Use at Intensive Margin					
	Number Cigarettes	Drinks Several Times per Month	# Drinks per Session	# Times used Marijuana	# Times used Pain Relievers
With Others	0.769 (0.720)	-0.046 (0.034)	0.457*** (0.155)	1.582 (1.144)	-1.253 (3.352)
On Own	-0.054 (0.696)	-0.012 (0.038)	0.470** (0.194)	2.382** (1.094)	-2.548 (1.971)
R^2	0.02	0.05	0.03	0.03	0.04
N	1,721	6,883	6,825	5,320	1,595
# Individuals	748	2,516	2,509	2,019	1,095
Sig. Different	No	No	No	No	No
On Own Avg.	8.969	0.545	3.536	13.332	6.609
With Others Avg.	7.246	0.571	3.413	15.010	5.957

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. Living on own is defined as being a head of household or a spouse of the head of household during the survey of the reported job loss. Living with others is defined as living with friends or relatives at the time of job loss.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

to those who live with friends or relatives. However, those responsible for their own households are statistically much more likely to be non-employed.

These differing labor market outcomes post displacement may lead to differences in post-job loss substance use patterns. When focusing on cigarettes, Table 7 shows that there is slight evidence that male job losers experience higher probabilities of smoking relative to female job losers. The coefficient for men is double that for women; however, the difference is insignificant. The same can be said for those who are responsible for their own home at the time of job loss. These individuals are slightly more likely to become smokers relative to those who live with friends or relatives; still, the difference is insignificant. Non-white displaced workers, however, are statistically more likely than white job losers (5.3 versus -0.5 percentage points) to become

smokers. Results in panel B of Tables 7 through 9 suggest that there are no differences in smoking intensity by gender, race, or living arrangements.

The degree of heterogeneity is higher when focusing on alcohol consumption. At the extensive margin, displaced women have a higher probability of drinking compared to male job losers. While the gender gap is insignificant, the point estimate for women is 14 times larger than for men (a significant 5.7 percentage point increase for women job losers versus an insignificant 0.4 percentage point increase for male job losers). A similar finding occurs with race. The racial gap in drinking probabilities is insignificant; however, it is economically large. The point estimate for white job losers is 0.006 and insignificant, whereas the corresponding estimate for non-whites is 0.045 and significant at the 5-percent level. We do find significant differences in drinking probabilities by living arrangement. Those who live with friends and relatives at the time of job loss are significantly more likely to drink relative to those who are responsible for their own household.

Results show no differences across groups with respect to the probability of drinking several times or more per month. However, a significant racial gap exists with the number of drinks consumed per session. Non-white job losers increase their intensity of drinking by 0.67 drinks per session, whereas displaced white workers drink an insignificant 0.21 drinks more.

For the results focusing on marijuana consumption at the extensive margin, there appear to be no differences in the probability of usage across race or living status. A gender gap does exist. Young adult men experience a significant reduced probability of consuming marijuana, whereas the point estimate for female job losers is statistically insignificant. Therefore, job loss does not seem to increase the probability of usage for young adult women. However, job loss seems to have a negative relationship with the probability of marijuana consumption for men. At the intensive margin, displacement seems to have no differential effects across groups.

The final set of results focuses on responses to displacement with regards to use of harder drugs. Focusing on the other drug category, which contains amphetamines, cocaine, barbiturates, and tranquilizers, we see that men, whites, and those who live with friends and relatives are significantly more likely to use these harder drugs after job loss relative to women, non-whites, and those responsible for their own home at the time of separation, respectively. The same can be said for the probability of using non-over-the-counter pain relievers/narcotics. Each of the estimates based on living status is significant. However, the estimates by gender and race are not. The probability of using pain relievers/narcotics after job loss increases by six percentage points for men and nine points for whites. This contrasts with a *decrease* in the probability of usage for women and non-whites by five percentage points each. These economic differences are rather large. The lack of statistical precision is most likely due to the small sample sizes for this drug. Recall that data on narcotics usage is only available for three surveys. It would be interesting to re-estimate these regressions as more data become available. At the intensive margin, women and non-white job losers use pain relievers significantly less after displacement, whereas the estimates are insignificant for the remaining groups. The gender gap in the number of times a person uses pain relievers is significant.

To summarize the findings presented in this subsection, women and non-white young adults are more likely to drink, and non-whites increase their drinking intensity after involuntary job loss relative to the respective comparison groups. Non-whites and men are more likely to report being current smokers. Finally, young adult men, whites, and those living with

friends and relatives are much more likely to use hard drugs such as amphetamines, cocaine, barbiturates, tranquilizers, and narcotics/pain relievers after displacement relative to their respective comparison groups.⁶ This last finding is particularly important and supports some of the literature on opioid usage during economic downturns being more problematic for white men relative to other demographics (Hollingsworth et al. 2017; Pierce and Schott 2020; Seltzer 2020).

There are a few potential reasons for these differences in substance use patterns. First, evidence presented here suggest that men and whites experience smaller earnings losses relative to women and non-whites. Furthermore, men and whites experience smaller reductions in the probability of employment. Harder drugs tend to be more expensive relative to alcohol. Therefore, it may be the case that whites and men are able to afford these substances after job loss more easily relative to women and non-whites. While there is some evidence that those living with friends and relatives at the time of displacement experience larger earnings losses when compared to those responsible for their own household, those living with friends/relatives may not need to pay for housing and food to the same extent. Therefore, these individuals may still be able to afford these hard drugs because overall disposable income may be higher. The second potential explanation relates specifically to gender. Ringel, Ellickson, and Collins (2007) note how society may view female hard drug use negatively. Therefore, women may be more likely to turn to alcohol as a coping mechanism relative to the hard drugs examined here in order to avoid a negative social stigma associated with female hard drug use.

4 Robustness and Reverse Causality

4.6 Attrition

Individuals must respond to at least two surveys to be in the sample. Further, displaced workers must be present in the sample during the survey wave preceding the first reported job loss. Therefore, the sample used here is an unbalanced panel. It is possible that non-random attrition could bias the results from equations (1) and (2) for three reasons. First, the sample used in this paper contains young adults between the ages of 17 and 28. Individuals in this age range may experience high rates of mobility as they transition from living with parents/relatives to living on their own and vice versa. Changes in living status could lead to differential rates of attrition since geographic mobility may lead to an inability of the PSID to follow respondents. What matters here is if job displacement leads to differential rates of moving into or out of relatives' homes. To this end, we estimated equation (1) twice. In the first estimation, the dependent variable equals one if the respondent is responsible for his/her own household and zero otherwise. In the second regression, the dependent variable equals one if the respondent moved into or exited from a relative's house from the previous survey and zero otherwise. The results are in appendix Table E-1 and show that job displacement does not lead to differential probabilities of either living on one's own or transitioning from one living arrangement to another.

⁶ It is possible that differences in substance use at the intensive margin arise because of differences in rates of usage pre-job loss. We replicated the analysis after replacing the dependent variable with the ratio of the yearly measure to the amount consumed during the period two years before job loss. Results are in appendix Table D-1 and are qualitatively similar to those presented in Tables 7 through 9. See the appendix for further detail.

Non-employment and substance use are two additional channels that potentially lead to non-random attrition. Non-employment may lead to survey non-response due to the stress involved with labor market transitions. Substance use may lead to non-random attrition if it leads to an inability or lack of desire to respond to surveys. Above we show that displacement leads to reductions in the probability of employment and increased rates of using some substances. Therefore, displaced workers may face differential rates of attrition if non-employment/substance use lead to differential rates of attrition. To this end we estimated several regressions. The dependent variable in each is binary, equaling one if the respondent attrites from the survey in the following period and zero otherwise. The independent variable of interest in each regression is a dummy for either being employed, being a current smoker, being a current drinker, ever using marijuana, ever using pain relievers/narcotics, and ever using the other drug category described above. Extra control variables include a quadratic in age, year dummies, and individual fixed effects. We do not have data after 2019 and do not know if people attrite from the survey after 2019. Therefore, we do not use observations in 2019 in these regressions. Results appear in appendix Table E-2 and show that employment status and substance use status are statistically unrelated to the probability of attrition. Therefore, even if displacement leads to increased probabilities of substance use and lower probabilities of employment, these differential probabilities do not seem to lead to an increased odds of sample attrition.

As a final way to investigate displacement's effect on the probability of attrition, we estimated equation (1) when defining the dependent variable to equal one if the respondent attrites from the sample in the following survey and zero otherwise. As with the regressions described in the previous paragraph, we exclude observations from 2019. Results are in appendix Table E-3 and show displacement is statistically unrelated to the probability of attrition. Admittedly, this is not a perfect test of the effect of displacement on the probability of attrition. If displacement does lead to higher odds of attrition, then it is reasonable to expect that the displaced workers who remain in our sample may experience better labor market outcomes or smaller instances of substance use relative to those job losers who attrite. This would tend to reduce the magnitude of our estimates and make it harder for us to find an effect.

4.7 Reverse Causality

It is possible that substance use, particularly intense substance use, leads to displacement. While the type of job loss analyzed here is involuntary, it does include layoffs/firings. Firms have discretion over who to lay off/fire. It is reasonable to expect that those who choose to use drugs and alcohol exhibit excessive absenteeism because of either poor health associated with substance use or incapacitation because of being currently under the influence of drugs and alcohol or recovering from a previous day's usage. Excessive absenteeism is a potential cause of termination. Two characteristics of the analysis should help mitigate this concern. First, equation (1) does include individual fixed-effects. These fixed effects should control for any unobservable characteristics that correlate with substance use and the probability of displacement. Furthermore, Stevens (1997) notes how approximately 16 percent of those reporting lay-off/fired are actually fired for cause. It is reasonable to expect that those who are fired for cause exhibit the excessive absenteeism (and other unobservable characteristics that would lead to job loss and substance use) described here.

To the extent that individual fixed-effects and the potentially low proportion of firings for cause do not eliminate this reverse causality, we re-estimate equation (1) after making two important changes. First, we change the dependent variable to a binary variable equaling one if the respondent reports a job loss in the following survey wave. Second, our independent variable of interest becomes one of the measures of usage in the current survey wave. In other words, equation (1) becomes the following: $job\ loss_{it+1} = x'_{it}\beta_1 + \delta_1 substance\ use_{it} + \alpha_i + \gamma_t + u_{it}$. The results from estimating this equation are in appendix Table F-1 and show that current usage at either the extensive, or intensive margins is statistically unrelated to the probability of reporting a job loss in the following survey wave. These results provide evidence that the findings in Table 3 are not capturing substance use leading to job loss.

4.8 Sensitivity Analysis

This subsection analyses the sensitivity of the main results in Tables 2 and 3 to changes in sample selection criteria. Results are in appendix Tables F-2 through F-4. All estimates are from equation (1). Table F-2 focuses on labor market outcomes associated with displacement, Table F-3 investigates substance use at the extensive margin, and Table F-4 analyzes usage at the intensive margin. Each table contains four panels, one for each dimension of sensitivity being investigated. We describe each of these dimensions in turn.

First, the PSID asks about job loss for up to five different jobs. We define a displaced worker as one who reports losing a job due to plant closure or layoff/firing from any of these five jobs. To the extent that young adults consider job 1 more important than job 5, we limit the treated sample to those who only report a displacement from job 1. Typically, the displacement literature only focuses on job loss from the main job. Therefore, this adjustment makes the treated sample appear more similar to those from the literature focusing on relatively older samples. Results from this appear in panel A of each table.

Second, the sample here contains young adults ranging in age from 17 to 28. Teenagers and those in their early 20s may have different labor market attachments than those in their middle- and late-20s. To make certain that treatment and comparison groups are similar, we restrict the entire sample to only those who report being employed during the first survey. Results from this analysis are in panel B of each table. Additionally, we further restrict the sample to those who report working at least 25 hours per week during their first observation. The results from this change in sample selection criteria are in panel C.

Each respondent can attrite from the survey at any time. In fact, the TAS only follows survey participants until the age of 28, after which the PSID moves the individual to the main family interview. Therefore, the sample contains forced attrition. To make certain that identification of the treatment effect is not coming from a particular subset of the treated sample, we limit the treated group to those who are in the treatment window at least between periods $t-2$ and $t+2$. Results from this are in panel D.

Results in the appendix show that altering the sample selection criteria does not affect the estimated effect of displacement on the various labor market outcomes investigated here. Each estimate remains significant and of the same sign as reported in Table 2. When investigating the sensitivity of the estimates for substance use at the extensive margin, results in the appendix show that the effect of job loss on the probability of smoking is quite similar to the main results

in Table 3. The only difference is that the estimate is imprecise when focusing on displacements from the main job. However, the point estimate is the same as that reported in Table 3. The relationship between job loss and the probability of drinking is lower and insignificant in each estimation when compared to the main estimate. However, given that the main estimate is marginally significant at the 10-percent level, this variability is unsurprising. Finally, results in the appendix regarding the number of drinks consumed per drinking session are consistent with the main findings. However, the relationship between job loss and the number of times the respondent uses marijuana is no longer significant, and the point estimate, while consistently positive, varies in size when compared to the main results in Table 3.

4.9 Plant Closures and Propensity Score Matching

This final sub-section examines the sensitivity of the main results to altering the definition of job displacement and the use of an alternative estimator. Specifically, we focus on layoffs that occur through plant closures only and the use of propensity score matching along with equation (1). These analyses are provided to help in further identifying causality.

The displacement literature generally views plant closures as more exogenous than layoffs and firings. This is due to firms not having discretion over who to fire during a plant closure. Therefore, it is common in the literature to provide estimates of the effect of job loss separately by layoffs and plant closures. Unfortunately, in this instance, the sample of young adults losing their jobs because of a firm closure is quite small, equaling 172. This small sample makes it very difficult to draw meaningful conclusions from any analyses. However, for completeness, we replicated most of the analysis after re-defining job loss as that resulting from plant closures only. The results are in appendix G. To summarize the main findings, job loss from a firm closure still results in significant earnings losses and declines in the probability of employment. Plant closures result in no statistically significant positive effects on substance use at either the extensive or intensive margins. However, there is a significant negative effect on the number of times the job loser consumes pain relievers. Female job losers are more likely to drink relative to their male counterparts; however, men consume more alcohol after job loss compared to women. Non-white job losers are more likely to smoke cigarettes, and they are more likely to drink more per session and consume marijuana more intensely relative to white job losers. Finally, those who live on their own at the time of job loss have lower probabilities of not only using pain relievers/narcotics, but also using them less intensely after displacement.

The final sensitivity analysis we conduct is propensity score matching similar to that in Schneider, von Wachter, and Heining (2022). Displaced and non-displaced workers may be inherently different. Not controlling for these differences could lead to biased estimates of the effect of displacement on substance use. When these differences are time-invariant, using individual fixed-effects is appropriate. However, as Schneider et al. (2022) discuss, propensity score matching can be useful if displaced and non-displaced individuals have differential trends. To construct a matched comparison group, define a displacement year as d . Since all displaced workers must be present in the dataset in the survey wave prior to the first reported job loss, then we have seven displacement years, 2007, 2009, 2011, 2013, 2015, 2017, and 2019. For each year d , we match each displaced worker to a non-displaced worker without replacement. We match individuals based on propensity scores calculated from a probit model, where we include

as control variables dummies for baseline survey year, gender, and race, and the following characteristics in period $d - 2$: labor earnings, employment status, a quartic in age, and whether or not someone consumes cigarettes, alcohol, marijuana, or other drugs, and whether someone lives on their own versus with family/friends. As in Schneider et al. (2022), the control group of matched workers can include those who experience displacement in the future. We then alter equation (1) as follows: $y_{itd} = x'_{itd}\beta_1 + \delta_1 D_{itd}^{k \geq 0} + \alpha_i + \gamma_t + u_{itd}$. Here, the subscript d ensures that we are specifically focusing on different displacement-year cohorts. Results from this analysis are in appendix H and are similar to the main results presented in Tables 2 and 3. Relative to the matched control group, displaced workers still experience an increase in the probability of smoking and consume more alcohol per drinking session. The coefficients associated with the probability of drinking and the number of times using marijuana decline slightly and lose significance. However, job losers are now more likely to use amphetamines, cocaine, barbiturates, and tranquilizers post displacement.

With the matched sample of treated and control units described above, it is possible to estimate event history models such as: $y_{itd} = x'_{itd}\beta_1 + \sum_{k \geq -m} D_{itd}^k \delta_k + \sum_{k \geq -m} c_{itd}^k \psi_k + \alpha_i + \gamma_t + u_{itd}$. Here, all variables are as before. The c_{itd}^k are dummy variables representing time relative to displacement year d and are created for all displaced and non-displaced workers. Schneider et al. (2022) note how these c_{itd}^k are important for controlling for potential trends in outcome variables that may exist around cohort years for all workers, displaced and non-displaced. We re-estimated the event history analyses from above. The results are in Figures H-1 and H-2 and are qualitatively similar to the main analysis.⁷

5 Conclusions

This paper investigates the relationship between involuntary job loss and substance use for an under-studied population, young adults between the ages of 17 and 28. Results from the analysis show that young adult displaced workers experience significant earnings losses and reductions in the probability of employment. Negative labor market shocks may lead to behavioral changes to help in coping with stress and other hardships that reduce mental well-being. Results here support that idea. Young adults who suffer from displacement have an increased probability of cigarette smoking and drinking. Furthermore, they tend to drink and use marijuana more intensely. Differences in labor market outcomes post-displacement exist between genders, races, and living status. Men, whites, and those living with friends and relatives experience an increase in the probability of hard drug use after displacement, whereas women and non-whites increase their consumption of alcohol. Aside from differences in labor market outcomes, different social pressures may lead to gender differences in substance use behavior following displacement. Findings regarding hard drug use among white men fit with the broader narrative of this demographic suffering more from opioid usage during downturns and industrial decline (Hollingsworth et al. 2017; Pierce and Schott 2020; Seltzer 2020).

This paper contributes to the literature by focusing on a group of relatively young workers. To our knowledge, not only is this the first paper to investigate displacement's potential effect on a broad range of substances across a single sample, but also we are unaware of any other

⁷ Schneider et al. (2022) include relative year fixed effects because the authors impose a tenure restriction on their sample of treated and control units. Our sample here does not impose any tenure restriction.

study attempting to link young adult involuntary job loss to the use of hard drugs such as amphetamines and narcotics. The results presented here aid in the understanding of a potential mechanism through which substance dependency and abuse can manifest itself over time and may lead to negative labor market outcomes later in life. Findings suggest that government policy designed to aid displaced workers should contain provisions to anticipate and respond to substance use disorders that may arise, particularly among younger job losers.

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Appendix to Accompany Young Adult Substance Use Following Involuntary Job Loss

Appendix A: Displacement's Effect on Substance Use – Event History Analysis

Appendix A-1 Displacement's Effect on Substance Use

	Prob. of Smoking	Prob. of Drinking	# Drinks per Session	# Times Used Marijuana
≤t-6	-0.037 (0.027)	0.001 (0.037)	0.155 (0.266)	-2.604 (1.893)
t-4	-0.016 (0.018)	0.037 (0.027)	0.021 (0.184)	-1.606 (1.239)
t	0.028** (0.013)	0.035* (0.019)	0.529*** (0.155)	1.486* (0.844)
t+2	0.023 (0.018)	0.056** (0.023)	0.380** (0.169)	1.283 (1.131)
t+4	0.029 (0.023)	0.019 (0.031)	0.376* (0.201)	2.987** (1.413)
≥t+6	-0.005 (0.034)	0.030 (0.042)	0.404 (0.305)	2.708 (1.861)
R ²	0.00	0.11	0.03	0.03
N	10,790	10,781	6,825	5,320
# Ind.	3,039	3,039	2,509	2,019

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. Estimates come from equation (2). Coefficients are relative to period $t-2$.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix B: Substance Use and Post-Displacement Employment

Appendix Table B-1 examines whether using specific substances at the time of displacement leads to larger employment losses. Appendix Table B-2 investigates whether starting to use certain substances during the wave of reported job loss leads to larger declines in the probability of employment. See the main manuscript for details on the construction of the various treatment groups. In each case, evidence is mixed.

Appendix Table B-1 The Effect of Substance Use on Employment

	Smoking	Drinking	Marijuana	Other Drugs	Pain Relievers
Panel A: Substance User at $t = 0$					
After	-0.178*** (0.039)	-0.107*** (0.024)	-0.122*** (0.026)	-0.158*** (0.040)	-0.182** (0.071)
R^2	0.09	0.09	0.09	0.09	0.02
N	8,536	9,809	9,475	8,458	4,002
# Individuals	2,484	2,796	2,719	2,463	1,800
Panel B: Not Substance User at $t = 0$					
After	-0.117*** (0.023)	-0.186*** (0.036)	-0.147*** (0.030)	-0.126*** (0.023)	-0.141*** (0.049)
R^2	0.09	0.09	0.09	0.09	0.03
N	10,023	8,750	9,076	10,093	4,268
# Individuals	2,845	2,533	2,608	2,864	1,911

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variable equals one if the respondent is employed and zero otherwise. Additional independent variables include age, age squared, and dummy variables for calendar year. Panel A limits the treatment group to those who are substance users at the time of the reported job loss. Panel B limits the treatment group to those who are not current substance users at the time of job loss. The substance in question is in the column headings.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table B-2 The Effect of Substance Use on Employment

	Smoking	Drinking	Marijuana	Other Drugs	Pain Reliever
Panel A: Non-users in $t - 2$ & Users in $t = 0$					
After	-0.194** (0.084)	-0.088** (0.043)	-0.146** (0.057)	-0.118* (0.061)	-0.171 (0.106)
R^2	0.09	0.09	0.09	0.09	0.02
N	7,962	8,325	8,100	8,056	3,809
# Individuals	2,345	2,443	2,376	2,370	1,729
Panel B: Non-users in $t - 2$ & $t = 0$					
After	-0.111*** (0.024)	-0.176*** (0.040)	-0.128*** (0.031)	-0.130*** (0.024)	-0.145** (0.057)
R^2	0.09	0.09	0.09	0.09	0.02
N	9,857	8,512	8,869	9,855	4,031
# Individuals	2,806	2,474	2,557	2,808	1,815

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variable equals one if the respondent is employed and zero otherwise. Additional independent variables include age, age squared, and dummy variables for calendar year. Panel A limits the treatment group to those who started using substances between the survey before job loss and the survey of the reported job loss. Panel B limits the treatment group to those who remained non-users during the survey before job loss and the survey of job loss. The substance in question is in the column headings.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix C: Displacement's Effect on Labor Market Outcomes – Heterogeneity

Appendix Table C-1 Displacement's Effect on Labor Market Outcome - Heterogeneity

	Log Earnings	Real Earnings	Employed
Panel A: Gender			
Men	-0.816*** (0.184)	-2,988.339*** (983.679)	-0.108*** (0.028)
Women	-0.694*** (0.200)	-5573.236*** (867.409)	-0.161*** (0.028)
R^2	0.16	0.17	0.08
N	8,460	10,816	10,816
# Individuals	2,863	3,039	3,039
Sig. Different	No	5%	No
Panel B: Race			
Non-White	-0.946*** (0.178)	-5,958.624*** (785.528)	-0.151*** (0.025)
White	-0.492** (0.212)	-1481.940 (1177.504)	-0.108*** (0.031)
R^2	0.17	0.17	0.08
N	8,453	10,807	10,807
# Individuals	2,861	3,036	3,036
Sig. Different	10%	1%	No
Panel C: Living Arrangements			
With Others	-0.984*** (0.184)	-5,054.904*** (795.454)	-0.086*** (0.026)
On Own	-0.506** (0.202)	-3360.716*** (1094.889)	-0.193*** (0.030)
R^2	0.17	0.17	0.09
N	8,460	10,816	10,816
# Individuals	2,863	3,039	3,039
Sig. Different	10%	No	1%

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. Living on own is defined as being a head of household or a spouse of the head of household during the survey of the reported job loss. Living with others is defined as living with friends or relatives at the time of job loss.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix D: Relative Levels of Substance Use

It is possible that differences in substance use at the intensive margin arise because of differences in rates of usage pre-job loss. For example, the main analysis finds that non-white job losers increase the number of drinks consumed per drinking session significantly more than white job losers do. As Table 8 shows, this could be due to the fact that non-white job losers average 2.9 drinks before job loss, whereas white job losers average 4.1. To investigate this further, we calculated each displaced worker's yearly usage of certain substances relative to the amount consumed in period $t - 2$. The substances investigated here are the number of cigarettes smoked per day, the number of drinks consumed per drinking session, and the number of times marijuana or pain relievers were consumed during the previous 12 months.⁸

Appendix Table D-1 Heterogeneity - Relative Differences

	# Cigarettes	# Drinks	Marijuana	Pain Relievers
Panel A: Gender				
Men	-0.058 (0.206)	0.306*** (0.100)	0.431 (0.349)	-0.089 (0.638)
Women	-0.076 (0.145)	0.106* (0.062)	0.332 (0.507)	-0.645 (0.475)
R^2	0.04	0.02	0.04	0.06
N	1,263	4,730	2,773	318
# Individuals	458	1,496	896	211
Sig. Different	No	10%	No	No
Panel B: Race				
Non-White	-0.064 (0.147)	0.296*** (0.081)	0.154 (0.311)	-0.285 (0.423)
White	-0.063 (0.231)	0.117 (0.091)	0.735 (0.559)	-0.777 (0.718)
R^2	0.04	0.02	0.04	0.06
N	1,259	4,726	2,773	318
# Individuals	457	1,495	896	211
Sig. Different	No	No	No	No
Panel C: Living Arrangements				
With Others	0.104 (0.220)	0.212*** (0.071)	0.282 (0.365)	-0.422* (0.254)
On Own	-0.230 (0.152)	0.216** (0.104)	0.502 (0.461)	-0.478 (0.780)
R^2	0.04	0.02	0.04	0.06
N	1,263	4,730	2,773	318
# Individuals	458	1,496	896	211
Sig. Different	No	No	No	No

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

⁸ Calculating relative effects is only possible for non-binary dependent variables. For the binary ones, the ratio will always equal one, zero, or be undefined.

For the control group, there is no pre-displacement period. Therefore, we calculated the yearly consumption relative to the amount consumed in the first year we observe the respondent. The results from this are in the table below. The same general pattern of differences across groups tends to hold when compared to the main results in the original analysis.

It is not truly possible to compare the results here to the main results, however. This is due to several factors that complicate this new set of results. First, the choice of pre-displacement period is arbitrary and may not represent an individual's true pre-job loss average. Second, this analysis excludes anyone who was a non-user before displacement since the denominator of the ratio would be zero. Unfortunately, using the average across all pre-displacement periods as the base does not solve either of these issues, particularly if the individual is only in the dataset for one observation pre-job loss. Finally, there is no pre-displacement period for those who never lose their job. This leads to the same complications as for the displaced – the choice of base year is arbitrary and excludes anyone who was a non-user during that specific year.

Appendix E: Differential Rates of Attrition

The results presented below show the relationship between displacement and the probability of living on one's own (i.e. being a household head or a spouse/cohabiter) in column 1 and the probability of transitioning from living with relatives to living on one's own or vice versa in column 2. As the table shows, job loss is statistically unrelated to either of these events. Therefore, any attrition that occurs because of changes in living arrangements does not affect displaced workers in a disproportionate manner and will not bias the results in the paper.

In the manuscript, we document that displacement leads to reduced probabilities of employment and increased odds of using some substances. If employment status/substance use lead to differential rates of attrition, then displaced workers will experience differential rates of attrition, which could lead to biased estimates. We investigated this by estimating several regressions to see if employment status (column 1) or substance use (columns 2 through 6) affect the probability of attrition (see main manuscript for a description). As the results in the table below suggest, neither employment status, nor substance use affect the probability of attrition.

Appendix E-1 Displacement's Effect on Living Arrangements

	On Own	Transition
After	-0.024 (0.015)	-0.017 (0.013)
R^2	0.42	0.09
N	10,816	10,816
# Individuals	3,039	3,039

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix E-2 Non-Random Attrition

	Employed	Current Smoke	Current Drink	Marijuana	Other Drug	Pain Reliever
Attrite	0.006 (0.010)	0.008 (0.016)	-0.015 (0.012)	0.002 (0.013)	0.005 (0.014)	0.000 (0.000)
R^2	0.68	0.68	0.69	0.69	0.69	1.00
N	5,725	5,718	5,716	5,707	5,707	884
# Individuals	1,417	1,417	1,417	1,417	1,417	573

The data come from the 2005-2017 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variable equals one if the individual attrites from the sample in the following period. The main independent variable of interest in each regression is indicated in the column. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

As a final method to investigate non-random attrition, we estimated equation (1) after redefining the dependent variable to equal one if the respondent attrites from the sample. Results appear below and suggest that job displacement does not lead to increased rates of attrition.

Appendix E-3 Displacement's Effect on Attrition

	Attrite
After	0.008 (0.016)
R^2	0.68
N	5,725
# Individuals	1,417

The data come from the 2005-2017 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variable is noted in the column heading. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix F: Robustness and Reverse Causality

In appendix F we analyze the potential for reverse causality and the robustness of the main results to alterations to the sample selection criteria. Appendix Table F-1 presents results examining how substance use leads to a reported displacement in the following survey. Substance use at either the extensive or intensive margin does not appear to be statistically related to involuntary job loss.

In appendix Table F-2, we investigate how sensitive the results for displacement's effect on labor market outcomes are to various alterations to the sample selection criteria. See the main manuscript for detail on these criteria. As the estimates suggest, altering the sample selection criteria does not change the main results presented in Table 2.

In appendix Table F-3 we analyze the sensitivity to the main results presented in panel A of Table 3, the effect of displacement on substance use at the extensive margin. Here, we see that the results for the probability of smoking are consistent with size and significance found in Table 3. There is some variability with the results for the probability of drinking. This is unsurprising given the marginal significance found in the main analysis.

In appendix Table F-4 we investigate the effect of displacement at the intensive margin. The results for the number of drinks consumed per drinking session are consistent with the

Appendix Table F-1 Substance Use's Effect on Displacement

Panel A: Extensive Margin					
	Current Smoke	Current Drink	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/ Narcotics
Job Loss	0.010 (0.022)	−0.012 (0.013)	0.014 (0.014)	0.009 (0.017)	−0.029 (0.026)
R^2	0.01	0.01	0.01	0.01	0.00
N	7,768	7,761	7,755	7,755	2,510
# Individuals	3,038	3,037	3,038	3,038	1,793
Panel B: Intensive Margin					
	# Cigarettes Smoked per Day	Drink Several Times per Month	# Drinks per Session	# Times Used Marijuana in Past 12 Months	# Times Used Pain Relievers in Past 12 Month
Job Loss	−0.001 (0.003)	−0.008 (0.015)	−0.005 (0.003)	0.000 (0.001)	0.000 (0.004)
R^2	0.01	0.01	0.01	0.01	0.02
N	1,263	4,782	4,741	3,631	920
# Individuals	658	2,191	2,179	1,754	761

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table F-2 Sensitivity Analysis - Labor Market Outcomes

	Earnings	Log Earnings	Employed
Panel A: Displaced Main Job			
After	-6,673.086*** (849.543)	-0.863*** (0.245)	-0.406*** (0.033)
R^2	0.17	0.16	0.10
N	10,816	8,460	10,816
# Individuals	3,039	2,863	3,039
Panel B: Employed at Baseline			
After	-4,616.058*** (949.157)	-0.860*** (0.196)	-0.141*** (0.022)
R^2	0.23	0.14	0.12
N	5,781	4,914	5,781
# Individuals	1,695	1,655	1,695
Panel C: Works at Least 25 Hours at Baseline			
After	-4,896.733*** (1,456.795)	-0.836*** (0.203)	-0.179*** (0.030)
R^2	0.12	0.17	0.07
N	4,005	3,589	4,005
# Individuals	989	986	989
Panel D: Displaced Workers Present between $t-2$ and $t+2$			
After	-4,993.206*** (848.074)	-0.886*** (0.167)	-0.117*** (0.024)
R^2	0.17	0.17	0.08
N	10,004	7,802	10,004
# Individuals	2,787	2,617	2,787

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

main findings. There is some variability with the estimates for marijuana consumption, with coefficients ranging from 0.652 to 1.396. Furthermore, the estimates are not significant. This may be due to smaller sample sizes of the treated group.

Appendix Table F-3 Sensitivity Analysis - Substance Use: Extensive Margin

	Currently Smokes	Currently Drinks	Ever Use Marijuana	Ever Use Other Drugs	Ever Use Pain Relievers
Panel A: Displaced from Main Job					
After	0.032 (0.022)	-0.020 (0.027)	-0.075*** (0.025)	-0.011 (0.021)	0.065 (0.068)
R^2	0.00	0.11	0.07	0.03	0.06
N	10,790	10,781	10,759	10,759	4,486
# Individuals	3,039	3,039	3,039	3,039	2,004
Panel B: Employed at Baseline Interview					
After	0.040** (0.017)	0.025 (0.025)	-0.031 (0.020)	0.014 (0.020)	0.057 (0.046)
R^2	0.00	0.09	0.06	0.03	0.06
N	5,767	5,763	5,758	5,758	2,523
# Individuals	1,695	1,695	1,695	1,695	1,147
Panel C: Worked at Least 25 Hours per Week at Baseline Interview					
After	0.049** (0.020)	0.020 (0.026)	-0.012 (0.023)	0.012 (0.024)	0.032 (0.070)
R^2	0.01	0.07	0.06	0.04	0.05
N	3,999	3,996	3,994	3,994	1,098
# Individuals	989	989	989	989	475
Panel D: Displaced Workers Present between $t - 2$ and $t + 2$					
After	0.028* (0.015)	0.019 (0.021)	-0.034** (0.017)	-0.001 (0.017)	0.043 (0.055)
R^2	0.00	0.11	0.06	0.03	0.06
N	9,979	9,970	9,950	9,950	4,132
# Individuals	2,787	2,787	2,787	2,787	1,849

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table F-4 Sensitivity Analysis - Substance Use: Intensive Margin

	# Cigarettes Smoked per Day	Drinks Several Times per Month	# Drinks Consumed per Session	# Times Used Marijuana past 12 Months	# Times used Pain Relievers/Narcotics past 12 Months
Panel A: Displaced from Main Job					
After	1.503* (0.841)	-0.036 (0.046)	0.785*** (0.230)	1.287 (1.371)	-1.451 (2.836)
R^2	0.03	0.05	0.03	0.02	0.04
N	1,721	6,883	6,825	5,320	1,419
# Individuals	748	2,516	2,509	2,019	978
Panel B: Employed at Baseline Interview					
After	0.412 (0.623)	-0.016 (0.035)	0.560*** (0.172)	1.396 (1.134)	-4.750 (3.226)
R^2	0.05	0.05	0.03	0.03	0.05
N	918	3,790	3,762	2,868	765
# Individuals	411	1,432	1,429	1,111	545
Panel C: Worked at Least 25 Hours per Week at Baseline Interview					
After	-0.084 (0.701)	0.008 (0.039)	0.669*** (0.210)	0.652 (1.171)	-3.729 (2.969)
R^2	0.03	0.03	0.04	0.02	0.13
N	758	2,805	2,785	2,186	417
# Individuals	310	885	887	714	286
Panel D: Displaced Workers Present from $t - 2$ and $t + 2$					
After	0.589 (0.665)	-0.055* (0.031)	0.454*** (0.151)	0.824 (0.950)	-1.635 (2.576)
R^2	0.03	0.05	0.03	0.02	0.04
N	1,539	6,362	6,307	4,883	1,315
# Individuals	665	2,299	2,292	1,834	901

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix G: Displaced from Plant Closures Only

The results below are from replicating the entire main analysis after limiting the treatment group to those who experience a job loss from the result of a plant closure.

Appendix Table G-1 Displacement's Effect on Labor Market Outcomes

	Earnings	Log Earnings	Employed
After	-3,635.597*** (1,339.037)	-0.274 (0.262)	-0.137*** (0.040)
R^2	0.17	0.18	0.09
N	8,422	6,505	8,422
# Individuals	2,463	2,297	2,463

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those displaced through plant closure only.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table G-2 Displacement's Effect on Substance Use

Panel A: Extensive Margin

	Currently Smokes	Currently Drinks	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/ Narcotics
After	0.002 (0.024)	0.047 (0.032)	-0.041 (0.030)	-0.023 (0.024)	-0.039 (0.072)
R^2	0.00	0.11	0.07	0.02	0.06
N	8,403	8,395	8,374	8,374	3,907
# Individuals	2,463	2,463	2,463	2,463	1,779

Panel B: Intensive Margin

	# Cigarettes Smoked Per Day	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana in Past 12 Months	# Times Used Pain Relievers Past 12 Months
After	0.047 (0.841)	-0.026 (0.046)	0.137 (0.237)	1.770 (1.694)	-5.535* (2.913)
R^2	0.03	0.06	0.03	0.02	0.04
N	1,156	5,363	5,319	3,991	1,221
# Individuals	531	2,010	2,003	1,580	860

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those displaced through plant closure only.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table G-3 Heterogeneity by Gender

Panel A: Labor Market Outcomes					
	Log Earnings	Real Earnings	Employed		
Men	−0.908** (0.368)	−3,174.104 (2,223.554)	−0.077 (0.055)		
Women	0.225 (0.354)	−4002.388*** (1513.980)	−0.184*** (0.054)		
<i>R</i> ²	0.18	0.17	0.09		
<i>N</i>	6,505	8,422	8,422		
# Individuals	2,297	2,463	2,463		
Sig. Different	5%	No	No		
Panel B: Substance Use at Extensive Margin					
	Currently Smokes	Currently Drinks	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/ Narcotics
Men	−0.001 (0.036)	0.008 (0.041)	−0.061 (0.039)	−0.022 (0.041)	0.047 (0.099)
Women	0.004 (0.031)	0.078* (0.045)	−0.024 (0.042)	−0.024 (0.028)	−0.099 (0.098)
<i>R</i> ²	0.00	0.11	0.07	0.02	0.06
<i>N</i>	8,403	8,395	8,374	8,374	3,907
# Individuals	2,463	2,463	2,463	2,463	1,779
Sig. Different	No	No	No	No	No
Panel C: Substance Use at Intensive Margin					
	# Cigarettes Smoked Per Day	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana in Past 12 Months	# Times Used Pain Relievers Past 12 Months
Men	0.667 (1.294)	−0.054 (0.064)	0.624* (0.365)	2.149 (2.545)	−7.610** (3.573)
Women	−0.743 (0.807)	0.002 (0.065)	−0.347 (0.265)	1.382 (2.152)	−4.688 (3.749)
<i>R</i> ²	0.03	0.06	0.04	0.02	0.04
<i>N</i>	1,156	5,363	5,319	3,991	1,221
# Individuals	531	2,010	2,003	1,580	860
Sig. Different	No	No	5%	No	No

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those displaced through plant closure only.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table G-4 Heterogeneity by Race**Panel A: Labor Market Outcomes**

	Log Earnings	Real Earnings	Employed
Non-White	-0.504 (0.334)	-6,288.925*** (1,392.415)	-0.145*** (0.052)
White	-0.050 (0.406)	546.915 (2510.808)	-0.125** (0.058)
R^2	0.18	0.17	0.09
N	6,501	8,416	8,416
# Individuals	2,296	2,461	2,461
Sig. Different	No	5%	No

Panel B: Substance Use at Extensive Margin

	Currently Smokes	Currently Drinks	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/ Narcotics
Non-White	0.038 (0.030)	0.048 (0.041)	-0.049 (0.040)	-0.018 (0.031)	-0.082 (0.085)
White	-0.060 (0.037)	0.048 (0.047)	-0.034 (0.041)	-0.041 (0.038)	0.060 (0.129)
R^2	0.00	0.11	0.07	0.02	0.06
N	8,398	8,390	8,369	8,369	3,906
# Individuals	2,461	2,461	2,461	2,461	1,778
Sig. Different	5%	No	No	No	No

Panel C: Substance Use at Intensive Margin

	# Cigarettes Smoked Per Day	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana in Past 12 Months	# Times Used Pain Relievers Past 12 Months
Non-White	-0.013 (1.351)	-0.012 (0.067)	0.468 (0.325)	5.123** (2.483)	-5.342 (4.714)
White	0.223 (1.032)	-0.039 (0.063)	-0.294 (0.318)	-2.184 (1.988)	-5.776** (2.575)
R^2	0.03	0.06	0.04	0.03	0.04
N	1,152	5,359	5,315	3,988	1,221
# Individuals	530	2,009	2,002	1,579	860
Sig. Different	No	No	10%	5%	No

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those displaced through plant closure only.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table G-5 Heterogeneity by Living Arrangements**Panel A: Labor Market Outcomes**

	Log Earnings	Real Earnings	Employed
With Others	−0.838** (0.338)	−5,882.592*** (1,195.762)	−0.127*** (0.047)
On Own	0.669* (0.385)	201.614 (2794.817)	−0.153** (0.069)
<i>R</i> ²	0.18	0.17	0.09
<i>N</i>	6,505	8,422	8,422
# Individuals	2,297	2,463	2,463
Sig. Different	1%	5%	No

Panel B: Substance Use at Extensive Margin

	Currently Smokes	Currently Drinks	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Relievers/ Narcotics
With Others	0.004 (0.028)	0.053 (0.040)	−0.072** (0.034)	0.003 (0.030)	0.068 (0.101)
On Own	−0.001 (0.042)	0.036 (0.049)	0.012 (0.054)	−0.067* (0.040)	−0.161* (0.097)
<i>R</i> ²	0.00	0.11	0.07	0.02	0.06
<i>N</i>	8,403	8,395	8,374	8,374	3,907
# Individuals	2,463	2,463	2,463	2,463	1,779
Sig. Different	No	No	No	No	10%

Panel C: Substance Use at Intensive Margin

	# Cigarettes Smoked Per Day	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana in Past 12 Months	# Times Used Pain Relievers Past 12 Months
With Others	0.879 (1.199)	−0.067 (0.059)	0.084 (0.268)	1.696 (2.148)	−0.860 (1.539)
On Own	−1.190 (0.795)	0.041 (0.068)	0.225 (0.431)	1.901 (2.649)	−13.398** (5.556)
<i>R</i> ²	0.03	0.06	0.03	0.02	0.05
<i>N</i>	1,156	5,363	5,319	3,991	1,221
# Individuals	531	2,010	2,003	1,580	860
Sig. Different	No	No	No	No	5%

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. The treatment group is limited to those displaced through plant closure only.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix H: Propensity Score Matching

The results presented in this appendix come from the sample of job losers matched to a set of non-displaced workers. The first table below replicates the calculations for the descriptive statistics presented in Table 1 of the paper for the matched treated and control groups.

Appendix Table H-1 Descriptive Statistics (means) of Selected Variables

	Non-Displaced (matched)	Displaced (matched)
Total Earnings ^{a,b}	\$3,094.56	\$2,214.53
Hours Worked ^b	18.43	21.14
Employed	54.13%	55.35%
Age	18.93	18.78
Female	53.59%	50.20%
White ^c	35.86%	36.40%
Responsible for Own Household	15.02%	14.88%
Education		
< High School	13.86%	13.69%
High School Degree/GED	23.41%	29.700%
Some College/Associates Degree	61.14%	56.38%
Bachelor's Degree	1.36%	0.23%
Master's Degree	0.23%	-
Currently Smoke	18.94%	21.65%
Number Cigarettes/Day	8.49	8.72
Currently Drink Alcohol	44.25%	46.55%
Drink at Least Several Times/Month	50.15%	50.29%
Number Drinks/Session	3.71	3.64
Ever Used Marijuana	43.55%	46.07%
Number of Uses of Marijuana previous 12 Months ^d	11.82	14.4
Ever Used Amphetamines, Cocaine, Barbiturates, or Tranquilizers	16.42%	15.86%
Ever Used Pain Relievers/Narcotics	27.93%	34.43%
Number of Uses of Pain Relievers/Narcotics previous 12 Months ^d	9.39	6.17
Total Number of Individuals	739	739

Notes: Sample is the matched treatment and control units. See main text for description of matching procedure. All years are used in the calculations. However, calculations only use the first observation in which an individual is observed.

a – Real 2018 dollars; b – equals the total across all five jobs; c – represents the modal report for race; d – midpoint of the range is used in the calculation

Appendix Table H-2 Displacement's Effect on Labor Market Outcomes

	Earnings	Log Earnings	Employed
After	-1,991.898*** (663.265)	-0.647*** (0.138)	-0.112*** (0.020)
R^2	0.20	0.15	0.08
N	6,043	4,760	6,043
# Individuals	1,307	1,263	1,307

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. See the main text for a description of the matching estimator.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix Table H-3 Displacement's Effect on Substance Use**Panel A: Substance Use at Extensive Margin**

	Current Smokes	Current Drink	Ever Used Marijuana	Ever Used Other Drugs	Ever Used Pain Reliever/ Narcotics
After	0.024* (0.013)	0.020 (0.018)	0.002 (0.015)	0.024* (0.014)	-0.007 (0.030)
R^2	0.00	0.10	0.05	0.02	0.07
N	6,034	6,028	6,015	6,015	1,883
# Individuals	1,307	1,307	1,307	1,307	695

Panel B: Substance Use at Intensive Margin

	# Cigarettes Smoked per Day	Drinks Several Times per Month	# Drinks per Session	# Times Used Marijuana Past 12 Months	# Times Used Pain Relievers Past 12 Months
After	0.462 (0.548)	-0.002 (0.024)	0.389*** (0.116)	1.097 (0.756)	-1.776 (1.153)
R^2	0.03	0.03	0.03	0.03	0.04
N	1,285	3,773	3,741	3,183	646
# Individuals	432	1,114	1,114	942	361

The data come from the 2005-2019 waves of the TAS from the PSID. The sample includes individuals who respond to at least two surveys. Displaced workers must respond to the survey prior to job loss. Standard errors clustered at the individual level shown in parentheses. The dependent variables are noted in the column headings. Additional independent variables include age, age squared, and dummy variables for calendar year. See the main text for a description of the matching estimator.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Figure H-1 Event History Analysis – Labor Market Outcomes.

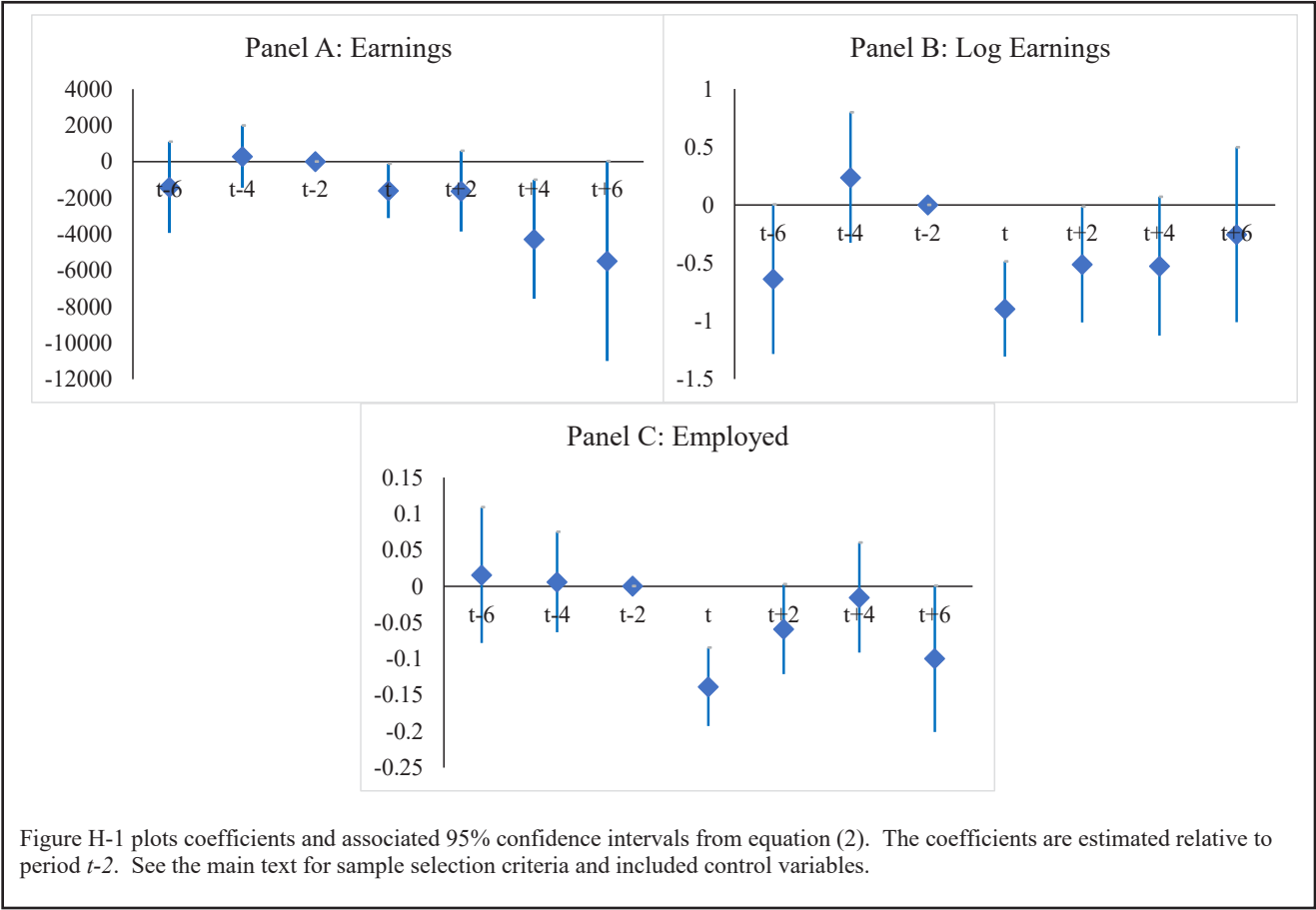


Figure H-2 Event History – Substance Use.

