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The Effect of Parental Paid Sick Leave on Youth Risky Behavior: Evidence from High School Students Across the United States District from 2005-2019

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Abstract

This paper focuses on analyzing the implementation of parental paid sick leave (PSL) and its effects on youth risk behavior in the United States. We use data from the Youth Risk Behavior Surveillance System (YRBSS) 2005 – 2019 to analyze the effect of parental PSL on youth wellbeing. We evaluate PSL implementation across 12 districts, two of which are in states that implemented PSL in 2015 and three in states that implemented it in 2017. We apply the staggering difference in difference method with multiple time periods to capture the average treatment effect for the policy and an event study for each outcome of interest to capture the dynamic effects.

Our main results suggest a statistically significant spillover of PSL exists on reducing substance use among adolescents at different percentage points for each substance, including marijuana, tobacco, ecstasy, heroin, and alcohol. Our results show that marijuana use declined by 1.6 percentage points with (0.05 % effect size), and tobacco use declined by one percentage point (0.25% effect size) following PSL implementation. We also found that ecstasy and heroin use declined by 3 and 1 percentage points, respectively. Looking at the effect size, ecstasy use was reduced by 50%, and heroin use was reduced by 33% following PSL implementation. Furthermore, alcohol use among youth was decreased by two percentage points (0.07%) following PSL implementation. We do not find any evidence that parents' PSL access affects sexual and violent behavior among youth. In sum, PSL has a dynamic effect on reducing substance use among youth, and this effect increases as families have access to PSL benefits over a longer time period. The results suggest that there are positive spillovers of PSL beyond workplace outcomes on children's health, particularly in risky behaviors. These positive spillovers are a significant social benefit of PSL and should be considered in expanding these benefits.

Keywords: Parental paid sick leave, Youth risk behavior surveillance system, United States, Adolescents.

Introduction

Paid sick leave (PSL) is a significant employee benefit that can help employees access personal and family care; it can be used to seek preventive care such as a routine checkup, or to recover from a short-term illness or injury for the employee or their family. In most cases, employees get one hour of leave for every 20 to 40 hours worked, up to seven days per year and accounting for 100% of the worker's regular wages [1].

According to the Center for Economic Policy and Research, the U.S. is the only developed country that does not guarantee PSL in any sector;

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however, some states and individual cities have taken steps to mandate PSL, such as California and Arizona [2].

The U.S. Bureau of Labor Statistics reported that the highest percentage of workers with access to PSL worked for state and local government, then at private and civilian companies at similar percentages. Approximately 90% of these employees earned at least 25% above the average wage from the threshold, with 89% working in full-time positions and 48% working in part-time positions [3].

In this paper, we look at the effect of PSL on three categories of youth risk behavior including substance use, sexual behavior, and violent behavior. Specifically, we estimate the spillover effect of parental PSL on the use of substances including heroin, ecstasy, marijuana, tobacco, and alcohol; violent behaviors such as suicide or physical altercations; and sexual behavior among adolescents. We also look at the effect of parental PSL on parental engagement on their children health.

We believe parental PSL would indirectly reduce these risk outcomes by increasing parental engagement and the seeking of preventive care for their children. Preventive care for adolescents can include depression screening to reduce any serious risk related to depression or suicidal ideation, and youth can receive consultations or tests related to substance use or sexual behavior during a preventive care visit. As a consequence, youth could become more educated about the risks of substance use, sexually transmitted diseases (STD), human immunodeficiency virus (HIV), and pregnancy, which could reduce the number of adolescents who become sexually active at an early age. According to the CDC, about half of all STDs reported in the U.S can be attributed to individuals aged 15–24 years, and the U.S. pregnancy rate among youths aged 12–19 years is one of the highest in the developed world, alongside high rates of drug use and violent behavior [4]. Risky behaviors are one of the most serious factors threatening adolescents' health and wellbeing. These behaviors increase the risk of early death, disability, and chronic diseases at younger ages [5].

Previous research supports the idea that increased parental support and control are strong determinants of lower prevalence levels of adolescent risk behavior than more general parenting practices. Parents' role in restricting their children from smoking and drinking behavior can reduce their probability of using drugs or beginning sexual activity early in leftfield [6]. A previous study found that parental involvement with adolescents was associated with lower odds of physical harm, mental health, and substance use between 0.229 and 0.70 [7].

We use district-level data from 2005 to 2019 of a Youth Risk Behavior Survey conducted every two years among middle and high school U.S students. We apply the staggered difference in difference method with multiple time periods, as introduced by Callaway and Sant'Anna. We look at the variation between treatment districts or states that have mandated PSL laws at different times, as compared to control districts or states that have no PSL law. We also apply an event study to look at the dynamic effect of PSL in our study's outcomes.

Our main findings show statistically significant results indicating that PSL policy implementation led to an indirect effect on reducing substance use among adolescents. We found marijuana use declined by 1.6 percentage points (5% effect size), and tobacco use declined by 1 percentage point (25% effect size) following PSL implementation. Furthermore, ecstasy use declined 3 percentage points (50% effect size) and heroin use declined 1 percentage point (33% effect size). We also found that alcohol use was reduced by 2 percentage points (7%) following PSL implementation. However, we found that PSL has no effect on sexual or violent behavioral outcomes, though some districts have significant indirect effects of PSL on reducing sexual intercourse and suicidal ideation.

These districts showed the effect of PSL from the year 2017 and were related to expanded PSL policy relative to other districts' PSL policies in our study. Basically, group 2017 included districts that are more flexible and generous in PSL policy, where employees can carry over hours of unused PSL days up to 80 hours to the next calendar year. This had an indirect effect of a 2-percentage point reduction of sexual intercourse and 3 percentage point reduction of suicidal ideation. We also found a dynamic effect of PSL policy on youth substance use, which generally appears to be negative and increases in magnitude the longer individuals are affected by PSL policy implementation. We also look at the effect of parental PSL on parental involvement time with their children. We also found PSL has a significant effect on increasing the time parents spend with their children. We found PSL has an effect on increase parental time use to care for their children's health by 7.77 to 9.35 minutes. We also found the time parents were spending in activities related to their children's heath, such as visiting doctor office, increase by 7 to 8 minutes in some states following PSL.

This paper builds on the existing understanding of the effect of PSL on labor market outcomes by looking at its effect on the wellbeing of workers and their families.

Previous studies found that parents who have access to PSL are more likely to seek preventive care for themselves or their families. This paper contributes to the existing literature by extends those findings by looking at the benefit of seeking preventative care to reduce youth risk behavior. We also looked at the dynamic effect of PSL using an event study to analysis how expanding these benefits would have a greater effect on improving youth wellbeing in the future. We also contribute to the existing literature on PSL by using a new methodology of DID to estimate the effect of PSL at multiple time periods with less biased and measurement error. We use a new outcomes variable from YRBSS data that have not study before in PSL literature.

This paper is organized in the following manner: PSL laws are discussed in the next section, with emphasis on those which were implemented during the study period; next, we discuss how this work fits within existing literature on PSL and family health; in the fourth section the data and methodology are presented; results are presented and discussed in the fifth section; the last section discusses the study's conclusions.

Background

PSL is an important employee benefit that can help employees to address personal and family care needs. It can be used to seek a preventive care such as a routine checkup or to recover from a short-term illness or injury for an employee or their family. Furthermore, in some cases, PSL policy can include "safe time," which relates to domestic violence, sexual assault, and stalking. Currently, in the U.S, there are no federal legal requirements for PSL, and many U.S employers do not offer PSL benefits to their employees. Some cities and states in the U.S. have taken actions to require employees above a certain threshold of workers to provide PSL benefits to their employees. During the COVID-19 pandemic, PSL has garnered increasing attention among policymakers across the U.S. As a result, several state and local governments have established new PSL laws, and some have expanded their existing PSL policies. Most of the PSL benefits that state or local governments provide to employees equals on average one hour of leave for every 30 hours worked without lose any of an employee's regular wages, after one has been employed for three months [1].

Figure 1 presents the percentage of workers with access to PSL benefits from 2010 to 2020 in the U.S., according to the U.S Bureau of Labor Statistics and based on a National Compensation survey. Between 2010 to 2020, state and local government workers reported the highest percentage of access to PSL benefits between 89% to 91%, alongside 63% of civilian workers, and 75% of private workers. For some of those workers with PSL, individual leave plans provided them a fixed number of days per year, with an average of 8 days. For others, PSL can be a carryover provision, which allows them to accumulate unused sick leave from year to year. Furthermore, some workers' PSL plans do not specify a maximum number of days, while for others their sick leave plan is part of a single amount of time off for workers to use for multiple purposes such as vacation, illness, or other personal business [8].

Figure 2 shows the share of U.S. private industry workers with access to PSL by average wage level. It indicates that lower-wage workers (the lowest 10% and 25%) are much more likely to lack access to PSL than workers in higher-wage occupations (at the highest 10% and 25%). According to the Kaiser Family Foundation (KFF), in 2017 only a small portion of part-time workers had access to PSL benefits. Fifty-six percent of large firms with at least 200 workers provided PSL to their part-time workers, compared to about 26% of smaller firms with less than 200 workers [1]. Even though the U.S federal government does not require employers to offer PSL to employees who need it, some state and local governments do require some or all employers to provide PSL to their workers. Figure 3 presents the U.S. map, which shows state PSL laws and local PSL laws or policies established for particular cities across the U.S. through April 2021. The figure does not contain COVID-19 PSL that is temporarily in place in many states and local municipalities. Oregon, Nevada, Arizona, Colorado, New Mexico, Michigan, Maine, and Connecticut all have statewide PSL laws. Washington, California, New York, and Maryland have state and local PSL laws, and Texas, Illinois, Pennsylvania, and Minnesota have PSL laws for particular local cities [9].

In this study, we analyze the effect of PSL in districts that implemented local PSL laws between 2005 and 2019, including New York City, Chicago, Philadelphia, Los Angeles, and San Diego. Furthermore, we include districts from New York state: Borough of Brooklyn, Borough of Manhattan, Borough of Queens, Borough of Staten Island; and districts from Florida state: Broward County, Orange County, and Palm Beach County, which have not implemented local PSL between 2005 and 2019 to be the control districts.

Furthermore, as of May 5th, 2018, New York City employers with five or more employers must provide employees with paid sick leave. Employers must provide their workers one hour for every 30 hours worked and allow them to carry over up to 40 hours per year. Employees

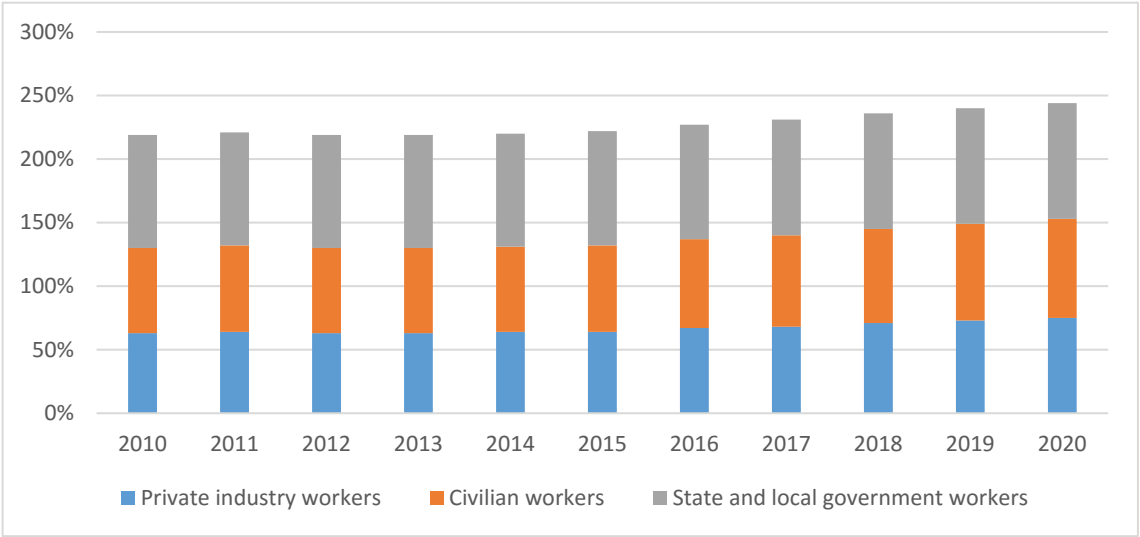


Figure 1: Percentage of workers with access to paid sick leave benefits, 2010 to 2020.
Source: U.S. Bureau of Labor Statistics, National Compensation Survey.

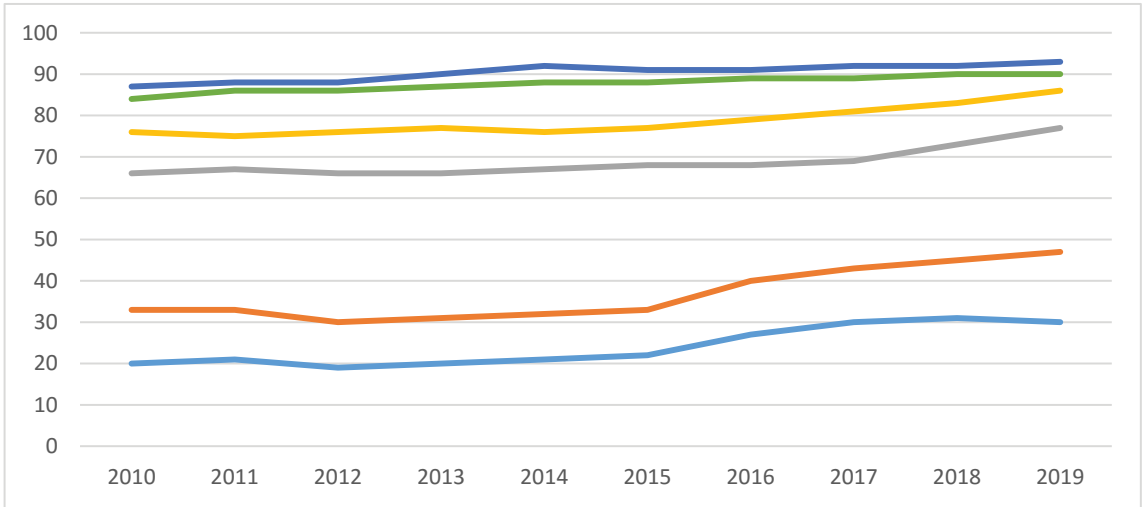


Figure 2: Share of U.S. private industry workers with access to paid sick leave, by average wage level.
Source: National Compensation Survey, U.S. Bure.

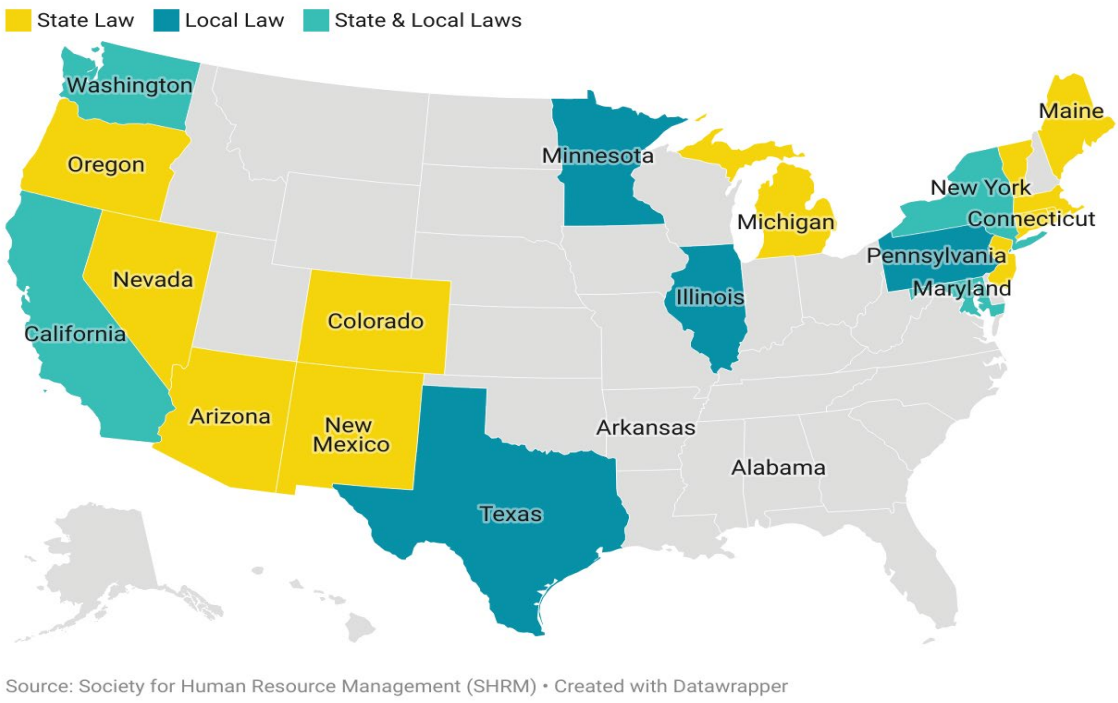


Figure 3: Overview of PSL Law Across the United States through 2021.

must be employed for at least four months to use their PSL benefits. Employees in New York City may use PSL time for their medical care or the medical care of a family member, including siblings, grandchildren, grandparents, children, and parents.

In the city of Philadelphia, effective May 13th, 2015, employers with ten or more employees are required to provide PSL to those who work at least 40 hours a year. Employees can earn 1 hour of sick time for every 40 hours they work, and PSL is capped at 40 hours per calendar year. The employer will keep records of sick leave accrual and use them for all employees for two years. Philadelphia's PSL law can be used for the employee's health needs, care for a family member, or leave due to domestic abuse or sexual assault (Society for Human Resource Management, 2021) [9].

Chicago enacted a law that requires employers to provide employees with PSL, effective July 1, 2017. According to said law, "all employers in Chicago must comply with the paid sick leave law. The law covers any employee who works within Chicago's city limits and works 80 or more

hours in 120 days. Employees must accrue one hour of sick leave for every 40 hours worked, up to 40 hours in 12 months. Employees must accrue one hour of sick leave for every 40 hours worked, up to 40 in 12 months" [10]. In addition, "Employees begin accruing paid sick leave upon commencement of employment; Employers may require employees to satisfy a 180-day waiting period before using accrued sick leave; Sick leave may be used by employees to care for themselves or their family members when they are sick or ill to receive medical care, or if the employee or family member is the victim of domestic violence or sexual abuse" [10].

Employees may use PSL for their illness, injuries, medical care (including preventive care) or certain covered family members' illnesses, injuries, or medical care. Family members include a child, legal guardian or ward, spouse under the laws of any state, domestic partner, parent, the parent of a spouse or domestic partner, sibling, grandparent, grandchild, or any other individual related by blood or "whose close association with the employee is the equivalent of a family relationship" [11]. The definition of "family member" also includes step- and foster relationships. Further, employees can use PSL if either the employee or a family member is a victim of domestic violence or a sex offense [12,13]. See figure 2 in the appendix for details about the specification of each district's PSL policy.

Literature Review

Recent literature has shown evidence of family spillovers of PSL, allowing parents to stay at home and seek medical care for sick children. If parents do not have access to PSL, they may be forced to leave their children without care when they are sick so as not to lose pay or, in some cases, risk losing their job. The issue becomes more complicated for low-income workers, especially those with children with chronic conditions who need more follow-up and check-up doctor's appointments. Previous research has shown that expanding workplace benefits by mandating adequate paid family or sick leave is a great benefit for parents, and mothers especially. With the implementation of PSL, mothers can bond with their infants by breastfeeding them, and it can also help parents place their children in high-quality childcare. Furthermore, previous research has found that the rate of access to paid leave was lower among low-income families than in families with high incomes. Among children whose parents had access to paid sick leave, parents were more likely to take time away from work to care for themselves or others. Hence, their findings suggests that PSL could help low-income parents keep their jobs and reduce job turnover [14,15].

Furthermore, PSL helps women get back to work and places them on the same playing field as men, which reduces gender inequality in the workplace. A group of studies focused on examining the effects of California's paid family leave (PFL) program that was established in 2004 using data from the Current Population Survey and the difference-in-difference method to compare the changes between the treatment and control groups. Those studies indicated that the California program increased the overall use of maternity leave, especially for low-income groups, by double and increasing women's participation in the labor market. In addition, studies found that PFL increased the usual weekly work hours and wage incomes from 10 to 17% for employed mothers who had children between one and three years old. In sum, Kang et al. and Rossin-Slater et al. have found that PFL has a positive effect on increasing the probability of young mothers and low-income mothers participating in the workplace rather than taking unpaid maternity leave [16,17].

Moreover, parents' work can influence a family's well-being both positively and negatively. Children from an early age need stable family relationships with responsive, protective, and nurturing adults as well as a physically safe environment that allows them to explore without engaging in high-risk behavior while also receiving adequate nutrition and health care [18]. If parents are constantly stressed from work or face financial hardship, they will face a conflict between managing their time at home and work. As a result, they will have less time to focus on and monitor their children, which may harm their children's performance in school and increase their participation in risky behaviors during their teen years [19].

In instances where they have access to PSL, parents will be more likely to focus on increasing their children's well-being by spending more money and time on improving nutrition and health. One study looked at the association between parental access to paid sick leave and children's access to healthcare services. The study concluded that access to parental paid leave increases the probability of children receiving a flu vaccination by 12.5% and annual medical checkups by 13.2% respectively, over those with parents who do not have access to PSL. The probability of children receiving delayed medical care because of parents' lack of time was 13.3% lower when PSL was implemented, and the probability of being taken to the ER was 53.6% lower in those cases [20].

At the same time, parents who have access to paid sick leave are more likely to concern themselves with the safety of their children's physical surroundings and to monitor their behaviors and learning achievement at school. In general, previous studies, including Rusby et al., have suggested that parent-youth relationships have a sufficient effect on controlling youth risk behavior [21]. A weaker parent-youth relationship and less parental monitoring were associated with alcohol use, binge drinking, and marijuana use. Youth parental monitoring was more intensive for girls than boys in alcohol and marijuana use, causing girls to begin using these substances later in life than boys [21].

Additionally, perceived parental monitoring had protective effects on youth risk involvement over time. There was a positive effect in reducing girls' sexual behaviors over time with additional parental monitoring. The probability of girls engaging in sex increased for those who had a problem with parental monitoring and communication [22]. This relationship between parental PSL and youth well-being can be explained through the economics theory of "household production," which frames how parents allocate their time

between work and children and how household budgets support the investment in their children [15].

This paper focuses on analyzing the implementation of PSL effect on the health and well-being of adolescents living in the United States. We believe the availability of PSL can affect parental engagement with children. This parental engagement may include taking the child to doctors' appointments, staying at home with a sick child, and increased supervision of children against risky behaviors. Particularly, we are interested in examining the link between parental PSL and youth risk behavior, including substance use, sexual behavior, and violence. As we mentioned above, previous works found that parents who have access to PSL are more likely to seek preventive care for themselves or their families.

In this paper, we want to extend the findings of previous studies by looking at the benefit of seeking preventive care to reduce youth risk behavior. In general, preventive care addresses serious diseases and medical problems before they become significant. Annual check-ups, immunizations, flu shots, and specific tests and screenings are a few examples of preventive care. These preventative visits allow parents to monitor the health of their children, with care such as screening, tests or, counseling. According to the American Academy of Pediatrics (AAP), depression screening, behavior prevention of sexually transmitted infections, and behavioral assessment are recommended for adolescents to be performed as preventive health care by pediatricians or primary care providers. Sexually Transmitted Disease (STD) and Human Immunodeficiency Virus (HIV) testing, as well as alcohol and drug use assessments are recommended by the AAP for adolescents if there is a positive risk assessment, alongside appropriate follow-up action from the pediatrician [23].

Our study focuses on examining the effect of PSL on youth risk behavior including substance use, sexual behavior and violent behavior. Specifically, we estimate the spillover effect between parental PSL on the use of some types of drugs and alcohol among adolescents, attempted suicide, physical fights, and other sexual and violence measures. We believe parental PSL would reduce in an indirect way these risk outcomes by increasing parental engagement and seeking of preventive care for their children. This preventive care includes depression screenings, which can reduce any serious youth risk related to depression or suicidal ideation. Furthermore, youth can receive consultation or tests related to substance use or sexual behavior during a doctor visit. As a result of this preventive care, youth would become more educated about the risks of substance use, STD, HIV, and youth pregnancy, which can reduce the early age of sexual activity among adolescents and can harm their overall health and physical activity. According to the CDC, about half of all STDs reported in the U.S comes from people aged 15–24 years, and the U.S. pregnancy rate among youth aged 12–19 years is one of the highest in the developed world, alongside high rates of drug use and violent behavior [4].

Data

This paper uses data from the Youth Risk Behavior Surveillance System (YRBSS) from 2005 to 2019 to study the impact of parents' PSL on youth's risk behavior. The YRBSS monitors health risk behaviors that contribute to significant causes of death, disease, injury, and social problems among adolescents. The YRBSS is designed to monitor risk health behaviors that are often established during childhood and early adolescence, including behaviors that contribute to unintentional injuries and violence. The YRBSS also includes sexual behaviors related to unintended pregnancy and sexually transmitted infections, including HIV infection, among these risk behaviors. In addition to these behaviors, the YRBSS provides information about substance use, unhealthy dietary behaviors, and inadequate physical activity. It represents a sample of 9th through 12th-graders in nationally, at the state level, and within school districts in the United States. The national survey conducted by the Centers for Disease Control and Prevention (CDC) includes students from public and private schools, and it is conducted every two years, usually during the spring semester. The state and district surveys are administered mainly in public schools by health and education departments, which is not balanced across survey waves. The YRBSS has collected data from more than 4.9 million high school students via over 2,100 separate surveys from 1991 through 2019. Survey administration procedures are designed to interview students in person and protect the confidentiality of schools and the anonymity of students [24].

This paper uses the YRBSS district-level data from 2005 through 2019, which includes nine survey waves, comprised of 8 districts from Illinois, New York, California, Florida, and Pennsylvania. We use district-level data due to the limitation on availability of YRBSS at state-level in our interest of outcomes variables. A total of 254,066 person-wave observations are included in this study. Of all participating districts, five districts implemented PSL during the survey panel, while all other districts are included in the control group. I exclude some districts that mandated local PSL policy such as San Francisco, but which do not continue to participate in them regularly based on most YRBSS waves. Additional districts joined the YRBSS over time, and some chose not to participate in every survey wave, resulting in an unbalanced panel. Thus, our sample size consisted of students from 9th through 12th grade from 12 districts that are similar in the size of geography, economy, and population.

Figure 4 shows our treatment group districts and the date of their respective PSL implementations. It shows that in 2014 New York City enacted the first PSL law of the group. This was followed by Philadelphia in 2015, San Diego in 2016, and both Chicago and Los Angeles in 2017. We include three districts that do not mandate PSL policies to be our control group, including Broward County, Orange County, and Palm Beach County which are districts found in Florida state.

Due to the small number of districts included in this study, we apply the t-Test to compare two samples; districts included in the sample and districts out of the sample; to check that there is no outlier in terms of socioeconomic

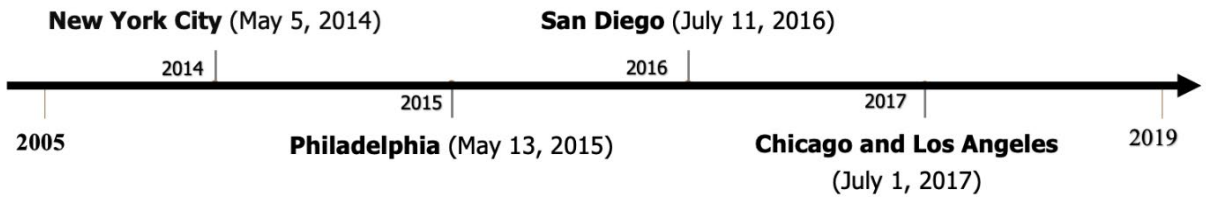


Figure 4: Paid Sick Leave Timeline of Effective Date across Our Study's Districts.

characteristics across districts using data from American Community Survey (ACS) 2016-2020. In Panel (a) of table 1, we show comprising between districts included in our sample and districts out of the sample in terms of household structure, household size, household income, education attainment, and employment rate. We found there is no significant difference between districts in and out of our sample in the household structure, size, and household income, but there is a slightly different in the rate of employment and education attainment between them. As our district selection is considered metropolitan districts, we compared only metropolitan districts in and out of the sample. It shows that the only difference between them is in educational attainment. Thus, we find only a few outliers between our selection sample and out of selection sample.

Table 2 presents the mean with standard deviations in parentheses for all variables used in this study; it represents all sample sizes, treatment (districts mandate PSL policy), and control groups (districts that do not mandate a PSL policy). The average age of our sample size is about 16 years, and about 52% of it is female in both treatment and control group districts. Furthermore, it contains several different races of students; 17% are White, 27% are Black, and 40% Hispanic in both groups. The second panel in Table 3 includes substance use variables. Marijuana and alcohol are the highest used among adolescents in our sample size, about 33% and 31%, respectively. About 40% and 32% of students from the treatment districts were using marijuana and alcohol, respectively, compared to 31% of students from control districts using marijuana and alcohol. Ecstasy, tobacco, and heroin ranged from 3% to 7% in all communities. The last panel of table 3 contains violence and sexual activity variables. About 40% of youth in our sample size are sexually active or have sexual intercourse. About 15% to 29% of students of our simple size had engaged in violent behavior, including physical fights, and considered suicide, respectively.

Method

In this paper, we use the Difference-in-Differences (DID) method; it is a quasi-experimental design that is used to estimate the effect of a specific intervention or treatment, which is PSL in our case, by comparing the changes in outcomes over time between a population enrolled in the intervention group (treatment group) and a population that is not (the control group). In our intervention case, PSL policy was introduced in many different states and districts during many different periods. As states and cities implemented the PSL policy at different times, some treatment groups act as a control for early adopters. Goodman-Bacon's (2018) decomposition showed that any two-way fixed effects estimate of DID with variation in treatment timing can rely on variation in treatment timing only when the treatment effects are homogeneous. Still, the estimation tends to be over-weights when treatment effects are heterogeneous across units. Furthermore, DID estimates are biased when treatment effects change over time within a unit. In such situations, Goodman-Bacon's analysis showed that two-way fixed effects estimators are inappropriate, and alternative approaches should be used [25,26]. As a result, Callaway and Sant'Ann introduced a Group-Time Average Treatment Effect ATT(g, t). This refers to the average treatment effect for individuals who are members of group g in period t. Estimating ATT (g, t) allows us to see if the treatment effects are heterogeneous by the time of adoption, observe the change in the treatment effect over time, and observe economic shocks on the treatment group to see, for example, if treatment effect dynamics differ if people are first treated in recession years or expansion years.

We use the Staggered Difference-in-Differences (DID) method to estimate the following equation (1) to analyze the impact of the parental PSL laws on youth risk behavior.

$$Y_{idt} = c_i + \beta PSL_{idt} + \lambda_t + \theta_d + \delta X_i + \varepsilon_{idt} \quad (1)$$

Where Y_{idt} denotes the outcomes of interest that measures risky adolescent behavior including, substance use, as well as violent and sexual behavior of an individual i at district d during period t. PSL_{idt} is a treatment indicator for PSL that is equal to one if an individual i from district d that has mandated a PSL law at period t, and zero otherwise. X_i is a vector with some demographic variables. These include race, age, and gender to control for demographic variation between them. Further, θ_d represents district fixed effects to control for district-specific time-invariant characteristics, such as socioeconomic composition, a variation on drugs laws, and school district education policy. λ_t represents year time fixed effects; it includes district non-specific characteristics, such as drugs laws, including those which refer to illegal substances like marijuana. Many types of drugs are regulated at both the federal and state level. Some states have set their own drug possession laws and

(A) Districts used vs non-used districts				
Indicators	**Mean of Districts Use**	**Mean of Districts non-use**	**t**	**P-value**
Households with one or more people under 18 years (%)	29.51	29.11	0.23	0.818
Households with one or more people 65 years and over (%)	30.24	34.122	2.02	0.043
People 18 years and over (%)	75.01	74.174	0.69	0.488
Household size	2.66	2.49	2.08	0.039
Total household (%)	40.69	50.40	-4.62	0.00
Family below FPL (%)	11.97	11.23	0.33	0.742
Employment (%)	58.91	53.80	2.23	0.0253
Education attainments (25 year &up)	30.92	20.47	3.35	0.00082
(b) Districts used vs non-use Metropolitan Districts				
Indicators	Mean of Districts Use	Mean of non-use Metropolitan Districts	t	P-value
Households with one or more people under 18 years (%)	29.509	30.698	-0.70	0.4825
Households with one or more people 65 years and over (%)	30.236	30.698	-0.72	0.7848
People 18 years and over (%)	75.009	73.840	1.1	0.2715
Household size	2.6618	2.560	1.32	0.1853
Total household (%)	40.690	50.816	0.29	0.7717
Family below FPL (%)	11.972	11.168	0.33	0.742
Employment (%)	58.909	55.552	1.41	0.1592
Education attainments (25 year &up)	30.918	24.02	2.19	0.028

Table 1: Comparison Between Two Samples Using t-Tests: Districts in Sample vs Districts Out of Sample.

Data Source: American Community Survey (ACS) 2016-2020 5-year data. The districts used are districts in our sample include New York City, Philadelphia, Chicago, Los Angeles, San Diego, and districts from Florida state; Broward County, Orange County, and Palm Beach County. Districts non-use include all other districts (3210 districts) that are out of our sample. Non-use of Metropolitan districts includes all metropolitan districts (1308 districts) that are out of our sample. We use the U.S Census reference to select metropolitan districts.

	All	**Treatment Districts**	**Control Districts**
Age	15.82(6.26)	15.96 (6.24)	15.70 (6.25)
Female (%)	0.52 (0.50)	0.52 (0.50)	0.52 (0.50)
White (%)	0.17 (0.38)	0.13 (0.34)	0.19(0.39)
Black (%)	0.27(0.44)	0.25 (0.43)	0.27 (0.44)
Hispanic (%)	0.40 (0.49)	0.45(0.50)	0.3920.49)
Substance Use:			
Marijuana (%)	0.33 (0.47)	0.40 (0.49)	0.31 (0.47)
Heroin (%)	0.03 (0.17)	0.03 (0.17)	0.03(0.17)
Ecstasy (%)	0.06(0.23)	0.07(0.25)	0.06 (0.23)
Tobacco (%)	0.04 (0.19)	0.04 (0.19)	0.04 (0.19)
Alcohol (%)	0.31 (0.46)	0.32(0.47)	0.31(0.47)
Violence & Sexual Behavior			
Sexual Intercourse	0.40 (0.49)	0.43 (0.50)	0.40 (0.49)
Physical Fight	0.29 (0.45)	0.30(0.46)	0.28 (0.45)
Considered Suicide	0.15 (0.35)	0.15 (0.37)	0.14(0.35)
No. of observations	254066	142291	111775

Table 2: Summary Statistics for Youth Risk Behavior among Middle and High School Students in districts that have PSL policy and districts that do not from 2005 to 2019.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. Treatment districts include New York City, Chicago, Philadelphia, Los Angeles, and San Diego. Control districts include districts from New York state; Borough of Brooklyn, Borough of Manhattan, Borough of Queens, Borough of Staten Island, and district from Florida state; Broward County, Orange County, and Palm Beach County. Parentheses contain standard deviations.

made some drugs legal for recreational use, medical use, or both. ε_{idt} is an error term. Since we have many pre and post-treatment periods, we use the bootstrap method to approximate standard errors and adjust them by clustering at the district level to avoid any unconscious biases that can affect our standard errors. Our empirical strategy follows an intention-to-treat framework. That is, we look at the availability of PSL during a period in a given district instead of actual access of individuals to PSL.

As mentioned early, local PSL policies in our cases have multiplied the time or date of effect across districts, so we are interested in estimating the ATT (g, t) as implemented by Callaway and Sant'Anna (2021). In our case, we have individual-wave data from 2005 to 2019. Some of these districts imposed PSL laws over this period, which became treated groups, and others did not, which function as the untreated groups. Sixteen districts implemented PSL laws at various times between 2005 and 2009; we exclude them

(a) Substance Use					
ATT(g,t)	**Marijuana (1)**	**Tobacco (2)**	**Ecstasy (3)**	**Heroin (4)**	**Alcohol (5)**
All	-0.016** (0.010)	-0.010*** (0.004)	-0.030*** (0.005)	-0.010*** (0.004)	-0.209*** (0.009)
Group 2015	-0.017*** (0.003)	-0.012* (0.005)	-0.032*** (0.007)	-0.007** (0.005)	-0.022* (0.012)
Group 2017	-0.014 (0.013)	-0.007** (0.005)	-0.025*** (0.007)	-0.018*** (0.005)	-0.018** (0.012)
Dep.Var Mean (in pre-period)	0.33	0.04	0.06	0.03	0.31
District FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y
No. of observations	254066	254066	254066	254066	254066

(b) Sexual & violence Behavior			
	Sexual Intercourse (1)	**Physical Fight (2)**	**Considered Suicide (3)**
All	-0.011 (0.01)	0.001 (0.009)	-0.004 (0.008)
Group 2015	-0.001 (0.013)	-0.012 (0.011)	0.003 (0.010)
Group 2017	-0.034*** (0.014)	0.032*** (0.011)	-0.021* (0.009)
Dep. Var Mean (in pre-period)	0.40	0.29	0.15
District FE	Y	Y	Y
Year FE	Y	Y	Y
Individual Characteristics	Y	Y	Y
No. of observations	254066	254066	254066

*** p<0.001, ** p<0.01, * p<0.05

Table 3: Staggered Difference-in-Difference: Substance use, Sexual and Violence Behavior Among Adolescents.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, race, and gender.

from our analysis due to the lack of data availability and too few survey waves to study them. Thus, we choose our treatment and control groups based on the availability of the data. In the end, we include 12 districts from different states of the U.S including New York, Florida, California, Illinois, and Pennsylvania.

We also examine the dynamic treatment affects using an event study to check the pre-treatment balance between treatment and control groups.

$$Y_{idt} = \delta_d + \lambda_{t+} \sum_{\tau=-q}^{-1} \gamma_\tau PSL_{d\tau} + \sum_{\tau=0}^{m} \emptyset_\tau PSL_{d\tau} + \varepsilon_{idt} \quad (2)$$

Where Y_{idt} is the interest of outcomes for a person i at district d at time t. PSL_{dt} is a group treatment indicator equal to one if district d is treated at time t, and zero otherwise for a never treated district. The coefficient $\emptyset_\tau$ captures the effect of PSL policy at post-treatment effects period m, while γ_τ is the anticipatory effect. The negative value of m is an anticipatory effect that captures the effect before policy mandate for all groups. δ_d is a district fixed effect, and λ_t is a time fixed effect. PSL is a dummy variable equal to 1 when the policy is implemented in the district and is 0 otherwise? We estimate equation (2) to look at the dynamic effect of PSL on our outcomes of interest using an event study method that was implemented by Callaway and Sant'Ann.

Results

Main analysis

Table 3 shows our primary and most important estimation results of equation (1). Each column presents results for a separate outcome, indicated in the header of the column. Each row, also, presents results of a separate specification – the first row presents the estimates for aggregate ATT, while the second and third rows present this estimate for each treatment group: group 2015 and group 2017. We report only the aggregate DID coefficient β and its standard errors in each case. The specifications also control for year and district fixed effects along with Individual characteristics, as indicated. For ease of interpretation of the magnitude of the effect, we also report the dependent variable mean. Panel a from table 3 shows the estimated effect of PSL on substance

use among adolescents. In the first column, the all ATT (g, t) coefficient indicates that marijuana use declined by 1.6 percentage points (5% magnitude of the effect) following PSL implementation. In the second column, the estimated coefficient of tobacco use is statistically significant but small; tobacco use declined 1 percentage point (25%) following PSL implementation.

Similarity in ecstasy and heroin use, the coefficients are 3, and 1 percentages points respectively; both are statistically significant and show that ecstasy use was reduced by size of 50% and heroin use was reduced by size of 0.33 because of PSL implementation. Moreover, alcohol use was reduced by 2 percentage point (7% effect size) following PSL implementation. Panel b in table 3 shows estimated results of outcome variables related to sexual and violent behavior. If we look at the sexual intercourse column, the coefficient is negative but is not statistically significant; this means that PSL has no effect on sexual activity among adolescents. In addition, there was no effect on physical fight chance, as the coefficient sign is positive and not statistically significant. Finally, we find no statistically significant effect of PSL on suicidal ideation. However, if we look at group 2017 in Panel b, we find sexual intercourse and suicidal ideation coefficients are statistically significant at 3 and 2 percentage points respectively. These results may reflect the variation of PSL policy across districts as we describe in more detail in table 1 in the appendix. Basically, group 2017 included districts that are more flexible and generous in PSL policy, where employees can carry over hours of unused PSL days up to 80 hours to the next calendar year, as compared to districts in group 2015.

Overall, table 3 provides support for the view that PSL policy implementation led to a reduction in several types of substance use at different percentages among adolescents, including marijuana, tobacco, ecstasy, heroin, and alcohol. We also find that PSL has no effect on adolescent's sexual and violent behaviors such as sexual intercourse, physical fights, and suicidal ideation. We also show table 3 results in more detail in the appendix by plot the group-time average treatment effects for each period of each group in figure 1 along with a uniform 95% confidence band. All inference procedures use clustered bootstrapped standard errors at the state level, and control for the autocorrelation of the data. The plots in figure 1 contain pre-treatment estimates, which is the red dots in the plots, as well as treatment effect estimates in post-treatment periods, the blue dots in the plots, for each group in each time along with a uniform 95% confidence interval. Specifically, each figure contains separate plots for each group of our estimation. There is a clear effect of PSL policy implementation on adolescent substance use as shown in panel (a). In panel (a) of group 2015, we can see a sufficient reduction of heroin, ecstasy, tobacco use in the post-treatment period, and a small fluctuation of marijuana and alcohol use. In contrast, group 2017 shows slight fluctuation up and down for most substance use outcomes in the post-treatment period. Panel (b) in figure (1) includes sexual violent behavior outcomes, where we find a statistically significant effect reduction trend in intercourse sexual and suicidal ideation for group 2017 only.

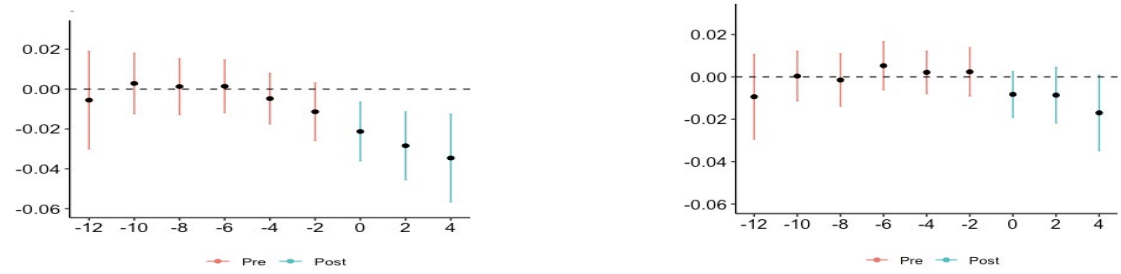
Figure 5 shows the dynamic treatment effects of our main significant results using event study of eq 3. For more details, we report the coefficients number for each outcome in table 2, found in the appendix. We can see in figure 5 that the number of adolescents who use drugs and alcohol has been decreasing over time; for instance, marijuana use in the first year is estimated to decrease by less than 1%, in the second year it is estimated to decrease by about 1.8%, and in the third year by 2.5%. Similarly, for tobacco, ecstasy, and heroin, the effect of treatment increases over time. However, we found no significant effect of PSL on alcohol use, physical fight, considered suicide, and Sexual intercourse over time. We could not observe any change over time following PSL on sexual and violence behavior among them. Overall, the dynamic effect of PSL policy appears to be negative and increasing on youth substance use in magnitude the longer individuals are exposed to the PSL policy. In the first year that a district mandated PSL policy we found reduced youth risk behavior. For example, some of our substance use variables decrease, this decrease became larger in subsequent years.

Stratification analysis

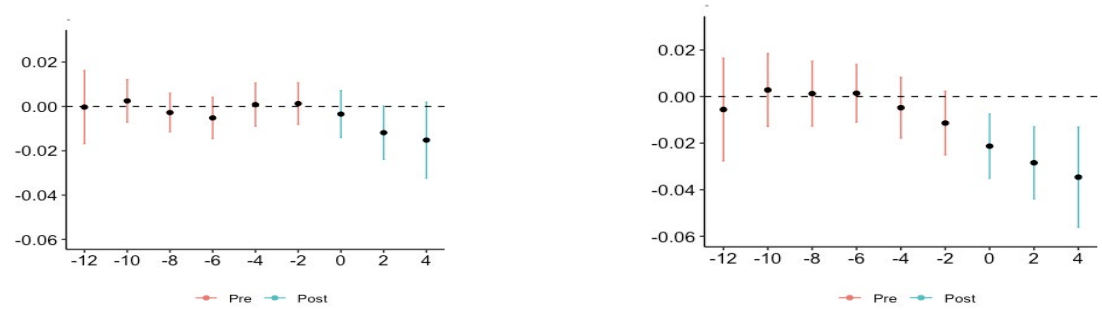
We want to examine the impact of PSL on youth risk behavior in the specific groups of our sample size. Therefore, we re-estimate eq 1 and separate by gender, race, and grade to examine if there is variation between these types of characteristics. Looking at Table 4.1 we find a statistically significant result that ecstasy uses among males and females declined about 0.02 and 0.034 points following PSL implementation, but PSL has a large effect on reducing ecstasy use among females (0.68%) compared to males (0.28%) following PSL implementation. Similarity, heroin uses decline by 0.015 (0.38%) among men and 0.0059 (0.33%) among women following PSL implementation, which shows both males and females had significant effects, but males seemed to be impacted more by PSL implementation than females in reducing heroin use. Furthermore, alcohol use had a significant effect only for males not female after PSL implementation. Alcohol use among male decrees by 0.031 points, which was a significant effect on reducing alcohol use by 10% among males following PSL implementation.

Table 4.2 shows the results for sexual and violent behaviors. By looking at table 4.2 for both male and female results, there is no significant evidence that PSL has a significant effect on rates of sexual intercourse, physical fights, and suicidal ideation. Furthermore, we also conducted an analysis by race as shown in Table 5. Looking at these results in 5.1, PSL has a significant effect on reducing tobacco use among whites 0.0145 points (size effect 0.36%). Ecstasy use for whites and blacks was affected by PSL policies, but this was not the case for Hispanics. A significant effect on reducing ecstasy use by 0.05 (effect size of 62%) for whites and 0.03 (effect size of 75%) for blacks was shown. On the other hand, PSL has a statistically significant effect on reducing heroin use about 0.012 points among Hispanics, showing that PSL has 40% effect size on heroin use among Hispanic only. Moreover, we are seeing reduction effects for blacks in alcohol use, which PSL has 17% size effect

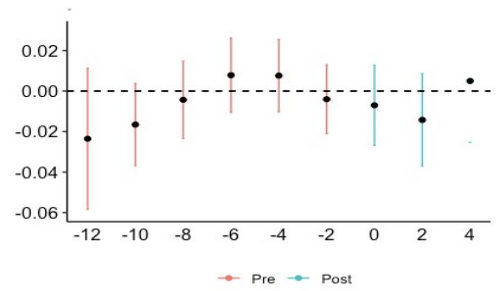
(a) Substance Use



(a) Marijuana (b) Tobacco

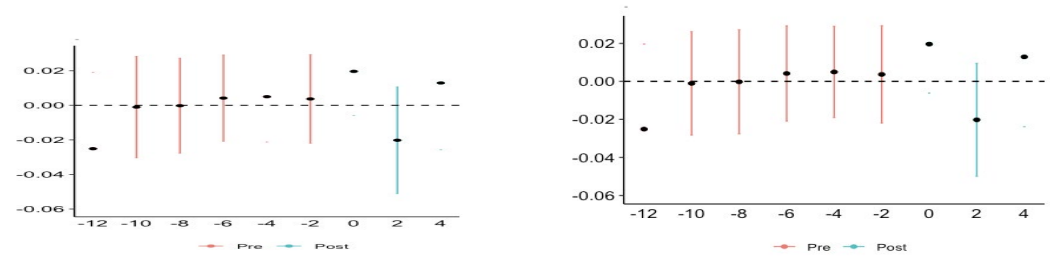


(c) Heroin (d) Ecstasy

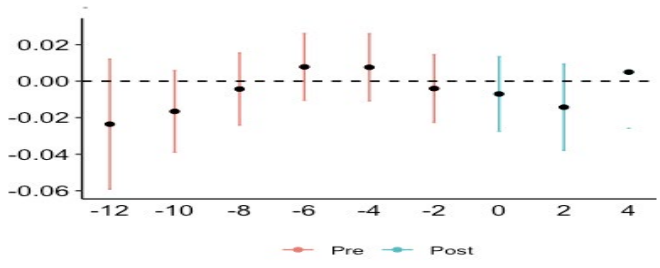


(e) Alcohol Use

(b) Sexual and Violence Behavior



(a) Sexual Intercourse (b) Physical Fight



(c) Considered Suicide

Figure 5: Event Study: Average Effect by Length of Exposure.

(a) Substance Use										
	Male					Female				
ATT(g,t)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)
All	-0.018 (0.0247)	0.0047 (0.0103)	-0.02* (0.0151)	-0.015* (0.0073)	-0.0316* (0.0145)	-0.0022 (0.0139)	0.0034 (0.0089)	-0.034* (0.016)	-0.0059 (0.0047)	-0.003 (0.0232)
Group 2015	-0.0105 (0.0303)	0.0003 (0.0119)	-0.0146 (0.0209)	-0.0109 (0.0089)	-0.0244* (0.0132)	-0.0101 (0.0175)	-0.0030 (0.0099)	0.042** (0.022)	-0.0034 (0.0027)	-0.0123 (0.0268)
Group 2017	-0.0354 (0.0488)	0.0149 (0.0184)	-0.032** (0.0126)	-0.026* (0.0181)	-0.0484* (0.0359)	0.0172 (0.0161)	0.0193* (0.0107)	-0.0141 (0.0184)	-0.0121 (0.0137)	0.0199 (0.0405)
Dep.Var Mean (in pre-period)	0.35	0.08	0.07	0.04	0.30	0.32	0.04	0.05	0.018	0.32
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. of observations	121573	121573	121573	121573	121573	132493	132493	132493	132493	132493
***p<0.001, ** p<0.01, * p<0.05										

Table 4.1: Staggered Difference-in-Difference: Substance use by gender.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age and race

(b) Sexual & violence behavior						
	Male			Female		
ATT(g,t)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)
All	0.0062 (0.0351)	-0.0113 (0.0145)	-0.0059 (0.0095)	-0.0133 (0.0179)	0.009 (0.0415)	-0.0016 (0.018)
Group 2015	0.0250 (0.0496)	-0.0155 (0.0225)	0.0045 (0.0118)	-0.0086 (0.0150)	-0.0128 (0.0285)	0.0026 (0.0275)
Group 2017	-0.0379 (0.0499)	-0.0015 (0.0341)	-0.0303* (0.0178)	-0.0248 (0.0415)	0.0628 (0.1287)	-0.0118 (0.0281)
Dep.Var Mean (in pre-period)	0.45	0.34	0.11	0.37	0.23	0.18
Year FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y	Y
No. of observations	121573	121573	121573	132493	132493	132493
*** p<0.001, ** p<0.01, * p<0.05						

Table 4.2: Staggered Difference-in-Difference: Sexual & violence behavior by gender.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, race, and gender.

on alcohol use among black only. In table 5.2, we find no evidence that PSL has impacted sexual and violent behavior for any particular race, white, black, or Hispanic.

Furthermore, we separate our sample size in Table 6 by school grades 9th,10th, and both 11th and 12th to see if there is variation effect of PSL on youth substance use, sexual behavior, and violent behavior. We find that PSL has a statistically significant effect on reducing ecstasy use among all school grades studied. Basically, ecstasy use reduces 0.027 points for 9th grade students, 0.0226 points for 10th

(a) Substance Use																
	White					Black					Hispanic					
ATT(g,t)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)	
All	0.0179 0.1222	-0.0145* 0.0088	-0.05** 0.0194	-0.0152 0.0126	-0.0015 0.1149	-0.0262 0.022	-0.005 0.0087	-0.03* 0.0137)	-0.0008 (0.0098)	-0.0452* (0.0349)	-0.0151 0.0209	0.0089 0.0115	-0.0184 0.019	-0.012* 0.0084	-0.0049	0.0112
Group 2015	0.0207 0.1330	-0.0226* 0.0137	-0.048* 0.0277	-0.0097 0.0086	0.0010 0.1152	-0.0235 0.0273	-0.0073 0.0103	-0.04** 0.0131	0.0006 (0.0066)	-0.0411 (0.0332)	-0.0165 0.0257	0.0041 0.0154	-0.0187 0.0275	-0.0102 0.0107	-0.0068	0.0166
Group 2017	0.0113 0.1071	0.0047 0.0211	-0.0435 0.0482	-0.0281 0.0376	-0.0075 0.0957)	-0.0377 0.0660	0.0051 0.0282	-0.0045 0.0545	-0.0071 (0.0543)	-0.0629 (0.1261)	-0.0126 0.0290	0.0176 0.0182	-0.0180 0.0174	-0.0142 0.0233	-0.0015	0.0266
Dep.Var Mean (in pre-period)	0.37	0.04	0.08	0.03	0.41	0.34	0.04	0.04	0.03	0.26	0.35	0.08	0.06	0.03	0.34	
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
No. of observations	44215	44215	44215	44215	44215	67352	67352	67352	67353	67353	102869	102869	102869	102869	102869	

Table 5.1: Staggered Difference-in-Difference: Substance use by race:

*** p<0.001, ** p<0.01, * p<0.05

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, and gender.

(b) Sexual & Violence Behavior									
	White			Black			Hispanic		
ATT(g,t)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)
All	0.0074 0.0329	0.0066 0.0469	0.0022 0.028	-0.0213 0.0336	-0.008 0.0202	0.0067 0.0178	-0.0083 0.038	-0.0084 0.0245	-0.0099 0.0119
Group 2015	0.0133 0.0310	-0.0173 0.022	-0.0121 0.0382	-0.0091 0.0373	-0.0113 0.030	0.0068 0.0209	0.0028 0.0559	-0.0196 0.0274	0.0060 0.0232
Group 2017	-0.0068 0.0846	0.0633 0.149	0.0362 0.0474	-0.0741 0.1228	0.0061 0.078	0.0059 0.0337	-0.0284 0.0266	0.0120 0.0546	0.0389* 0.0272
Dep.Var Mean (in pre-period)	0.35	0.25	0.14	0.48	0.34	0.13	0.43	0.29	0.15
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. of observations	44215	44215	44215	67352	67352	67352	102869	102869	102869

Table 5.2: Staggered Difference-in-Difference: Sexual & violence behavior by race:

*** p<0.001, ** p<0.01, * p<0.05

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, and gender.

	9th					10th				
ATT(g,t)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)
All	-0.0145 0.0276	-0.0102 0.0091	-0.027* 0.0142	-0.0097 0.0135	-0.0189 0.0163	0.0196 0.0168	-0.0093 0.0128	-0.0226** 0.0093	-0.0072 0.0127	-0.0245* 0.0173
Group 2015	-0.0136 0.0308	-0.0065 0.0107	-0.032* 0.0168	-0.0103 0.0142	-0.035* 0.0263	0.0207* 0.0154	-0.0118 0.0158	-0.0272** 0.0099	-0.0003 0.0124	-0.0391* 0.0262
Group 2017	-0.0167 0.0471	-0.0188* 0.0116	-0.0176 0.0238	-0.0083 0.0214	0.0194 0.0214	0.0170 0.0447	-0.0029 0.0192	-0.0111 0.0246	-0.0244 0.0320	0.0121 0.0179
Dep.Var Mean (in pre-period)	0.25	0.04	0.05	0.03	0.25	0.31	0.04	0.06	0.03	0.30
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. of observations	68382	68382	68382	68382	68382	70122	70122	70122	70122	70122
*** p<0.001, ** p<0.01, * p<0.05										

Table 6.1 (a): Staggered Difference-in-Difference: Substance use by grade.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, race, and gender.

	11th-12th				
ATT(g,t)	Marijuana (1)	Tobacco (2)	Ecstasy (3)	Heroin (4)	Alcohol (5)
All	-0.001 (0.027)	-0.010* (0.005)	-0.034* (0.026)	-0.011 (0.011)	0.009 (0.018)
Group 2015	-0.025 (0.029)	-0.0134* (0.006)	-0.034 (0.033)	-0.008 (0.011)	0.003 (0.024)
Group 2017	0.055 (0.045)	-0.002 (0.010)	-0.035* (0.018)	-0.016 (0.019)	0.026 (0.030)
Dep.Var Mean (in pre-period)	0.39	0.04	0.06	0.03	0.36
Year FE	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y
No. of observations	112510	112510	112510	112510	112510
*** p<0.001, ** p<0.01, * p<0.05					

Table 6.1 (b): Staggered Difference-in-Difference: Substance use by grade.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, race, and gender.

Sexual & Violence Behavior									
9th				10th			11th-12th		
ATT(g,t)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)	Sexual Intercourse (1)	Physical Fight (2)	Considered Suicide (3)
All	0.009 (0.038)	0.009 0.038	0.002 (0.016)	0.020 (0.029)	0.019 (0.012)	0.016 (0.015)	0.007 (0.034)	0.005 (0.020)	-0.0105 (0.015)
Group 2015	-0.013 (0.049)	-0.013 (0.049)	0.002 (0.025)	0.017 (0.031)	0.008 (0.0135)	0.031* (0.019)	0.0037 (0.038)	-0.0182 (0.020)	-0.0049 (0.023)
Group 2017	0.064* 0.039	0.064* (0.039)	0.002 (0.014)	0.028 (0.056)	0.0471** (0.019)	-0.020 (0.037)	0.0149 (0.057)	0.0623 (0.051)	-0.0241 (0.022)
Dep.Var Mean (in pre-period)	0.37	0.30	0.15	0.37	0.30	0.15	0.49	0.24	0.14
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	v
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. of observations	68382	68382	68382	70122	70122	70122	112510	112510	112510
*** p<0.001, ** p<0.01, * p<0.05									

Table 6.2: Staggered Difference-in-Difference: Sexual & Violence Behavior by grade.

Data Source: Youth Risk Health Behavior Surveillance System (YRBSS) from 2005-2019. The dependent variable in each regression is the outcome listed in column, as a binary indicator. ATT (g, t) is aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the district level. Group 2015 treatment districts: New York City and Philadelphia, and Group 2017 includes treatment districts: Chicago, Los Angeles, and San Diego. Dependent variables are substance use by adolescents including marijuana, tobacco, ecstasy, heroin, and alcohol, and sexual, and sexual & violence behavior include sexual intercourse, physical fight, and considered suicide. Individual characteristics include age, race, and gender.

grade students, and 0.034 points for 11th and 12th grade students.

We also found that students at the 9th, 11th, and 12th were more heavily impacted by PSL policy implementation on reducing ecstasy use at 56% for both 11th and 12th grade students and 54% for 9th grade students, compared to only 36% 10th grade students. Furthermore, the results in table 6 indicate that PSL policy implementation significantly reduces alcohol use among 10th-grade students by 0.0245 points and has an 8% effect on reducing heroin use. Tobacco use seems to be impacted more by PSL among students in grade 11th and 12th. Table 6 shows that tobacco use was reduce by 0.01 points with a 25% effect size following PSL policy implementation. Finally, we found that PSL access does not affect sexual and violent behaviors from 9th through 12th school grade students.

Mechanism analysis

In this section, we examine our hypothesis that parental PSL would increase parental engagement in improving their children's wellbeing. We assume PSL increase parental time for workers to seek preventive care services for their children. We use American Time Use Survey (ATUS) data from 2016-2021. We show summary statistics of ATUS in table 7. We use dependent variables that measure parental time use in minutes, including time for caring for the household, caring for household children's health, and times spent for activities related to household children's health. Table 8 shows the effect of PSL on workers' time spent caring for their family health using the staggered DID method. We find the time parents spend caring for their children health increased by 9 minutes in states that implemented PSL in 2019 and 8 minutes in the state that implemented PSL in 2020. Furthermore, they spend about 77% to 97% of their time caring for their children's health. We also found PSL increase parents' time by about 8 minutes on spending in activities that are related to household care, including going to doctor appointment, checkup, and others about 8 minutes. Thus, these results show the effect of PSL on parental time use by allowing them to have time to care for children's health and doing any activities related to health as going preventive visits.

Discussion

Our results show that parental access to PSL has a significant effect on reducing some types of substance use among adolescents. We found a significant effect of PSL access on ecstasy, heroin, and tobacco use by 50%, 33%, and 25%, respectively. We also found a small but significant effect of PSL implementation, about 5%, on reducing marijuana

	All	Treatment States	Control States
Age	50.29 (17.97)	49.75 (18.02)	50.46 (17.81)
Male (%)	0.414 (0.49)	0.423(0.49)	0.411(0.49)
White (%)	0.81(0.40)	0.80 (0.40)	0.81(0.39)
Black (%)	0.12 (0.33)	0.09 (0.285)	0.14 (0.341)
CAREHH_KID (Minutes per day)	36.62 (87.32)	38.45 (89.485)	36.02 (86.579)
CAREHH_KIDHEALTH (%)	0.76 (11.62)	0.774 (11.46)	0.750 (11.674)
ACT_CAREHH (Minutes per day)	39 (89.12)	40.69 (90.78)	38.43 (88.55)
No. of observations	999999	999999	999999

Table 7: Summary Statistics for **American Time Use Survey (ATUS) Data from 2016-2021: (Adult 16-85 years).**

Data Source: American Time Use Survey (ATUS) Data from 2016-2021. Treatment States include Control states include.
Note: BLS_CAREHH_KID: Caring for HH children. ACT_CAREHH: Caring for and helping HH members. BLS_CAREHH_KIDHEALTH: Activities related to household children's health. Treatment States: Arizona, Oregon, Maryland, Vermont, Washington, Michigan, Rhode Island, and New Jersey. Control states include the remaining states (43 states) that do not mandate PSL policies. Parentheses contain standard deviations.

ATT (g, t)	CAREHH_KID (1)	CAREHH_KIDHEALTH (2)	ACT_CAREHH (3)
All	-0.75 (5.12)	-0.23 (0.41)	-1.17 (5.68)
Group 2017	-25.08**** (4.352)	-5.353**** (0.337)	-24.61**** (4.83)
Group 2018	0.97 (9.50)	0.63 (0.82)	0.40 (9.80)
Group 2019	9.35*** (3.56)	0.98**** (0.16)	8.53*** (3.66)
Group 2020	7.66*** (3.30)	0.77**** (0.17)	7.65*** (3.14)
Dep. Var Mean (in pre-period)	36.62	0.76	39.00
Year FE	Y	Y	Y
State FE	Y	Y	Y
Individual Characteristics	Y	Y	Y
No. of observations	999999	999999	999999
**** p<0.001, *** p<0.01, ** p<0.05, p<0.10*			

Table 8: Staggered Difference-in-Difference: Parental Engagement Time with their children.

Data: American Time Use Survey from 2016-2021. Dependent variables are CAREHH_KID: Caring for HH children. **ACT_CAREHH:** Caring for and helping HH members.

CAREHH_KIDHEALTH: Activities related to household children's health. Individual Characteristics include age, race, sex, and family income.

ATT (g, t) is the aggregate average treatment effects on the treated for each group g at all periods of study. Parentheses include standard errors at the state level. Group 2017 treatment states: include Arizona and Oregon. Group of 2018 which is Maryland, Vermont, and Washington. Group in 2019 includes Michigan, Rhode Island, and New Jersey. Group in 2020 includes Nevada, and Minnesota.

use and about 7% on reducing alcohol use among sample. We found PSL implementation has a great effect on reducing ecstasy use among females (0.68%) compared to men (0.28%). Furthermore, we found that PSL implementation has a slightly significant impact on reducing heroin use among males, about 38%, compared to 33% among females. We also found that PSL policy implementation has a 10% significant effect on reducing alcohol use among males only, and a non-significant effect for females. Furthermore, we found that PSL access significantly reduces tobacco use among the whites, with a 36% effect size. We also found that PSL substantially reduces ecstasy use, about 62% among white and 75% among black populations. Our results show that Hispanics were impacted mainly by PSL in reducing heroin use, which showed a 40% effect. We also see PSL has about 17% size effects on reducing alcohol use among blacks.

We also found students in 9th, 11th, and 12th grade were more impacted by PSL policy on reducing ecstasy use: 56% in both 11th and 12th grade students, and 54% in 9th grade students.

We also found an 8% significant effect of PSL implementation on reducing alcohol use in 10th grade students and a 25% effect of PSL implementation on reducing tobacco use among students in grades 11 and 12. We did not find any significant result that PSL influences sexual and violent behavior in our sample size.

We also found that the dynamic effect of PSL policy implementation appears to be negative and increases in size related to marijuana, tobacco, ecstasy, and heroin use the longer individuals have access to PSL policies. We found the number of adolescents who used marijuana, tobacco, ecstasy, and heroin has decreased slowly over time and this decrease has become larger in subsequent years. Our main results show that students who belonged to group 2017, which includes Chicago, Los Angeles, and San Diego districts, were more significantly more impacted by PSL policy implementation. These results may reflect the fact that

PSL policy in these districts is more flexible and generous, meaning that employees can carry over hours of unused PSL days up to 80 hours to the next calendar year compared to communities in group 2015, wherein we assume expanded PSL has a much more significant effect on improving youth wellbeing and reducing risky youth behavior. We also found parental PSL increase the time parents spending to care for their family's health including activities such as going to preventive visit, or any kind of medical care.

Overall, our results show that parental PSL access indirectly improves youth well-being by allowing parents to have more time to engage with and provide preventive care for their children, including preventing risky behavior. Our results are consistent with the literature. Asfawand Colopy (2017) found that children whose parents have paid sick days are 13% more likely to receive preventive health care than children whose parents do not have paid sick days.

Our results are small in effect size compared to Asfaw and Colopy's because we examined the impact of parental PSL on youth wellbeing indirectly by looking at prevention of risky youth behavior, rather than looking directly to youth access to preventive care. Bhuyan et al. (2016) found that PSL access reduces serious illness risk factors and emergency department visits. The magnitude of their significant effects is greater than our estimated outcomes or effective results.

Bhuyan et al.'s (2016) findings shows that working parents without PSL are 2.5 times more likely than those with PSL to report taking a child or family member to the emergency room because they could not take time off during their regular job hours. Bhuiyan et al.'s results are consistent with our results in that we both show that PSL reduces health risk and reduces risky behavior due to access to preventive care.

As mentioned above, we studied PSL policies unique to each district. We found a more significant PSL effect on youth wellbeing in districts with less restrictive PSL policies than in more restricted districts. For example, the Los Angeles and San Diego districts have fewer restrictions on PSL access; for example, workers can begin to use PSL days after 90 days unlike other districts which require workers to complete 180 days of work to access PSL. They also can earn 1 hour of PSL for every 30 hours worked and carry over about 70 hours to the next year in the Los Angeles and San Diego districts, while some districts in our study required 40 hours of work to earn 1 hour of PSL, while also carrying over fewer hours. Most of our results for these districts are significant for substance use, and even for violence and sexual behavior we can observe the effect of parental PSL on youth wellbeing varies depending on the flexibility of the PSL days their parents can use. This effect becomes larger with expansion of PSL benefits. It would be helpful to policymakers to expand the benefits provided by PSL policies, so individuals or their family members can get the most benefit from PSL days, especially for large families with more than one child, or children living with a single parent, which requires extra work and time to negotiate work and childcare.

Conclusion

This research explores the effect of parental paid sick leave on youth risk behavior using U.S. district samples. We find that accessing family PSL benefits indirectly reduces youth risk behavior. Specifically, we find that PSL implementation has a spillover effect on reducing substance use at different percentages among adolescents, including such substances as marijuana, tobacco, ecstasy, heroin, and alcohol, but has no overall impact on sexual and violent behavior among adolescents. Furthermore, PSL has a significant dynamic effect on substance use. This effect increases over time when families can access PSL for an extended period. We suggest that future work examine the effect of PSL access as related to different family characteristics, including income, social benefits, and family size.

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