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THE INVESTIGATION OF THE EFFECTS OF ADOLESCENT SUBSTANCE USE ON
SOCIOECONOMIC OUTCOMES DURING ADULTHOOD

by

BEDIS ELKAMEL

A thesis submitted in partial fulfillment of the requirements
for the Honors Undergraduate Thesis program in Health Sciences
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ABSTRACT

Background: Adolescence is a crucial point in life where choices, behaviors, and environmental influences can significantly shape future outcomes. This research investigates the increasing concerns surrounding adolescent substance use and examines its long-term effects on socioeconomic status (SES) in adulthood. Substance use during adolescence has been shown to have significant long-term physiological impacts, as the brain is still developing at this age. Additionally, many short- and long-term effects are associated with substance use, such as impacts on academics, physical and emotional well-being, and social life. Several studies have been conducted to explore the relationship between substance use and SES, however, there is little research that investigates how the initiation of substance use during adolescence will affect SES-related factors in adulthood while using a nationally representative sample and a comprehensive range of substances.

Methods: Data from Wave I and Wave V of the nationally representative data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) dataset was used to explore the relationship between early initiation of substance use and subsequent socioeconomic-related outcomes during adulthood. Substance use was defined through survey questions addressing the age of initial exposure to alcohol, marijuana, and other illicit drugs reported at Wave I (ages 1-21), while SES in adulthood was assessed through objective indicators (personal income, educational attainment, and poverty indicators such as being unable to pay utility bills) and the subjective MacArthur Scale of Subjective Social Status (SSS) reported at Wave V (ages 33-43). Logistic regression was used to estimate odds ratios and 95% confidence intervals for the association between age at first substance use for each substance [categorized as never used (referent), first use at age 1-11, age 12-17, or 18 or older] and each adulthood SES outcome

accounting for the complex survey design.

Results: Age of first alcohol use was not significantly associated with adulthood functional poverty indicators, educational attainment, or personal income relative to the federal poverty line. Compared to those who never used, early alcohol use initiation was found to be strongly associated with a decreased SSS (first use at age 1-11, OR = 1.66, 95% CI = 1.08, 2.55). Age of illicit drug use initiation was significantly associated with functional poverty indicators in adulthood (age 12-17, OR = 1.40, 95% CI = 1.02, 1.90) and lower perceived SSS (age 12-17, OR = 1.56, 95% CI = 1.12, 2.27). Lastly, the first age of marijuana use was statistically significant across all measured outcomes, with differences present across age categories. For example, marijuana use was significantly associated with functional poverty indicators in adulthood (first use at age 1-11, OR = 3.40, 95% CI = 1.55, 7.49; first use at age 12-17, OR = 1.56, 95% CI = 1.30, 1.94), a lowered educational attainment (chi-squared = 69.3804, $p = 0.0000$), reduced personal income relative to the federal poverty line (first use at age 1-11, OR = 2.28, 95% CI = 1.06, 4.93), and a lowered perceived SSS (first use at age 12-17, OR = 1.39, 95% CI = 1.12, 1.74).

Conclusions: The insights from this analysis will be beneficial to the local community as they have the potential to benefit adolescents from a reduced socioeconomic status in the long term; it can inform intervention strategies, public health policies, and result in the formation of other initiatives to mitigate potential consequences of the initiation of substance use.

Understanding the relationship between the initiation of substance use during adolescence and the resulting repercussions to socioeconomic status during adulthood is essential in crafting targeted and effective measures to support the well-being of adolescents and, by extension, the broader society.

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INTRODUCTION

Adolescence is a crucial stage of one's life, where numerous developmental, physical, and physiological changes occur (Nickerson, 2023). The choices, behaviors, and one's environment during adolescence may influence later outcomes, either positively or negatively (Kansky et al., 2016). Various factors may influence this trajectory, with an important one being substance use. Adolescent substance use is a significant issue nationwide, and substance use has generally worsened since the pandemic (VerBruggen, 2022; Gensing-Pophal, 2021). By the end of Grade 8, approximately 21.3% of students have reported using illicit drugs at least once (National Center for Drug Abuse Statistics [NCDAS], 2023). Although it may not seem like much, imagine it this way: If one were to walk into their local middle school and went to a Grade 8 classroom that had 25 students, on average, at least 5 of them would have partaken in the use of illicit drugs.

Substance use during adolescence has been shown to have significant physiological impacts in the long term, as one's brain is still developing at this age. Additionally, short- and long-term effects have resulted from this, including impacts on one's academics, physical and emotional well-being, social life, and much more. One specific outcome that is affected in the long term is socioeconomic status (SES). There have been studies conducted that have explored the relationship between these two variables longitudinally (Fergusson et al., 2003; Kendler et al., 2014; Strong et al., 2014; Bray et al., 2020; Najman et al., 2022). Further investigations are consistently conducted to elucidate the implications of adolescent substance use on socioeconomic factors in adulthood.

By better understanding adolescent substance use and SES in adulthood, numerous insights can be provided, implemented, and help adolescents nationwide. By further magnifying

and identifying the significance of the impact between the two, more intervention strategies, public health policies, or other instruments can be put in place to help mitigate the possible consequences.

LITERATURE REVIEW

Importance of Socioeconomic Status

SES is a broad measurement of an individual's position in society based on several characteristics, including both subjective and objective measurements (Navarro-Carrillo et al., 2020). There is no commonly accepted way to measure SES, as individuals in different fields elucidate it using varying measures; however, some researchers seem to have an effective mechanism for measuring it (Sarsani, 2011; Mueller & Parcel, 1981). Mueller and Parcel (1981) conducted a study investigating the most effective way to measure SES. They found that an approach focusing on occupational data, income, and education would be more effective. A National Center for Education Statistics (2012) study also found that these factors are the most important measures. Although no standardized mechanism exists to determine SES, these measurements are often utilized.

SES is commonly used in varying fields as it is an essential indicator of numerous factors and has widely been used to investigate varying inequities (APA Dictionary of Psychology, 2022). It is crucial to study SES and how to reduce it to decrease the existing gaps in our society. The American Psychological Association [APA] (2010) cites that in the long term, a low SES can negatively affect one's physical and psychological health, educational attainment, family stability, and more. For example, Nutakor et al. (2023) found a strong correlation between one's SES and quality of life. Other studies have also found that a low SES leads to an earlier onset of risky behaviors, such as gambling (Petruzelka et al., 2020). This is particularly significant to the United States, as the official poverty rate in 2022 was 11.5 percent, with approximately 37.9 million people in poverty (Shrider & Creamer, 2023). Furthermore, approximately 44 percent of

all Americans are not paid a living wage for their labor (Howard, 2020). As previously mentioned, income is a significant detriment to one's SES; therefore, understanding SES and its implications can help create change.

One of the most valuable applications of SES is understanding the onset of diseases and other health-related behaviors due to their relationship. These relationships exist both in the short-term and long-term. Reiss et al. (2019) found that children and adolescents with a low SES developed mental health issues to a more considerable extent than their higher SES counterparts while growing up. Steptoe and Zaninotto (2020) used a longitudinal study mechanism and found that a low SES accelerated the numerous health issues resulting from aging. Longitudinal study designs are often employed to examine the long-term effects of SES. The findings of multiple studies show that SES is an important indicator of numerous health outcomes and other related issues.

Implications of Substance Use

Substance use is a broad term that refers to the inhalation, injection, or absorption of specific substances ranging from tobacco and alcohol to other drugs that may result in adverse consequences (Centers for Disease Control and Prevention [CDC], 2023). Consistent substance use may lead to a substance use disorder, which is characterized by a physiological and psychological need for a substance that results in complications with one's relationships, friendships, and day-to-day life (John Hopkins Medicine, n.d.). The onset of a substance use disorder results from a combination of genetic and environmental factors. Goldman et al. (2005, as cited in McLellan, 2017) found that approximately 40% to 70% of developing a substance use disorder is related to one's genetic composition. Numerous environmental factors also contribute to the onset of substance use and possibly a substance use disorder in both adolescence and

adulthood, including exposure to violence during adolescence, a low SES during any period, exposure to individuals that actively use substances during one's adolescence, and more (Beharie et al., 2018; Calling et al., 2019; Kilpatrick et al., 2000).

Substance misuse is a significant public health issue due to its numerous implications on individuals' health, financial well-being, and ability to succeed (Cystic Fibrosis Foundation, n.d.; American Public Health Association, n.d.; National Institute on Drug Abuse [NIDA], 2020). In 2021 alone, approximately 106,699 drug overdose-related deaths occurred in the United States (CDC, 2023). A substance use disorder may also result in the onset of numerous diseases, like cancer or cardiovascular disease; it may also result in the onset or potential worsening of mental disorders like schizophrenia, anxiety, or depression (NIDA, 2020). Not only are there numerous consequences in the short term, but there are also many implications of substance misuse that may cause distress or harm throughout one's life. Slade et al. (2008) found that individuals who developed a substance use disorder by 16 years of age had a significantly greater chance of incarceration during adulthood due to substance-related issues. Ellickson et al. (2003) found that individuals who started consuming alcohol during adolescence were more likely to report substance use, problematic behavior, and employment issues during adulthood. Adolescent substance use is increasingly more common, with approximately 2.08 million, or 8.33% of all 12–17-year-olds reporting the use of illicit drugs in the past month (NCDAS, 2023). By the time students reach grade 12, approximately 46.6% of all teens have tried illicit drugs at least once (NCDAS, 2023). It is clear that substance misuse is a serious issue that has numerous consequences throughout one's life, and it is vital to study its implications.

Relationship Between Substance Use and Socioeconomic Status

Numerous studies and literature elucidate that the use of certain substances is linked to one's SES in the future, or other variables related to or consisting of SES. Some studies indicate that one's SES at a young age determines their likelihood of partaking in substance use during adolescence (Patrick et al., 2012). The combination of these studies indicates that there is a relationship between the aforementioned variables, and that there is a need to study this relationship. The following studies have investigated these variables in an attempt to understand their relationship and association to a higher degree.

Najman et al. (2022) conducted a longitudinal study based on a nationally representative Australian birth cohort study to analyze the long-term effects of adolescent substance use. Approximately 2350 offspring provided data from birth to age 30 for this study, which took place in 1981 and had subsequent follow-ups at six months, and 5, 14, 21, and 30 years. One of the questions the study sought to answer was if using either cannabis or amphetamine during adolescence would be able to predict life success in adulthood independent of early life adversities. To measure life success, the authors used nine variables, with 3 of the variables related to SES. The three variables associated with SES were family income, level of education, and ownership of own accommodation. To measure cannabis and amphetamine use during childhood, the researchers administered a Composite International Diagnostic Review (CIDI); the CIDI is a standardized diagnostic interview that is meant to assess the presence of mental disorders or other issues based on DSM-IV criteria (Wittchen, 1994). To evaluate the association between cannabis/amphetamine use and other related variables, binomial and multinomial logistic regression methods were used. These regression methods allow researchers to assess a connection/relationship between an independent and dependent variable; multinomial regression

is utilized if multiple independent variables are used (Kobayashi, 2020). The researchers found that if adolescents ceased the use of amphetamines and cannabis, their level of life success would not be impacted, whereas, individuals who continued to use these substances past adolescence and into adulthood had significantly lower life success.

Strong et al. (2014) used data from a Woodlawn Study that followed 1,242 African American children living in Chicago; this study had numerous collection points of data, with one at age 6-7 from 1966-1967, and subsequent waves at age 15-16, 32-33, and 42-43. The study aimed to understand the long-term effects of cigarette smoking during adolescence on both depression and SES in adulthood. Several questions from the Woodlawn Study survey were used to measure SES in their research: education was determined by asking about the last time formal schooling occurred, poverty was assessed based on the government's definition of it in 1994, if they had received welfare, their current employment status, and whether they had been unemployed for at least three months. To assess their smoking level, researchers used questions from when adolescents in the study were asked how frequently they smoked during wave two at ages 15-16. Propensity score methods were used to analyze the relationship between the independent and dependent variables, and the STATA statistical software was used for analysis. This type of analysis aims to estimate the effect of an exposure while considering different covariates that may be responsible for predicting it (Valojerdi & Janani, 2018). The researchers found that adolescents who smoked regularly had a significantly higher chance of unemployment during adulthood and lower educational attainment.

Another study analyzed the relationship between SES and alcohol behaviors during adolescence (Kendler et al., 2014). The authors used a longitudinal study method using the Avon Longitudinal Study of Parents and Children cohort data. They used data from two different

periods; the first was when the respondents were 16 years old, and the second was when respondents were 18 years old. A number of different variables were used to classify alcohol behaviors and SES. To classify alcohol use, the researchers used the following five outcomes: elevated drinking frequency, elevated drinking quantity, heavy episodic drinking, symptoms of alcohol dependence, and alcohol-related problems (like fighting). Each was measured on a scale and operationalized accordingly. To measure SES, researchers assessed the income and educational level of the parents of the participants; both are seen as practical measurements of SES (APA, 2015). Univariate and multivariate analyses were executed using logistic regression to analyze the relationship between the aforementioned variables. Univariate analysis is used when only one variable is studied, whereas, multivariate analyses are used when multiple variables are studied (Bobbitt, 2022). The researchers found that at both ages 16 and 18, there were relatively similar findings. Increased alcohol consumption was significantly related to greater SES using both univariate and multivariate analyses. On the other hand, a low SES predicted more alcohol-related problems in comparison to their counterparts.

Bray et al. (2020) investigated the relationship between the initiation of alcohol, cigarettes, marijuana, and other illicit drugs and the dropout rate during adolescent's high school years. The researchers used data from a longitudinal survey that consisted of 1,392 adolescents aged 16-18 years old during wave 4. The outcome that the researchers were investigating was the dropout rate, and they also collected socio-demographic variables to account for potential confounders. The measurement used to measure the initiation of substance use was a self-reported question that provided if they had tried any of the aforementioned substances on at least one occurrence. Stata statistical software and empirical testing were used to analyze all potential relationships between the variables of interest. Empirical testing is often used when analyzing

data similar to this study, and it can test hypotheses through observation (Rahman, 2021). The researchers found that the different categories of substances studied were significantly associated with high school dropout. More specifically, they found that the initiation of marijuana use increased the dropout rate of students by approximately 2.3 times compared to their non-using counterparts.

Fergusson et al. (2003) examined the potential of a relationship between cannabis use in adolescence and young adulthood and subsequent educational attainment. A longitudinal study based in New Zealand that provided data on 1265 children was used. Data collection took place at several periods in this study, ranging from birth to 25 years of age. The researchers conducted personal surveys with each participant to analyze cannabis use. The questions that were asked were related to their use of cannabis, as well as any problems with the use since the last annual interview that took place. When annual interviews were not performed, such as at age 21, 23, and 25, other supplemental methods were used to classify cannabis use effectively based on the data that they had. The educational outcomes considered for this study included leaving school without any qualifications at age 18, not entering university by age 21, and not attaining a degree by age 25. An ample number of confounding variables were considered, including sociodemographic factors, measures of family functioning, measures of parental adjustment, measures of childhood educational achievement, and other individual factors. Logistic regression methods were used to understand if there were any relationships between the independent and dependent variables. The researchers found that cannabis use negatively affected all of the variables of interest; this allowed them to conclude that cannabis use does have the potential to decrease educational achievement.

Literature Review Consolidation

When reading through the literature pertaining to the relationship between substance use and SES, there were some common limitations. There were also specific limitations that were present in each individual study. The combination of these limitations opens up the potential for follow-up studies to understand the relationships between SES and substance use to a higher degree.

The study by Najman et al. (2022) stated that there is no relationship between substance use and future life success when ceasing their use in early adulthood; there are numerous limitations and questions to be considered. First, they measured adolescent substance use at age 21, and cited that substance use by this period was considered as adolescent substance use. Additionally, they only considered the relationship between cannabis and amphetamines, but their study did not include data about opioids or other synthetic drugs. Lastly, many individuals from their sample were unavailable for follow-ups during the study. Therefore, a future study investigating the effects of substance use that occurs much earlier than 21 years of age, as well as the effects of other substances, is necessary.

In the second study by Strong et al. (2014) that concluded smoking cigarettes during adolescence had major impacts on unemployment during adulthood and lower educational attainment, several limitations must be considered. First of all, it is unclear if this research will be generalizable to a larger population because the study only included African Americans in Chicago. Furthermore, other variables were not considered as potential confounders for the results mentioned, and other SES-related variables were not evaluated. Lastly, participants in the study were only asked about their smoking behavior during middle adolescence. Adolescence ranges from ages 10 to 19, and the data collected included participants outside of this age range

(World Health Organization, n.d.). Therefore, a future study that uses a different collection period and considers other dependent variables is necessary to better understand the effects of cigarette use on adolescents later in their lives.

Some limitations must be considered from the study that found that a higher SES was related to increased alcohol consumption and a lower SES was related to more alcoholic problems during adolescence (Kendler et al., 2014). The first thing to consider is that the sample may need to be more generalizable, as the data was collected from a study in the United Kingdom. Furthermore, using self-reported data opens up the possibility of potential biases or errors in the data. The analysis only considered gender as a potential confounder, although many other confounders may be responsible for their findings. Lastly, although a longitudinal study was utilized, they only used data that differed by two years; it would be interesting to understand if similar results were found in subsequent years. A future study that considers other possible confounders and uses a more representative sample and measurement techniques would help elucidate whether or not the relationship that the researchers found was accurate.

In the study by Bray et al. (2020) that explained that different categories of substances studied were significantly associated with high school dropout, there are a few crucial factors to consider when analyzing the findings of this study. First, only the initiation of the substances was measured rather than their consistent use. Individuals who consistently use these substances may have a higher potential of dropping out than individuals who have only used the substance once; however, the study design does not allow readers to make any concrete conclusions about this. Additionally, the authors cited that the data used in this study was not nationally representative, which may yield a loss of the potential for generalizability. Lastly, there is the potential for reporting errors and biases due to the use of a self-reporting methodology. Therefore, a follow-up

study should be conducted that uses a better method of classifying substance use so that the conclusion that is provided in the research can be valid.

Multiple factors must also be considered in the last study that was analyzed by Fergusson et al. (2003), which found that cannabis use had a detrimental effect on leaving school without any qualifications, not entering university by age 21, and not attaining a degree. First of all, the data that was collected for cannabis use was first collected at 16 years of age. It is unclear whether earlier cannabis use would also have similar effects, although it would be logical for this to be the case. Also, the only substance that was studied during this study was cannabis. There may be other substances that do or do not have a similar effect on one's educational achievement, and a follow-up study would be necessary to determine this. Lastly, there is always the potential for biases and reporting errors even though the study was done through one-on-one interviews; also, there may be an issue with generalizability as the sample used was from New Zealand youth. A future study that rectifies the following limitations is needed to understand the potential effects of both cannabis and other substances on these educational attainment outcomes.

In summary, there were numerous gaps found in the literature relating to adolescent substance use and its effect on socioeconomic factors in adulthood. One common trend was the need for a nationally representative sample of the United States population. Through the use of the Add Health data set, this will be addressed. Another shortcoming was the consideration of only a few substances. In this study, the use of a wide range of substances, rather than only a few, will be investigated. Lastly, the effects of the age of the first substance use will be explored in this study; this has yet to be considered in relation to socioeconomic factors in other studies.

RESEARCH OBJECTIVES & HYPOTHESES

Research Objectives

This research sought to examine the association between the first age of substance use and SES during adulthood. A secondary data analysis of the nationally representative National Longitudinal Study of Adolescent to Adult Health (Add Health) study was conducted. In this study, we gained a greater understanding of the significance of the relationship between substance use during adolescence and subsequent SES-related outcomes in adulthood, including personal income, educational attainment, and other poverty indicators.

Hypothesis

We expected the study to reveal the presence of a relationship between age at first use of substances in adolescence and subsequent SES-related outcomes. We hypothesized that the earlier adolescents partook in the use of illicit substances like alcohol, LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, pills, cocaine (powder, freebase, or crack), inhalants (glue or solvents), marijuana, and heroin, the more detrimental the consequences would be on socioeconomic related factors in adulthood, such as lower personal income and poorer educational attainment. The association between a younger age of first use and the outcomes was expected to be greater than between individuals that used at a later age, as well as their non-using counterparts.

METHODOLOGY

Study Design

The public-use dataset from the National Longitudinal Study of Adolescent to Adult Health (Add Health) was employed. This study collected data from a nationally representative sample in a longitudinal cohort. Data collection from the participants of the original sample has continued, where there are currently five waves of data, with the sixth ongoing (Figure 1). The study began in 1994-1995; the first wave of data included approximately 20,000 adolescents in grades 7-12. The first two waves of data collected very similar information, with an in-school survey, an in-home survey, a school administrator survey, and a parent survey all being conducted. These surveys provide a broad amount of information on various topics, including substance use, sociocultural demographics, and SES. In subsequent waves, new information was gathered from the participants, including information that built on the previous waves. The third wave was carried out when participants were young adults (aged 18-26) and included information about participants' transitions to young adulthood, including education, employment, and behaviors. The fourth and fifth wave collected data from the participants' late 20s and early 30s, and their late 30s and early 40s, respectively. These two waves focused more on family life and well-being, with the fifth wave heavily focusing on socioeconomic outcomes. For this study, publicly available data will be utilized, which will have a smaller sample size but similar representativeness.

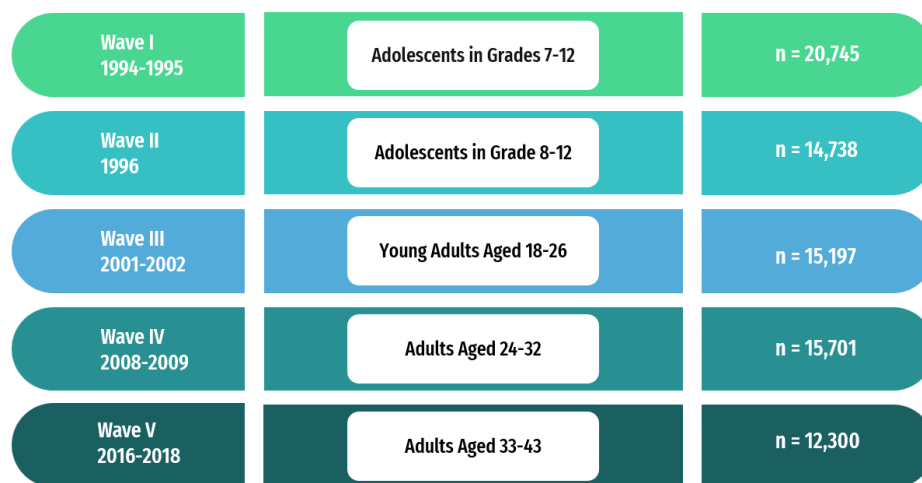


Figure 1. Wave Collection Dates and Respective Ages of the Add Health Study

Study Population

The study population of the Add Health dataset is incredibly diverse and representative of the United States. A cluster sample design was implemented to ensure that the different populations across the country were equally represented. The final study included participants from various backgrounds and ethnicities from different high schools across the nation.

Table 1. Race/Ethnicity Breakdown of Participants in Wave I of the Add Health Study

| Ethnicity/Race | Total Number | Percentage (%) |
|------------------------------------|---------------|----------------|
| Central-South America | 647 | 3.2 |
| Cuba | 508 | 2.5 |
| Mexico | 1,767 | 8.6 |
| Puerto Rico | 570 | 2.8 |
| Philippines | 643 | 3.1 |
| China | 341 | 1.7 |
| Other Asia | 601 | 2.9 |
| Black (Africa/Afro-Caribbean) | 4,601 | 22.4 |
| Non-Hispanic White (Europe/Canada) | 10,760 | 52.5 |
| Missing Race/Ethnicity | 30 | 0.3 |
| Total Number | 20,468 | 100 |

The racial and ethnic groups within the representative sample are shown in Table 1. As can be seen from the table, the sample size is extremely large, and there are good variations of ethnicity and race. This is essential for formulating sensible, reliable, and accurate conclusions, while avoiding biases (Young, 2023). The sample is designed to allow for relevant findings and is necessary when implementing policy changes on a national level. The immigrant status of the participants and numerous other factors providing diversity are shown in Table 2.

Table 2. Immigrant Status of Participants in Wave I of the Add Health Study

| Immigrant Status | Total Number | Percentage (%) |
|----------------------------|---------------------|-----------------------|
| 1 st Generation | 1,707 | 8.4 |
| 2 nd Generation | 2,987 | 14.6 |
| 3 rd Generation | 15,774 | 77.0 |
| Total Number | 20,468 | 100 |

Exposure: Adolescent Substance Use

Substance use was measured using several survey questions during Wave I of Add Health. Information about the use of alcohol, LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, pills, cocaine (powder, freebase, or crack), inhalants (glue or solvents), marijuana, and heroin were all measured. Information about alcohol, cannabis, and cocaine were the only substances that were not grouped and provided information about only the use of one specific substance. For example, LSD was grouped with heroin in a survey question asking about their use in the past 30 days: "During the past 30 days, how many times did you use any of these types of illegal drugs? (LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, or pills)?"

To define substance use, previous studies conducting secondary data analysis of the Add Health study have used questions measuring the use of a specific drug, such as cannabis, in the past 30 days, past 12 months, or during the lifetime (Scheidell et al., 2018; Prasad et al., 2023;

Russell & Gordon, 2017; Barker et al., 2023; Waddell & Howe, 2023). This study utilized survey questions that provided the age of an adolescent's first exposure to a specific substance to classify its use. For example, the following survey question was used: "How old were you when you tried marijuana for the first time?" The other questions that were used have the same format but ask about the remaining substances mentioned previously. A total of five survey questions that provided this information were considered. In addition to the analysis of each drug on its own, illicit drugs were categorized into one variable and analyzed to have a larger sample. Depending on the survey question, different responses were indicated by a specific response value and response label. For the survey questions asking about the first age that a participant had exposure to one substance, individuals could respond with their exact age. Responses were then categorized into one of four categories. A category of 0 indicated that an individual had never partaken in substance use (referent group), a category of 1 indicated that substance use happened for the first time from ages 1-11, a category of 2 indicated that substance use happened for the first time from ages 12-17, and finally, a category of 3 indicated that substance use happened for the first time at age 18 or older. Grouping the variables into these age categories, ranging from childhood to late adolescence, allowed for the consideration of the impacts on the cognitive, psychosocial, and physical transformations that are occurring during each developmental phase (Christie, 2005).

Outcome: Socioeconomic Status

Participants were asked several questions related to SES during the fourth and fifth waves of the Add Health study. Information regarding participants' employment status, finances, occupation, and other related socioeconomic factors was available. The last two waves of the data provided information about the participants at ages 24-32 and 33-43, respectively. Although

all waves include questions regarding SES, the last two waves contain only data about the participants' SES during adulthood. Data from Wave V was considered for the outcomes of interest to allow for the utilization of a life course approach.

To define SES, previous researchers have used information related to individuals' occupations, wages, education, and more (Liu & Clark, 2023; Miller et al., 2020; Madigan & Daly, 2023). In addition to these, poverty indicators, including eviction rates, financial assistance, and late payments, can be analyzed to further gauge an individual's socioeconomic status (Cagnassola, 2023; Collinson et al., 2023; Davis, 2022). Madigan & Daly (2023) conducted a secondary data analysis of the Add Health dataset and used four survey questions related to the following topics to classify SES: participant's household income, personal income, combined assets, educational attainment, and job prestige. Both personal income and educational attainment were utilized in this study; the following survey question was used to measure participant's income: "First, in the last calendar year, how much income did you receive from personal earnings before taxes? Include wages or salaries, tips, bonuses, overtime pay, and income from self-employment." The response options for this survey question are values of money (ex: less than \$5000, \$5000 to \$9999, etc.). The response values were recoded to create a binary variable, with a value of 0 indicating that an individual's income was above \$10,000, and a value of 1 indicating that an individual's income was below \$9,999. The income cutoffs were based on the federal poverty level of \$12,060 in 2017, with the cutoffs being different due to the design of the survey responses. Educational attainment was based on the highest level of education completed at the time of response: "What is the highest level of education that you have achieved to date?" The response values of this survey response include many different types of secondary and post-secondary education. The response values were organized into

multiple groups, with a value of 0 indicating that less than high school was completed, a value of 1 indicating that an individual graduated high school or attained their GED, a response value of 2 indicating that some community college or vocational training was done, but not completed, and finally, a response value of 3 indicated that some form of college (community, junior, or regular), vocational training, or other graduate degree was completed. Furthermore, three poverty indicators were used to classify SES further. The first poverty indicator measured the number of times financial assistance was received from outside sources: "How many times has a parent or parent figure paid your living expenses or given you \$50 or more to pay living expenses during the past 12 months?" To understand respondent's financial situation, a survey question regarding eviction was considered: "Since 2008, have you experienced a foreclosure procedure, eviction, or repossession of something?" The last poverty indicator regarding late payments further elucidated each individual's financial situation: "Since 2008, did you or your spouse/partner fall behind on paying your bills?" The response values for the three poverty indicators are binomial, with a 0 indicating no or never, and a response of 1 indicating that an individual has faced one of these. These three indicators were grouped together to form a poverty indicator metric. In addition to these objective indicators, the MacArthur Scale of Subjective Social Status (SSS) was used. The SSS provides a subjective social status scale based on individuals' perceived rank relative to their counterparts (Galvan et al., 2022). The following survey question was used to measure this during the fifth wave: "Think of this ladder as representing where people stand in the United States. At the top of the ladder (step 10) are the people who have the most money and education, and the most respected jobs. At the bottom of the ladder (step 1) are the people who have the least money and education, and the least respected jobs or no job. Where would you place yourself on this ladder? Pick the number for the step that shows where you think you stand

at this time in your life, relative to other people in the United States." Individuals who believed they were similar to the national average regarding educational attainment, income, and job prestige responded with a value of 5 on the ladder. Responses of this variable were recoded as a binary variable, where a response of 0 indicated that an individual believed they were above average on the scale (6-10), and a response of 1 indicated that an individual believed they were average or below average (1-5). This allowed for an alternative measurement of SES that was utilized in addition to the other objective outcomes to create a broader and more accurate measurement of SES. In total, six survey questions were used to investigate how the main socioeconomic factors are affected.

Data Exploration and Analysis

In previous sections, the collected data was discussed along with the study's premise and the variables of interest. Data exploration is an essential aspect of research studies, as it allows researchers to understand the collected variables better, identify any relationships between variables, whether there is any missing data, or if any outliers exist. Summary statistics were conducted on both the dependent and independent variables. After data exploration, logistic regression models were formulated for this study.

During data exploration, the mean, median, mode, range, maximum, and minimum of the independent variables were obtained to better understand the individuals that used substances during adolescence. The value of each of these statistical metrics is straightforward; the standard deviation of the variables was also investigated to understand the spread of the data points. Skewness was also assessed; this was important as it allowed for a greater understanding of the symmetry of the collected data and whether data was skewed to one side or another, where a

value of zero indicated a symmetrical data distribution. The aforementioned metrics are displayed in Table 3.

Table 3. Data Exploration of the Age of Different Substance Use at Wave I

| Variables of Interest | Mean | Median | Mode | Min | Max | ±SD | Skewness |
|--------------------------------------|-------|--------|------|-----|-----|------|----------|
| Marijuana Use | 12.96 | 14 | 14 | 1 | 18 | 2.67 | -2.21 |
| Alcohol Use | 13.36 | 14 | 14 | 1 | 19 | 2.58 | -1.50 |
| Solvents Use | 12.00 | 13 | 13 | 1 | 18 | 3.56 | -1.35 |
| Cocaine Use | 13.40 | 15 | 16 | 1 | 18 | 4.55 | -1.82 |
| LSD, PSP, and other Illicit Drug Use | 14.16 | 15 | 15 | 1 | 18 | 3.21 | -2.60 |

Following the calculation of the statistical metrics, data visualization techniques were applied to gain a greater insight into each of the collected variables and their relationship with one another. A histogram, bar chart, or frequency table were formulated for each independent and dependent variable; this allowed for the visualization of the data points and a greater understanding of the spread of the responses, as seen in Figure 2 to Figure 15. The limited number of responses in Figure 4, Figure 5, and Figure 6 led to the creation of Figure 7, which groups the responses from the previous figures together.

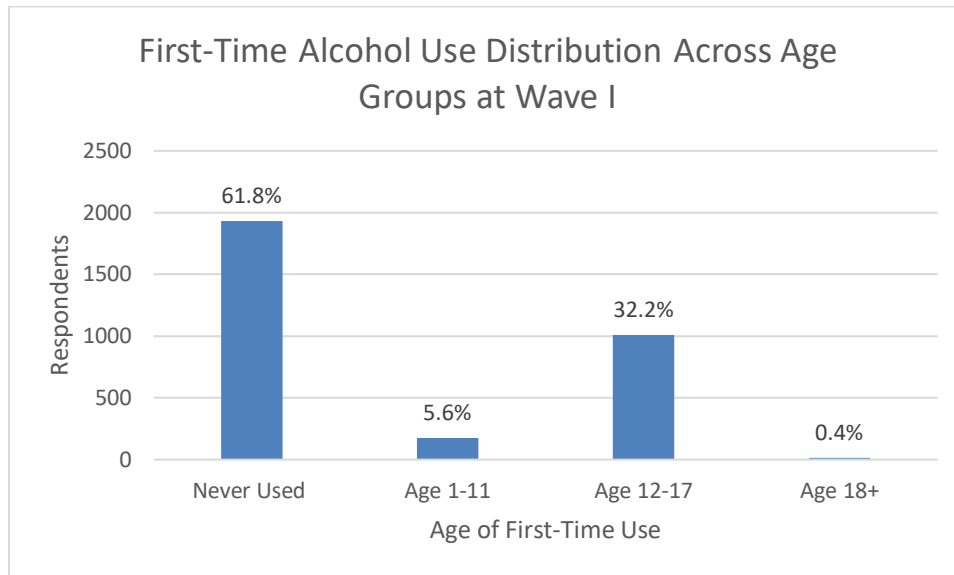


Figure 2. Distribution of First-Time Alcohol Use Across Age Categories at Wave I

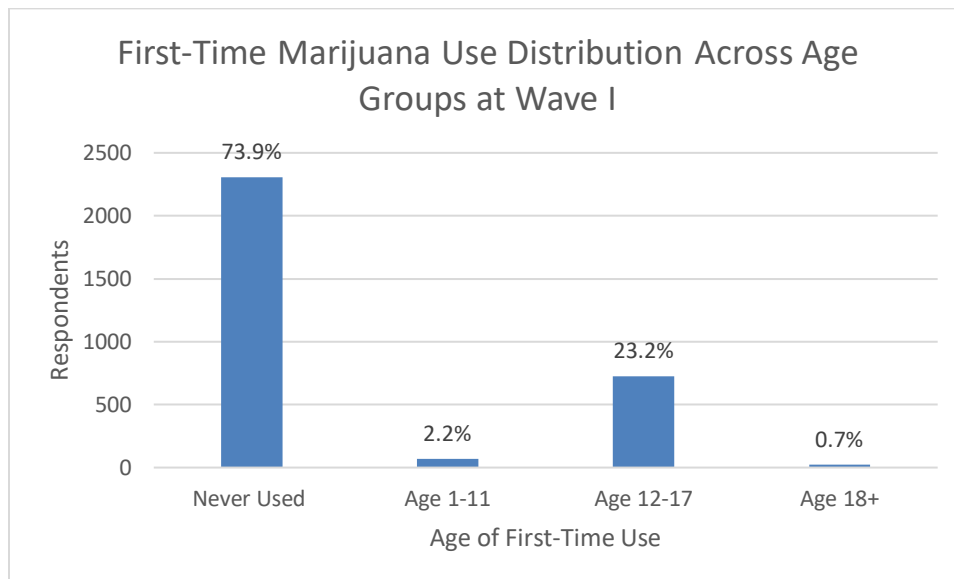


Figure 3. Distribution of First-Time Marijuana Use Across Age Categories at Wave I

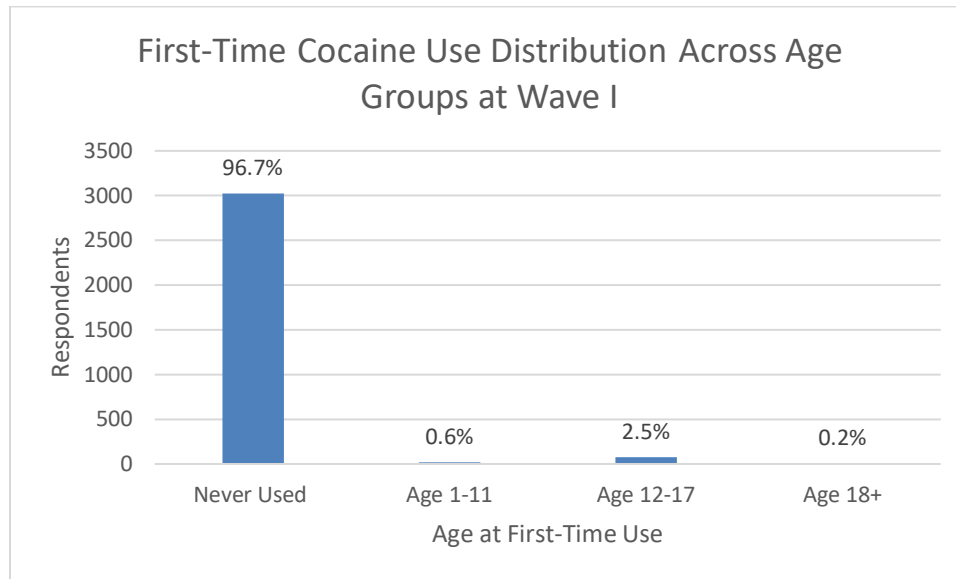


Figure 4. Distribution of First-Time Cocaine Use Across Age Categories at Wave I

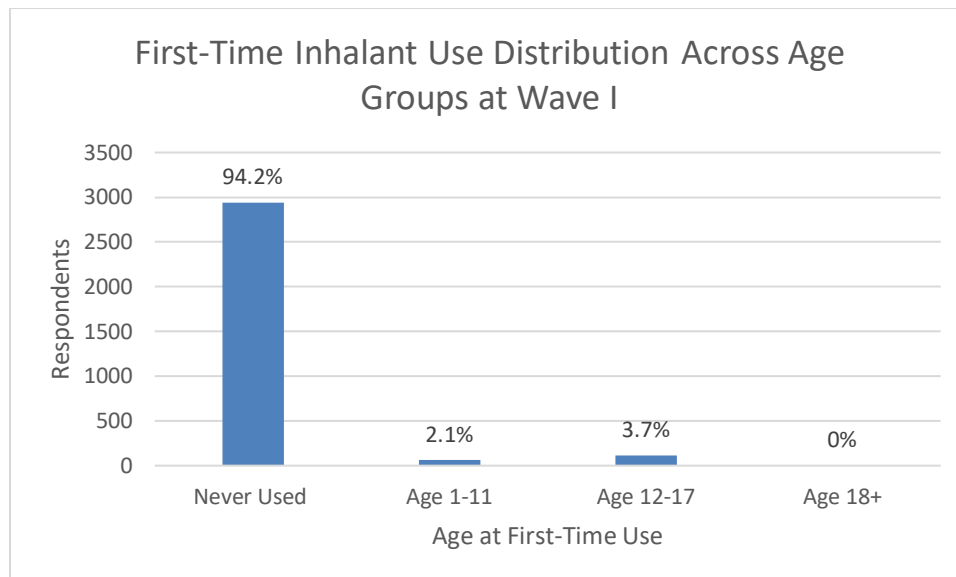


Figure 5. Distribution of First-Time Inhalant Use Across Age Categories at Wave I

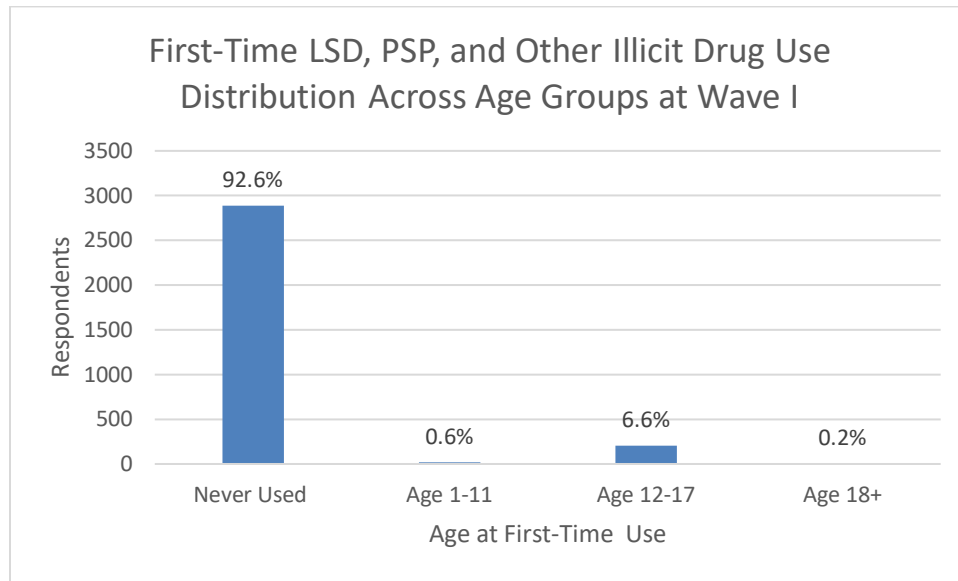


Figure 6. Distribution of First-Time LSD, PSP, and other Illicit Use Across Age Categories at Wave I

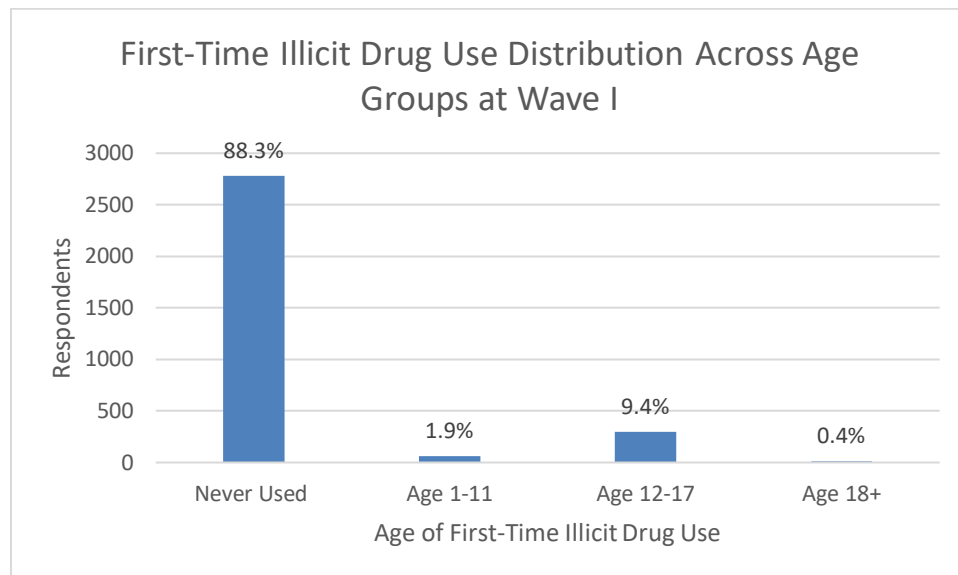


Figure 7. Distribution of Illicit Drug Use Across Age Categories at Wave I

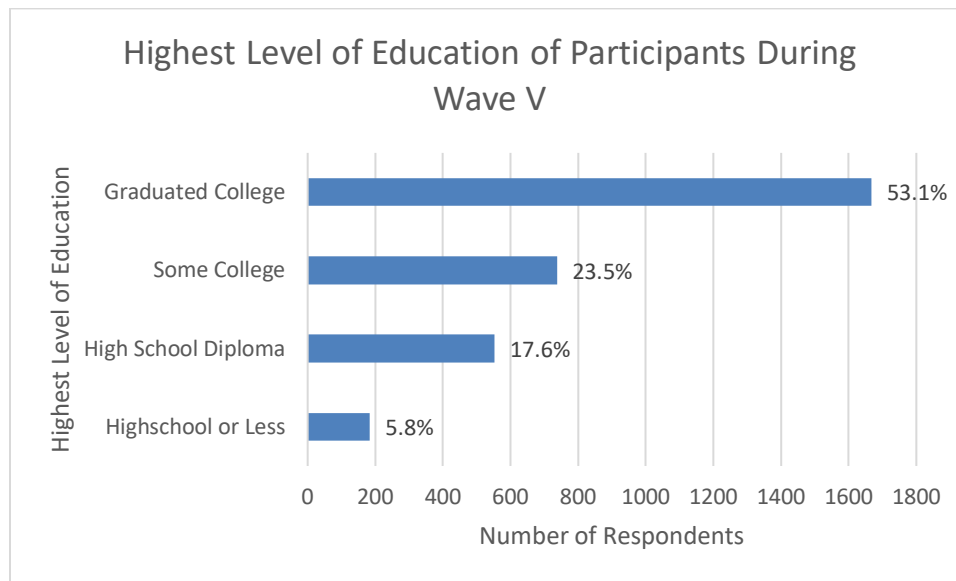


Figure 8. Highest Level of Education Completed at Wave V

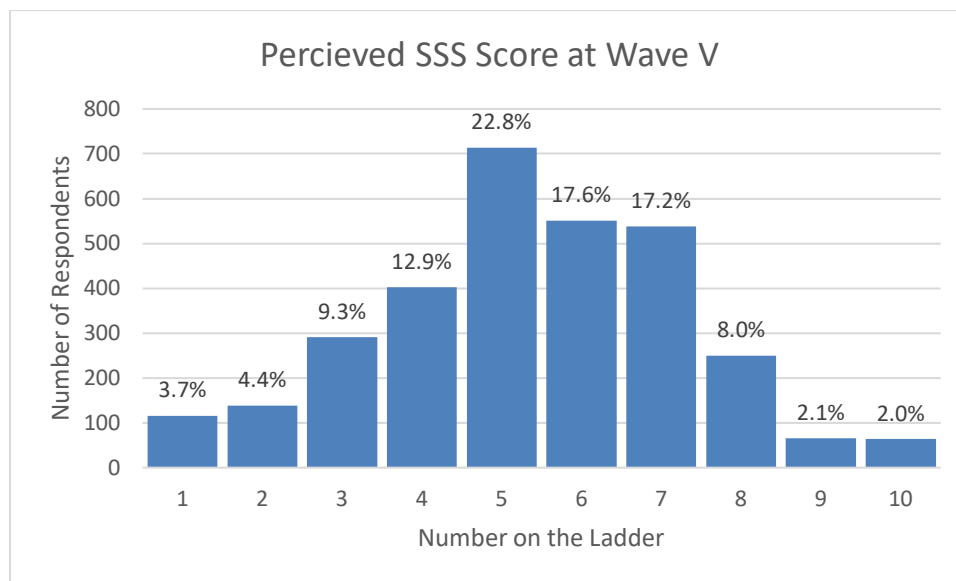


Figure 9. Perceived MacArthur SSS at Wave V

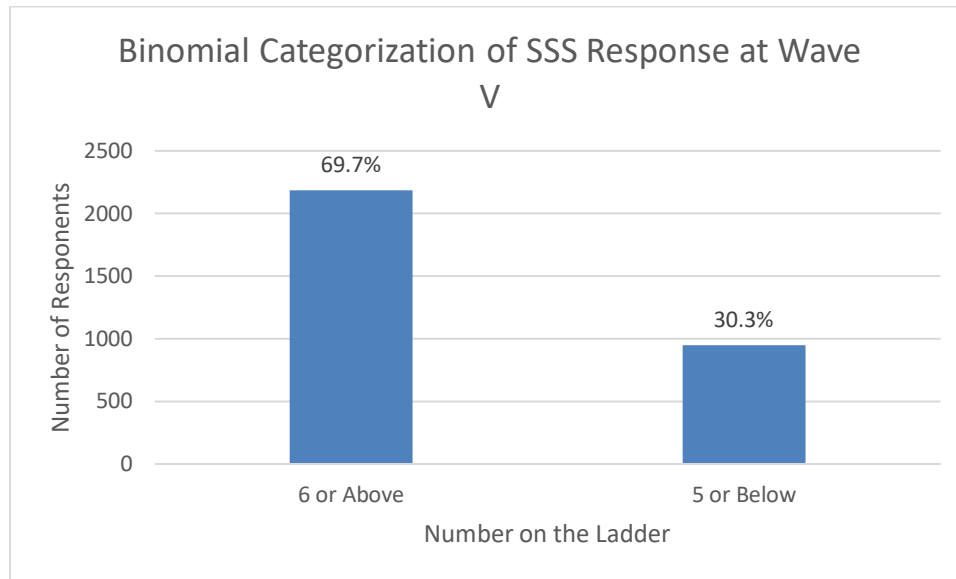


Figure 10. Binomial Recategorization of Perceived MacArthur SSS at Wave V

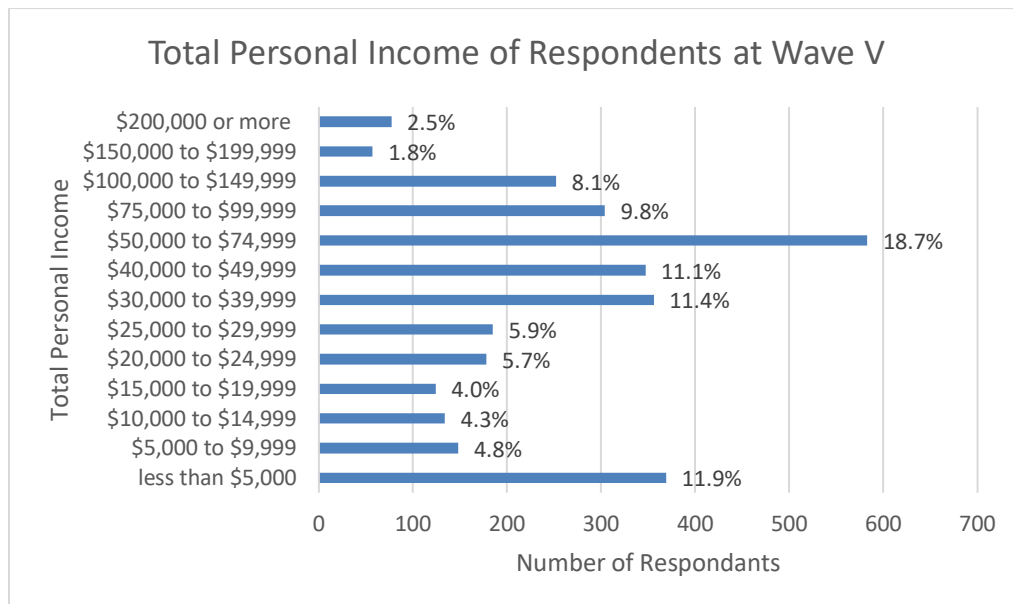


Figure 11. Total Personal Income of Respondents at Wave V

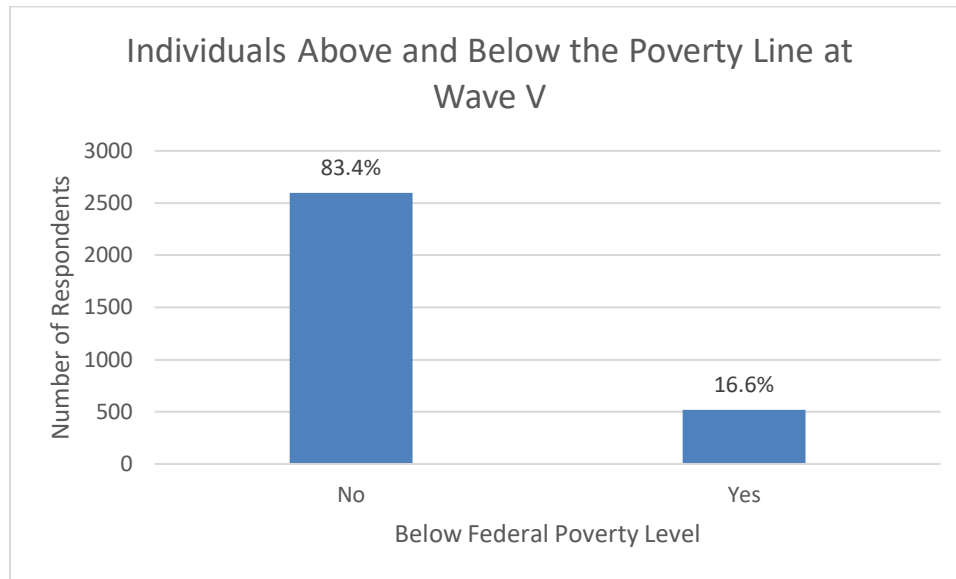


Figure 12. Total Number of Respondents Below the Federal Poverty Line at Wave V

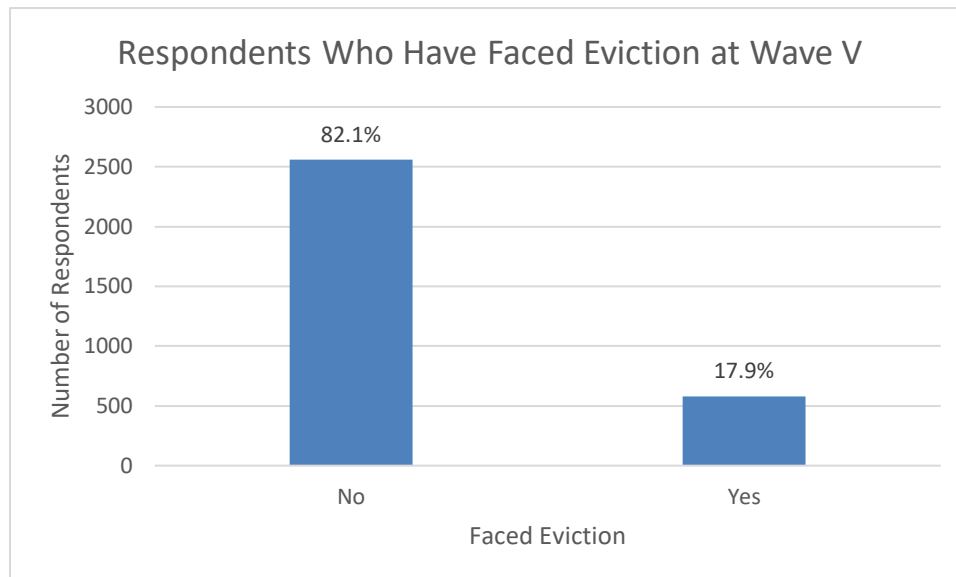


Figure 13. Total Number of Respondents Who Faced Eviction at Wave V

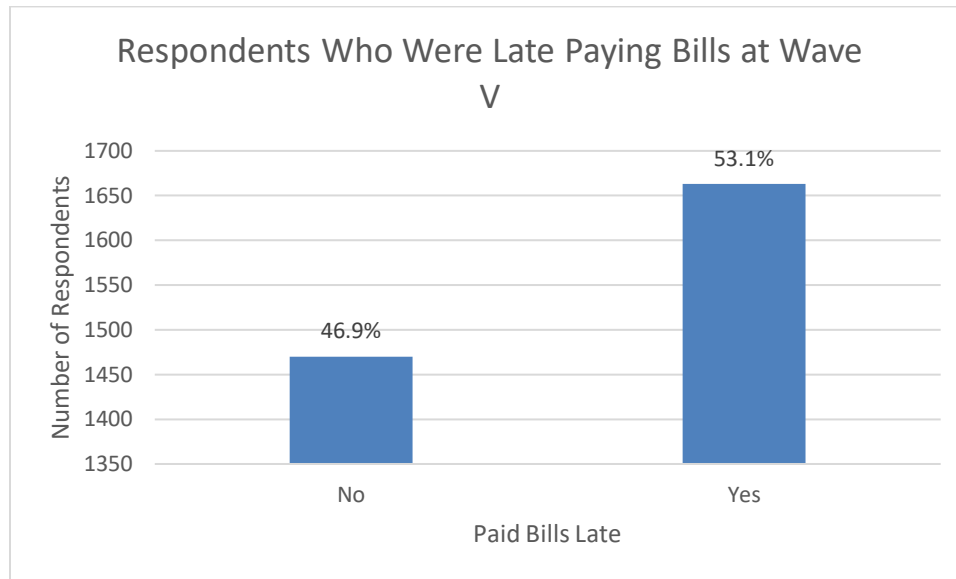


Figure 14. Total Number of Respondents Who Were Late Paying Bills at Wave V

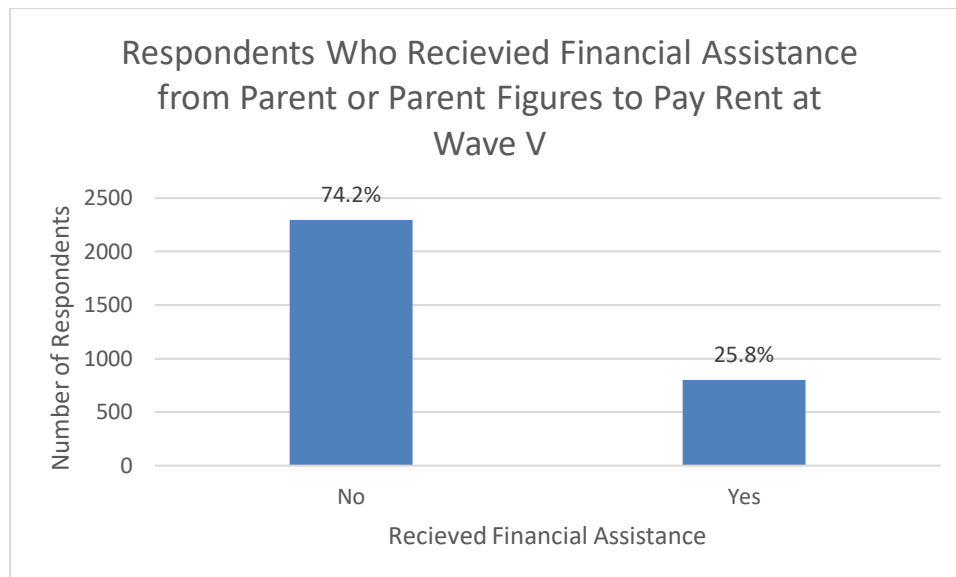


Figure 15. Total Number of Respondents Who Received Financial Assistance From Parents or Parent Figures to Pay Rent at Wave V

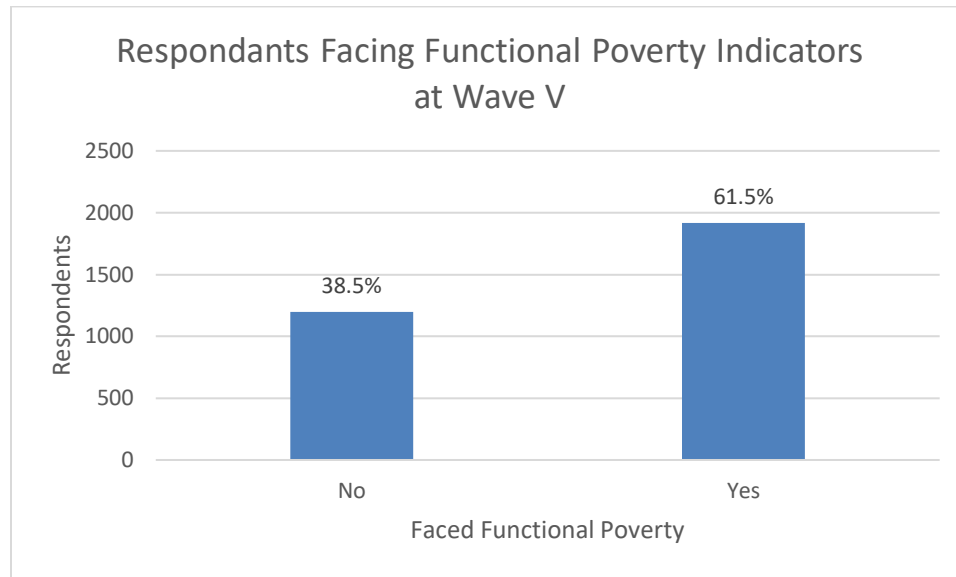


Figure 16. Total Number of Respondents Who Faced a Functional Poverty Indicator at Wave V

In addition, the exposure variables related to the first age of substance use were analyzed in relation to each of the outcome variables; a Pearson chi-squared test and its associated p-value were used to investigate the relationship between them. Due to a low frequency count for the illicit drugs, they were grouped into one category to maximize statistical power. This allowed for the determination of the strength of the relationship, as well as a better understanding of the predictors significant at the 5% level. Following these data exploration techniques, logistic regression models predicting SES-related outcomes were formulated.

After the creation of the models, investigations were conducted to determine whether the model accurately predicted SES, and whether the results were trustworthy for the developed hypothesis. A thorough analysis was essential to elucidate the influence between the respective variables. The first step was to investigate the unadjusted odds ratios and confidence intervals of the models. The confidence intervals around the beta weights were analyzed to determine whether they included a value of one or not. Suppose a value of one was not present; in that case, this concluded that the confidence interval of the beta weights was statistically significant, and

the relationship between the variables was significant. The pseudo-R-squared value was also taken into account; this would explain the percentage of variation in SES defined by the variables related to substance use. Lastly, the p-value associated with each individual age category of the independent variables was considered to understand the differences in the effects of first use on different age categories.

RESULTS

Functional Poverty Indicators

The association between the age of first use of substances of interest were analyzed in relation to the three functional poverty indicators that were first grouped into one binomial variable. Table 4 and Table 5 represent the analysis of the relationship between the age of first alcohol use and experiencing the three functional poverty indicators in adulthood. As seen in Table 4, the percentage of individuals that faced functional poverty did not differ significantly between individuals that did, and did not use alcohol during Wave I. Additionally, the chi-squared statistic was 6.0980 and had a p-value of approximately 0.2351, which was above the 0.05 conventional significance level; this indicated that there was not a strong association between the variables of interest. After examining this association, logistic regression was performed and the odds ratios for each of the respective categories relative to never used; the odds ratios for age 1-11, age 12-17, and age 18 and older were 1.29 (95% CI: 0.85, 1.97), 1.15 (95% CI: 0.95, 1.39), and 0.55 (95% CI: 0.15, 2.02), respectively. These values indicated the factor by which the odds of functional poverty changed for each increase in the predictor variable. As seen by the associated p-values, which were all above 0.05, there were no specific effects caused by alcohol use in relation to the outcome of interest. Furthermore, the confidence intervals of all three age categories included a value of 1, indicating that the odds ratios were not significantly different, and the effect was not meaningful.

Table 4. Chi-Squared Test Results for Associations Between First Alcohol Use in Wave I and Functional Poverty in Wave V

| Age of First Alcohol Use | No Functional Poverty | Percentage of Total | Functional Poverty | Percentage of Total |
|--------------------------|-----------------------|---------------------|--------------------|---------------------|
| Never Used Alcohol | 762 | 39.84% | 1150 | 60.16% |
| Age 1-11 | 59 | 33.85% | 115 | 66.15% |
| Age 12-17 | 365 | 36.45% | 635 | 63.55% |
| Age 18+ | 65 | 54.68% | 53 | 45.32% |

Chi-squared = 6.0980 ; Design-based F(2.88, 376.83) = 1.4287 ; P = 0.2351

Table 5. Logistic Regression Analysis Predicting Functional Poverty in Wave V as a Result of First Alcohol Use in Wave I

| Functional Poverty | Odds Ratio | Standard Error | P> t | 95% CI |
|---------------------------|------------|----------------|-------|--------------|
| Age of Alcohol Use | | | | |
| Baseline Odds | 1.51 | 0.088 | 0.000 | [1.35, 1.69] |
| 1-11 | 1.29 | 0.27 | 0.23 | [0.85, 1.97] |
| 12-17 | 1.15 | 0.11 | 0.14 | [0.95, 1.39] |
| 18+ | 0.55 | 0.36 | 0.37 | [0.15, 2.02] |

* Denotes significance

The associations between the age of first illicit drug use during adolescence and functional poverty were estimated, and the results are shown in Table 6 and Table 7. The percentage of individuals facing functional poverty between the relative categories was not significantly different, with all fluctuating around 65%. The chi-squared test yielded a test statistic of 9.4444 and a p-value of 0.0990, indicating that the association between the measured variables was not statistically significant at the 0.05 level. As seen in Table 7, the odds ratios for the respective categories were 1.05 (95% CI: 0.5, 2.19), 1.40 (95% CI: 1.02, 1.90), and 3.69 (95% CI: 0.63, 21.61). The confidence interval for the first and third categories included a value

of 1, indicating that there was no significant relationship with the outcome of interest. Additionally, the p-value for these categories was 0.902 and 0.146, which further confirms this. For the age category of 12-17, the confidence interval does not include a value of 1 and has a p-value of 0.033; this indicates that there is a statistically significant association between functional poverty and first use of illicit substances at these ages compared to never using during adolescence.

Table 6. Chi-Squared Test Results for Associations Between First Illicit Use in Wave I and Functional Poverty in Wave V

| Age of First Illicit Drug Use | No Functional Poverty | Percentage of Total | Functional Poverty | Percentage of Total |
|-------------------------------|-----------------------|---------------------|--------------------|---------------------|
| Never Used Illicit Drugs | 1083 | 39.3% | 1672 | 60.7% |
| Age 1-11 | 22 | 38.2% | 35 | 61.8% |
| Age 12-17 | 94 | 31.63% | 202 | 68.37% |
| Age 18+ | 2 | 14.92% | 10 | 85.08% |

Chi-squared = 9.4444 ; Design-based F (2.90, 380.50) = 1.4287 ; P = 0.0990

Table 7. Logistic Regression Analysis Predicting Functional Poverty in Wave V as a Result of First Illicit Drug Use in Wave I

| Functional Poverty | Odds Ratio | Standard Error | P> t | 95% CI |
|--------------------------------|------------|----------------|-------|---------------|
| Age of Illicit Drug Use | | | | |
| Baseline Odds | 1.54 | 0.084 | 0.000 | [1.38, 1.72] |
| 1-11 | 1.05 | 0.39 | 0.90 | [0.50, 2.19] |
| *12-17 | 1.40 | 0.21 | 0.033 | [1.02, 1.90] |
| 18+ | 3.69 | 3.29 | 0.15 | [0.63, 21.61] |

* Denotes significance

The percentages between the age categories and the use of marijuana were much different in relation to functional poverty. The chi-squared test yielded a value of 41.3366 and a p-value of < 0.0001, strongly suggesting evidence against the null hypothesis. The respective odds ratios for each age category were 3.40 (95% CI: 1.55, 7.49), 1.56 (95% CI: 1.30, 1.93), and 2.2 (95% CI: 0.71, 6.86), as seen in Table 9. The associated confidence intervals for the first two age categories did not include a value of 1, indicating that the odds ratios for these categories are statistically significant. Additionally, the p-values for the first two age categories were 0.003 and < 0.0001, again showing a significant relationship between these two age categories and facing one or more functional poverty indicators during adulthood. The confidence interval for the last age category included a value of 1, indicating that the odds ratio was not significant; it also had a p-value of 0.170, showing that there was no significant relationship between first use at 18 and older and the outcome of interest.

Table 8. Chi-Squared Test Results for Associations Between First Marijuana Use in Wave I and Functional Poverty in Wave V

| Age of First Marijuana Use | No Functional Poverty | Percentage of Total | Functional Poverty | Percentage of Total |
|----------------------------|-----------------------|---------------------|--------------------|---------------------|
| Never Used Marijuana | 950 | 41.55% | 1336 | 58.45% |
| Age 1-11 | 12 | 17.25% | 58 | 82.75% |
| Age 12-17 | 223 | 30.95% | 497 | 69.05% |
| Age 18+ | 5 | 24.36% | 14 | 75.64% |

Chi-squared = 41.3366 ; Design-based F (2.89, 379.09) = 1.4287 ; P = 0.0000

Table 9. Logistic Regression Analysis Predicting Functional Poverty in Wave V as a Result of First Marijuana Use in Wave I

| Functional Poverty | Odds Ratio | Standard Error | P> t | 95% CI |
|-----------------------------|-------------------|-----------------------|-----------------|---------------|
| Age of Marijuana Use | | | | |
| Baseline Odds | 1.41 | 0.073 | 0.00 | [1.27, 1.55] |
| *1-11 | 3.40 | 1.36 | 0.003 | [1.55, 7.49] |
| *12-17 | 1.56 | 0.16 | 0.00 | [1.30, 1.93] |
| 18+ | 2.21 | 1.26 | 0.17 | [0.71, 6.86] |

* Denotes significance

Educational Attainment

Next, the substances of interest were studied using a chi-squared test statistic to find associations between adolescent substance use and the level of education completed. The study of adolescent substance use on educational attainment is displayed in Table 10, where the chi-squared test yielded a value of 24.3543, and a p-value of 0.0816. There was no significant association between alcohol use and educational attainment due to the p-value found from the test. It is important to note that the percentages of the baseline category of individuals who never used alcohol are relatively different from the first age category of ages 1-11. Although the p-value indicates that there is no relationship, there may still be a potential trend present.

Table 10. Chi-Squared Test Results for Associations Between First Alcohol Use in Wave I and Educational Attainment in Wave V

| Age of First Alcohol Use | Less Than High School | % Total | High School Completion | % Total | Some College | % Total | College Completed | % Total |
|--------------------------|-----------------------|---------|------------------------|---------|--------------|---------|-------------------|---------|
| Never Used Alcohol | 124 | 6.40% | 328 | 16.98% | 456 | 23.59% | 1024 | 53.02% |
| Age 1-11 | 15 | 8.59% | 41 | 23.26% | 52 | 29.49% | 68 | 38.67% |
| Age 12-17 | 44 | 4.40% | 173 | 17.24% | 224 | 22.29% | 562 | 56.07% |
| Age 18+ | 1 | 6.78% | 4 | 32.36% | 2 | 13.06% | 6 | 47.90% |

Chi-squared = 24.3543; Design-based F (7.64, 1000.70) = 1.7757 ; P = 0.0816

The chi-squared test was again used to estimate the association of the first age of illicit drug use on educational attainment. The results of this test are displayed in Figure 11. As seen by the chi-squared value of 23.1764, and the p-value of 0.1597, there is not a significant association between the variables of interest. In addition to this, the percentages between the categories are relatively similar.

Table 11. Chi-Squared Test Results for Associations Between First Illicit Drug Use in Wave I and Educational Attainment in Wave V

| Age of First Illicit Drug Use | Less Than High School | % Total | High School Completion | % Total | Some College | % Total | College Completed | % Total |
|-------------------------------|-----------------------|---------|------------------------|---------|--------------|---------|-------------------|---------|
| Never Used Illicit Drugs | 162 | 5.84% | 470 | 16.92% | 648 | 23.33% | 1497 | 53.91% |
| Age 1-11 | 7 | 11.77% | 10 | 17.33% | 11 | 18.17% | 31 | 52.73% |
| Age 12-17 | 14 | 4.89% | 68 | 22.89% | 78 | 26.50% | 135 | 45.72% |
| Age 18+ | 0 | 0.00% | 6 | 47.69% | 1 | 5.99% | 6 | 46.32% |

Chi-squared = 23.1764; Design-based F (7.29, 954.37) = 1.5020 ; P = 0.1597

Table 12 displays the results of the comparison of marijuana to educational attainment. This yielded a chi-squared value of 69.3804 and a p-value of < 0.0001. Therefore, marijuana use is strongly associated with educational attainment in later life according to these test metrics. As seen by the percentages between the differing categories, individuals who used marijuana in adolescence generally dropped out at a higher rate and completed less schooling.

Table 12. Chi-Squared Test Results for Associations Between First Marijuana Use in Wave I and Educational Attainment in Wave V

| Age of First Marijuana Use | Less Than High School | % Total | High School Completion | % Total | Some College | % Total | College Completed | % Total |
|----------------------------|-----------------------|---------|------------------------|---------|--------------|---------|-------------------|---------|
| Never Used Marijuana | 120 | 5.22% | 369 | 15.99% | 523 | 22.67% | 1295 | 56.12% |
| Age 1-11 | 13 | 17.90% | 24 | 34.90% | 21 | 30.19% | 12 | 17.01% |
| Age 12-17 | 47 | 6.56% | 148 | 20.46% | 186 | 25.77% | 341 | 47.21% |
| Age 18+ | 0 | 0% | 4 | 17.76% | 5 | 26.51% | 11 | 55.73% |

Chi-squared = 69.3804; Design-based F (7.68, 1005.85) = 4.8700 ; P = 0.0000

Personal Income

Adolescent substance use was also compared to personal income. Personal income was related to the federal poverty line and coded as a binomial variable to allow for logistic regression. Alcohol use during adolescence was first compared to federal poverty with both a chi-squared test and logistic regression; the results are displayed in Table 13 and Table 14. As seen in Table 13, the chi-square test yielded a value of 1.3715 and a p-value of 0.8334, meaning there was no significant association between the two studied variables. In addition to this, the odds ratios for the different age categories were 0.964 (95% CI: 0.56, 1.65), 0.884 (95% CI:

0.64, 1.22), and 1.12 (95% CI: 0.22, 5.63). These odds ratios are not significant due to their associated confidence intervals, which include a value of 1. Additionally, the p-values for each of the age categories, 0.893, 0.454, and 0.885, further indicated that these two variables have no significant relationship.

Table 13. Chi-Squared Test Results for Associations Between First Alcohol Use in Wave I and the Federal Poverty Line in Wave V

| Age of First Alcohol Use | Above Federal Poverty Line | Percentage of Total | Below Federal Poverty Line | Percentage of Total |
|--------------------------|----------------------------|---------------------|----------------------------|---------------------|
| Never Used Alcohol | 1585 | 82.91% | 327 | 17.09% |
| Age 1-11 | 144 | 83.43% | 29 | 16.57% |
| Age 12-17 | 842 | 84.58% | 154 | 15.42% |
| Age 18+ | 9 | 81.17% | 2 | 18.83% |

Chi-squared = 1.3715 ; Design-based F (2.76, 361.99) = 0.2670 ; P = 0.8334

Table 14. Logistic Regression Analysis Predicting Federal Poverty in Wave V as a Result of First Alcohol Use in Wave I

| Personal Income | Odds Ratio | Standard Error | P> t | 95% CI |
|---------------------------|------------|----------------|------|--------------|
| Age of Alcohol Use | | | | |
| Baseline Odds | 0.21 | 0.073 | 0.00 | [0.17, 1.65] |
| 1-11 | 0.96 | 0.26 | 0.89 | [0.56, 1.65] |
| 12-17 | 0.88 | 0.15 | 0.45 | [0.64, 1.22] |
| 18+ | 1.13 | 0.92 | 0.89 | [0.22, 5.63] |

* Denotes significance

Illicit drug use was also compared to personal income and the federal poverty line, and similar results were found, as seen in Table 15 and Table 16. The initial chi-squared test and p-value, which were 4.8970 and 0.4417, respectively, indicated that there was no association

between the studied variables. Furthermore, the odds ratios of each age category displayed in Table 16 of 1.53 (95% CI: 0.52, 4.53), 1.22 (95% CI: 0.84, 1.77), and 2.32 (95% CI: 0.55, 8.97), were not significant. This is due to their associated confidence intervals, which include a value of 1. The p-values, which were 0.493, 0.291, and 0.250, also indicated that there was no significant relationship between the two.

Table 15. Chi-Squared Test Results for Associations Between First Illicit Drug Use in Wave I and the Federal Poverty Line in Wave V

| Age of First Illicit Drug Use | Above Federal Poverty Line | Percentage of Total | Below Federal Poverty Line | Percentage of Total |
|-------------------------------|----------------------------|---------------------|----------------------------|---------------------|
| Never Used Illicit Drugs | 2308 | 83.85% | 444 | 16.15% |
| Age 1-11 | 44 | 77.23% | 13 | 22.77% |
| Age 12-17 | 237 | 80.97% | 56 | 19.03% |
| Age 18+ | 8 | 69.08% | 4 | 30.92% |

Chi-squared = 4.9870 ; Design-based F (2.60, 340.39) = 0.8747 ; P = 0.4417

Table 16. Logistic Regression Analysis Predicting Federal Poverty in Wave V as a Result of First Illicit Drug Use in Wave I

| Personal Income | Odds Ratio | Standard Error | P> t | 95% CI |
|--------------------------------|------------|----------------|------|--------------|
| Age of Illicit Drug Use | | | | |
| Baseline Odds | 0.19 | 0.073 | 0.00 | [0.16, 0.22] |
| 1-11 | 1.53 | 0.84 | 0.44 | [0.52, 4.53] |
| 12-17 | 1.22 | 0.23 | 0.29 | [0.84, 1.77] |
| 18+ | 2.32 | 1.70 | 0.25 | [0.55, 9.87] |

* Denotes significance

Lastly, marijuana use in adolescence was compared to personal income, and the majority of the findings were consistent with what was found between the previous two substance

categories and income. The results in Table 17 indicate that there was not a significant association between the two, as the p-value was 0.1074 and the chi-squared was 10.2483. Despite this, when looking at the percentage of individuals below the federal poverty line in terms of income, individuals who used marijuana for the first time at ages 1-11 were greater in terms of percentages. When conducting logistic regression, the odds ratios were 2.28 (95% CI: 1.06, 4.93), 1.02 (95% CI: 0.77, 1.35), and 1.10 (95% CI: 0.31, 3.96). The odds ratio for the first category was significant as its associated confidence interval did not include a value of 1. Additionally, the p-value was 0.036. The other two categories had confidence intervals that included a value of 1, and p-values indicating that the relationship was not significant (0.891 and 0.876).

Table 17. Chi-Squared Test Results for Associations Between First Marijuana Use in Wave I and the Federal Poverty Line in Wave V

| Age of First Marijuana Use | Above Federal Poverty Line | Percentage of Total | Below Federal Poverty Line | Percentage of Total |
|-----------------------------------|-----------------------------------|----------------------------|-----------------------------------|----------------------------|
| Never Used Marijuana | 1912 | 83.83% | 369 | 16.17% |
| Age 1-11 | 49 | 69.41% | 21 | 30.59% |
| Age 12-17 | 601 | 83.56% | 118 | 16.44% |
| Age 18+ | 16 | 82.41% | 4 | 17.59% |

Chi-squared = 10.2483 ; Design-based F (2.78, 363.84) = 2.0801 ; P = 0.1074

Table 18. Logistic Regression Analysis Predicting Federal Poverty in Wave V as a Result of First Marijuana Use in Wave I

| Personal Income | Odds Ratio | Standard Error | P> t | 95% CI |
|-----------------------------|-------------------|-----------------------|-----------------|---------------|
| Age of Marijuana Use | | | | |
| Baseline Odds | 0.19 | 0.018 | 0.00 | [0.16, 0.23] |
| *1-11 | 2.28 | 0.89 | 0.036 | [1.06, 4.93] |
| 12-17 | 1.02 | 0.15 | 0.89 | [0.77, 1.35] |
| 18+ | 1.10 | 0.71 | 0.88 | [0.31, 3.96] |

* Denotes significance

Subjective Status

The final outcome that was studied was based off on individuals' perceived social status in relation to the general population. Alcohol use was analyzed first with a chi-squared test and logistic regression, and the results are displayed in Table 19 and Table 20. A value of 12.8880 was obtained from the chi-squared test, along with a p-value of 0.0448. This indicates that there is a relationship between the two variables of interest. The subsequent logistic regression resulted in odds ratios of 1.66 (95% CI: 1.08, 2.55), 0.97 (95% CI: 0.78, 1.22), and 2.27 (95% CI: 0.64, 8.08), however, only the odds ratio of the first age category is considered significant due to the confidence interval not including a value of 1. Additionally, the p-values of the three categories resulted in the same conclusions, as they were 0.02, 0.820, and 0.202.

Table 19. Chi-Squared Test Results for Associations Between First Alcohol Use in Wave I and the MacArthur SSS in Wave V

| Age of First Alcohol Use | Perceived SSS ≥ 6 | Percentage of Total | Perceived SSS ≤ 5 | Percentage of Total |
|--------------------------|------------------------|---------------------|------------------------|---------------------|
| Never Used Alcohol | 1353 | 70.27% | 572 | 29.73% |
| Age 1-11 | 103 | 58.68% | 72 | 41.32% |
| Age 12-17 | 708 | 70.81% | 292 | 29.19% |
| Age 18+ | 6 | 50.96% | 6 | 49.04% |

Chi-squared = 12.8880 ; Design-based F (2.74, 359.22) = 2.7996 ; P = 0.0448

Table 20. Logistic Regression Analysis Predicting MacArthur SSS in Wave V as a Result of First Marijuana Use in Wave I

| MacArthur SSS | Odds Ratio | Standard Error | P> t | 95% CI |
|---------------------------|------------|----------------|-------|--------------|
| Age of Alcohol Use | | | | |
| Baseline Odds | 0.42 | 0.031 | 0.000 | [0.37, 0.49] |
| *1-11 | 1.66 | 0.36 | 0.02 | [1.08, 2.55] |
| 12-17 | 0.97 | 0.11 | 0.82 | [0.78, 1.22] |
| 18+ | 2.27 | 1.46 | 0.20 | [0.64, 8.08] |

* Denotes significance

When comparing illicit drug use in adolescence to perceived subjective status in adulthood, similar results were found. As seen in Table 21, the chi-squared test yielded a value of 15.5377 and a p-value of 0.0495, meaning that there was a significant association between the two. Additionally, as seen in Table 22, the odds ratios for each of the age categories were 1.27 (95% CI: 0.54, 2.98), 1.56 (95% CI: 1.12, 2.27), and 1.94 (95% CI: 0.48, 7.78). Only the odds ratio for the second age category, which included individuals who used illicit drugs from ages 12-17 was significant, as the confidence interval did not contain a value of 1, and its p-value was 0.01. The remaining two categories did not have a significant relationship with the outcome due

to the confidence intervals, and p-values of 0.580 and 0.347, respectively.

Table 21. Chi-Squared Test Results for Associations Between First Illicit Drug Use in Wave I and the MacArthur SSS in Wave V

| Age of First Illicit Drug Use | Perceived SSS ≥ 6 | Percentage of Total | Perceived SSS ≤ 5 | Percentage of Total |
|-------------------------------|------------------------|---------------------|------------------------|---------------------|
| Never Used Illicit Drugs | 1961 | 70.86% | 806 | 29.14% |
| Age 1-11 | 38 | 65.70% | 20 | 34.30% |
| Age 12-17 | 179 | 60.37% | 117 | 39.63% |
| Age 18+ | 7 | 55.62% | 5 | 44.38% |

Chi-squared = 15.5377 ; Design-based F (2.89, 378.19) = 2.6698 ; P = 0.0495

Table 22. Logistic Regression Analysis Predicting MacArthur SSS in Wave V as a Result of First Illicit Drug Use in Wave I

| MacArthur SSS | Odds Ratio | Standard Error | P> t | 95% CI |
|--------------------------------|------------|----------------|-------|--------------|
| Age of Illicit Drug Use | | | | |
| Baseline Odds | 0.41 | 0.028 | 0.00 | [0.36, 0.47] |
| 1-11 | 1.27 | 0.55 | 0.58 | [0.54, 2.98] |
| *12-17 | 1.56 | 0.28 | 0.010 | [1.12, 2.27] |
| 18+ | 1.94 | 1.36 | 0.35 | [0.48, 7.78] |

* Denotes significance

Lastly, marijuana use was compared to the outcome of interest, and results similar to that of illicit drugs were found, as seen in Table 23 and Table 24. The initial chi-squared test yielded a value of 19.1922, and a p-value of 0.0154; this indicated a significant association between the age of first marijuana use and perceived social status. Additionally, the odds ratio for the category that included youth from 12-17 was 1.39 (95% CI: 1.12, 1.74), and was significant when considering its associated confidence interval, which did not include a value of 1. The p-value for this category was 0.004, which further indicated that there was a significant

relationship between the two. The odds ratios for the remaining categories were not significant when looking at the confidence intervals and the p-values, which were 0.148 and 0.382.

Table 23. Chi-Squared Test Results for Associations Between First Marijuana Use in Wave I and the MacArthur SSS in Wave V

| Age of First Marijuana Use | Perceived SSS ≥ 6 | Percentage of Total | Perceived SSS ≤ 5 | Percentage of Total |
|----------------------------|------------------------|---------------------|------------------------|---------------------|
| Never Used Marijuana | 1642 | 71.55% | 653 | 28.45% |
| Age 1-11 | 42 | 60.7% | 28 | 39.30% |
| Age 12-17 | 466 | 64.32% | 258 | 35.68% |
| Age 18+ | 18 | 83.50% | 3 | 16.50% |

Chi-squared = 18.1922 ; Design-based F (2.95, 386.32) = 3.5398 ; P = 0.0154

Table 24. Logistic Regression Analysis Predicting MacArthur SSS in Wave V as a Result of Marijuana Use in Wave I

| MacArthur SSS | Odds Ratio | Standard Error | P> t | 95% CI |
|-----------------------------|------------|----------------|-------|--------------|
| Age of Marijuana Use | | | | |
| Baseline Odds | 0.40 | 0.030 | 0.000 | [0.34, 0.46] |
| 1-11 | 1.62 | 0.55 | 0.15 | [0.84, 3.16] |
| 12-17 | 1.39 | 0.16 | 0.004 | [1.12, 1.74] |
| 18+ | 0.49 | 0.40 | 0.38 | [0.10, 2.40] |

* Denotes significance

DISCUSSION

Interpretation of Results

The analyses conducted among this nationally representative cohort of US adolescents in grades 7-12 from the 1990s provided numerous insights surrounding the predictor and outcome variables studied. Each substance studied yielded different findings, showing that the substance used during adolescence affects SES-related factors in adulthood in different ways. These findings align with the life course theory, as individuals initially surveyed in Wave I were anywhere from 12-18 years old, and the effects were displayed in Wave V when respondents were aged 33-43.

The associations of the first age of use of alcohol in adolescence were only found to be significant in relation to individuals' perceived subjective status during adulthood for youth aged 1-1. No significant associations were found between adolescent substance use and facing functional poverty indicators, the level of education completed, and making a yearly income that is below the federal poverty line spanning any age group. This is surprising, as substance use during adolescence is often subject to numerous implications in adulthood. Since the age of first use was the predictor variable, it may be due to adolescents not sustainably using alcohol after their first use. However, SSS was seen to be impacted by the first age of use. Although youth older than 11 were not affected by the predictor, the findings have great implications for youth. A lower SSS has been found to be associated with increased odds of numerous health issues, including hypertension, obesity, and cardiovascular disease (Tang et al., 2016). Additionally, a lower SSS has been linked to greater emotional distress in pregnant women (Guardino & Schetter, 2022). In turn, this can affect future generations, as a developing baby is directly affected by

their mother's well-being. These findings are similar to previous studies, which found that alcohol use initiation may result in decreases of well-being (Blonigen et al., 2015). In the future, attempts should be made to prevent the use of alcohol at a young age due to its potential effects on SSS in adulthood. Not only is this a significant issue, but there are major repercussions of adolescent substance use in other aspects unrelated to SES. Protocols and policies should be implemented in the future, and parents should be informed of the detrimental impacts of an early age of alcohol use on one's future.

Similar to alcohol, illicit drug use had no significant association with educational attainment or personal income, relative to the federal poverty line. However, illicit drug use was found to be significantly associated with functional poverty indicators; more specifically, individuals who used for the first time from ages 12-17 were more likely to face these outcomes during adulthood compared to those who never used during adolescence. The functional poverty indicator included information from three survey questions, which were all related to monetary outcomes. Although personal income in relation to the poverty line was unaffected, individuals' total salaries may have been, as individuals faced indicators directly related to income.

Functional poverty indicators are associated with issues related to housing, earnings, and worsened physical and mental health in the long-term (Cornec, 2023; PD&R, 2021). Therefore, an early age of use is detrimental to individuals' long-term stability and success. In addition to these effects, individuals in the same age category were associated with a decreased SSS. As previously mentioned, there are numerous implications to this. The two outcomes that 12–17-year-olds who use illicit drugs for the first time face may be related to one another, as facing functional poverty indicators may decrease one's perceived status. Previous studies have found that an earlier age of onset is associated with psychosocial, emotional, and physical problems in

adulthood (Poudel & Gautam, 2017). Policy changes must be enacted to prevent the exposure of adolescents to these illicit drugs, in order to prevent the manifestation of these issues during adulthood.

Of the substances studied, marijuana was found to have the strongest associations with the outcomes of interest, as all of the study's outcomes were associated with the age of first use.

First of all, first-time marijuana use from age 1-17 and facing functional poverty in adulthood was found to be statistically significant. As previously mentioned, the repercussions of facing these are severe, and can cause detrimental effects in the long term. In addition to this,

educational attainment was strongly associated with the first age of marijuana use.

Approximately 17.9% of individuals who used substances for the first time at age 1-11 did not complete high school, whereas their non-using counterparts did not complete high school at a rate of 5.22%. Earning a high school diploma is associated with lifelong earning potential, better employment prospects, and a decreased chance of premature death (OASH, n.d.). First marijuana use is significantly affecting individuals' long-term success, not only from an opportunity standpoint, but also from a financial standpoint. This is further seen in individuals who used for the first time at ages 1-11, due to the statistically significant relationship between this and attaining an income below the federal poverty line. Educational attainment is directly linked to financial prospects, and the findings of this study are reasonable according to the literature.

Lastly, individuals who first used at age 12-17 had a lower SSS than their non-using counterparts. Due to the combination of these results, it is clear that marijuana has significant impacts on individuals' SES during adulthood. With the ongoing legalization of marijuana across the United States, it is essential for certain precautions to take place. Individuals must understand the detrimental effects of using it at a young age, and parents must help keep it out of the reach

of the youth. Early prevention efforts can be made to ensure that individuals do not face the subsequent impacts in the long term.

There are numerous strategies that can be used to prevent the adverse outcomes of the initiation of substance use during adolescence. To understand the most effective strategies to target this, one must first understand why adolescents partake in the use of drugs in the first place. The misuse of substances is generally due to one of five reasons: individuals wanting to feel good, feel better, do better, out of curiosity, or because others are doing it (NIDA, as cited in Dow & Kelly, 2013). Adolescents who have never tried any substances do not know the immediate feelings associated with a drug; they only know what has been told to them by a friend or what they may have heard from another source. According to this, the areas that are left to focus on are all related to adolescents' environment. Over the past few decades, numerous policies and educational programs have been used to prevent substance use and have found success. In the 1990s, when data from the first wave of the Add Health study was collected, substance use was incredibly high, with as many as 43.3% of adolescents in 8th, 10th, or 12th grade reporting the use of illicit drugs (Vankar, 2024). In optimal conditions, youth educational programs have been found to stop or delay the onset of drug use in adolescence (Midford, 2000). This is evident by the decreasing use over the years, however, barring the pandemic, substance use rates among adolescents have remained relatively steady since 2010 (Vankar, 2024). The increased use of social media may be the reason for this. In a survey of 500 young adults conducted by American Addiction Centers (2023), they found that half of the respondents got the impression from social media that it was okay or normal to try drugs; additionally, 63% of respondents strongly agreed that it was cool to use drugs in high school. Therefore, the use of new methods may be necessary to account for cultural lag. Advances in technology, such as the

internet and social media, have made it easier for adolescents to access information about and obtain various substances. Although these technological advancements have occurred, norms and regulations regarding substance use have not adapted at the same pace. We are only now starting to see the implementation of policies related to social media. Recently, a bill banning children under 14 from using social media was signed in the state of Florida (Farrington, 2024). It will be interesting to understand the effects of this bill in relation to substance use in the near future. In addition to this, parental programs should also be considered when targeting the initiation of substance use. Young children often learn through watching the individuals in their environment (Shrier, 2014). Therefore, informing parents about the consequences of partaking in certain behaviors around their children may be essential in the prevention of substance use. There are also other confounders that may have caused the steady use rate of adolescents, and future studies must work to understand this.

Limitations and Future Studies

There are several limitations of this study that must be considered. First of all, the sample for the age categories used in this study are relatively small, which led to the combination of substance categories and functional poverty indicators. Even after combining these, the samples remained small, possibly leading to inaccurate conclusions. In addition to this, there is a limitation surrounding the federal poverty line metric that is related to personal income. The federal poverty line at the time of data collection in Wave V was approximately \$12,060. When creating the binary variable, the federal poverty line was set at \$10,000 due to the format of the survey responses in the study. Furthermore, the continued use of substance use was not considered; only the first age of use was. Individuals who used for the first time may have continued to use substances throughout the rest of their adolescent years, which may have led to

the relationships established. Additionally, the survey questions regarding the first use of a substance were only considered during the first two waves. The data from individuals who started using when they were 14 years old but responded to the survey at age 12 would not be included in the study. This questioning in later waves is necessary for insights into these individuals. Consideration of social desirability bias must also be taken into account, as respondents may have only answered in a way to appeal to the individual conducting the survey. Lastly, the presence of confounders must be considered when understanding the associations made in this study. There are numerous predictors that may also be related to the variables of interest, such as childhood trauma, low academic achievement, mental health issues, or other related factors. By considering these confounders, a more reliable conclusion would be attained.

In the future, a larger sample should be used to form more reliable conclusions about the relationships of interest. Through the use of the restricted-use Add Health dataset, this can be addressed, while maintaining a study that has a longitudinal format that is representative of the United States population. With a larger sample size, variables would not have to be combined and could be studied individually. This would allow for more specific and significant findings that could lead to more accurate policy changes and prevention strategies in the future. In addition to this, a new longitudinal study should be conducted in the future to ensure that the relationship between substance use initiation in adolescence and socioeconomic outcomes in adulthood is still present in the youth from later generations.

CONCLUSION

The analysis conducted in this study observed a relationship between the age of initiation of substance use and socioeconomic outcomes in adulthood through the use of the Add Health public-use dataset. The findings underscore the effects of the first age of alcohol, illicit drug, and marijuana use on individuals' long-term future. Associations were found between each of the substances that were studied, with the strongest associations surrounding marijuana use. More specifically, first use of alcohol was found to affect individuals' perceived SSS in adulthood; first use of illicit drug use was found to be significantly associated with facing functional poverty indicators and a lower perceived SSS in adulthood; and lastly, first use of marijuana is strongly associated with facing functional poverty indicators in adulthood, lower educational attainment, a greater chance of making less than the federal poverty line, and perceiving oneself as below average socioeconomically. This emphasizes the importance of the implementation of prevention efforts and policy changes to prevent the associated repercussions in adulthood. Further research in this area is needed to understand the associations of this study further.

LIST OF REFERENCES

- American Addiction Centers. (2023, May 4). *Drug education survey*.
<https://americanaddictioncenters.org/blog/drug-education-survey>
- American Psychological Association. (2010). *Children, youth, families and SES*.
<https://www.apa.org/pi/ses/resources/publications/children-families>
- American Psychological Association. (2015). *Measuring SES and subjective social status*.
<https://www.apa.org/pi/ses/resources/class/measuring-status>
- American Public Health Association. (n.d.). *Substance misuse*. <https://www.apha.org/topics-and-issues/substance-misuse>
- APA Dictionary of Psychology. (2022). *SES*. American Psychological Association.
<https://www.apa.org/topics/socioeconomic-status>
- Barker, K. M., Brown, S., Pitpitan, E. P., Shakya, H. B., & Raj, A. (2023). Adolescent alcohol use: Use of social network analysis and cross-classified multilevel modeling to examine peer group, school, and neighborhood-level influences. *The American Journal of Drug and Alcohol Abuse*. <https://doi.org/10.1080/00952990.2023.2222431>
- Beharie, N., Scheidell, J. D., Quinn, K., McGorray, S., Vaddiparti, K., Kumar, P. C., Frueh, B. C., Boone, L., & Khan, M. R. (2019). Associations of adolescent exposure to severe violence with substance use from adolescence into adulthood: Direct versus indirect exposures. *Substance Use Misuse, 54*(2), 191.
<https://doi.org/10.1080/10826084.2018.1495737>
- Blonigen, D. M., Durbin, E. C., Hicks, B. M., Johnson, W., McGue, M., Iacono, W. G. (2015, September 30). Alcohol use initiation is associated with changes in personality trait trajectories from early adolescence to young adulthood. *Alcoholism: Clinical and Experimental Research, 39*(11), 2163-2170. <https://doi.org/10.1111/acer.12878>
- Bobbitt, Z. (2022, April 25). *Univariate vs. multivariate analysis: What's the difference?* Statology. <https://www.statology.org/univariate-vs-multivariate-analysis/>
- Bray, J. W., Zarkin, G. A., Ringwalt, C., & Qi, J. (2000). The relationship between marijuana initiation and dropping out of high school. *Health economics, 9*(1), 9–18.
[https://doi.org/10.1002/\(sici\)1099-1050\(200001\)9:1<9::aid-hec471>3.0.co;2-z](https://doi.org/10.1002/(sici)1099-1050(200001)9:1<9::aid-hec471>3.0.co;2-z)
- Cagnassola, M., E. (2023, March 24). *45% of parents with adult kids are helping them pay their bills*. Money. <https://money.com/parents-paying-kids-bills/>

- Calling, S., Ohlsson, H., Sundquist, J., Sundquist, K., & Kendler, K. S. (2019). SES and alcohol use disorders across the lifespan: A co-relative control study. *PLoS ONE*, *14*(10).
<https://doi.org/10.1371/journal.pone.0224127>
- Centers for Disease Control and Prevention. (2023, December 19). *Communities are leading the way to prevent youth substance use*.
<https://www.cdc.gov/drugoverdose/deaths/index.html>
- Centers for Disease Control and Prevention. (2023, August 22). *Drug overdose deaths*.
<https://www.cdc.gov/drugoverdose/deaths/index.html>
- Centers for Disease Control and Prevention. (2023, June 26). *Substance Use*.
<https://www.cdc.gov/nchs/hus/sources-definitions/substance-use.htm>
- Christie, D. (2005). Adolescent development. *ABC of adolescence*, *330*(301).
<https://doi.org/10.1136/bmj.330.7486.301>
- Collinson, R., Humphries, J. E., Mader, N. S., J., Reed, D. K., Tannenbaum, D. I., & van Dijk, W. (2023). Eviction and poverty in American cities. *The Quarterly Journal of Economics*, *139*(1). <https://www.nber.org/papers/w30382>
- Cornec, H. (2023, September 26). *New research sheds light on the economic consequences of evictions*. Yale University. <https://economics.yale.edu/news/230926/new-research-sheds-light-economic-consequences-evictions>
- Cystic Fibrosis Foundation. (n.d.). *Substance misuse*. <https://www.cff.org/managing-cf/substance-misuse>
- Davis, M. (2022, October 3). *Amid rising inflation, 61% of Americans who paid a bill late in the past 6 months say they couldn't afford it*. Lendingtree.
<https://www.lendingtree.com/personal/late-bills-study/>
- Dow, S., Kelly, J. F. (2013). Listening to youth: Adolescents' reasons for substance use as a unique predictor of treatment response and outcome. *Psychology of Addictive Behaviors*, *27*(4), 1122–1131. <https://doi.org/10.1037/a0031065>
- Ellickson, P. L., Tucker, J. S., & Klein, D. J. (2003). Ten-year prospective study of public health problems associated with early drinking. *Pediatrics*, *111*(5 Pt 1), 949–955.
<https://doi.org/10.1542/peds.111.5.949>
- Farrington, B. (2024, March 25). *Florida's DeSantis signs one of the country's most restrictive social media bans for minors*. AP News. <https://apnews.com/article/florida-social-media-ban-desantis-fd07f61e167bd9109a83cd7355b5f164>

- Fergusson, D. M., Horwood, L. J., & Beautrais, A. L. (2003). Cannabis and educational achievement. *Addiction*, *98*(12), 1681–1692. <https://doi.org/10.1111/j.1360-0443.2003.00573.x>
- Galvan, M. J., Payne, K., Hannay, J., Georgeson, A., & Muscatell, K. (2022). What does the macarthur scale of subjective social status measure? Separating economic circumstances and social status to predict health. *PsyArXiv*. <https://doi.org/10.31234/osf.io/e9px3>
- Goldman, D., Oroszi, G., & Ducci, F. (2005). The genetics of addictions: Uncovering the genes. *Nature Reviews Genetics*, *6*(7), 521-532. <https://doi.org/10.1038/nrg1635>
- Grensing-Pophal, L. (2021, December 17). *Substance abuse got worse amid the pandemic and remote work*. SHIRM. <https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/substance-abuse-got-worse-amid-pandemic-and-remote-work.aspx>
- Guardino, C., & Schetter, C. D. (2022, March). Subjective social status and allostatic load in mothers one year after birth. *Health Psychology*, *41*(3), 235-241. doi: 10.1037/hea0001148
- Howard, R. (2020). *Working for a living wage*. UNC School of Government. <https://ncimpact.sog.unc.edu/2022/07/working-for-a-living-wage/>
- John Hopkins Medicine. (n.d.). *Substance use disorder*. <https://www.hopkinsmedicine.org/health/conditions-and-diseases/substance-abuse-chemical-dependency>
- Kansky, J., Allen, J. P., & Diener, E. (2016). Early adolescent affect predicts later life outcomes. *Applied Psychology: Health and Well-Being*, *8*(2), 192. <https://doi.org/10.1111/aphw.12068>
- Kendler, K. S., Gardner, C. O., Hickman, M., Heron, J., Macleod, J., Lewis, G., & Dick, D. M. (2014). SES and alcohol-related behaviors in mid- to late adolescence in the avon longitudinal study of parents and children. *Journal of Studies on Alcohol and Drugs*, *75*(4), 541-545. <https://doi.org/10.15288/jsad.2014.75.541>
- Kilpatrick, D. G., Acierno, R., Saunders, B., Resnick, H. S., Best, C. L., & Schnurr, P. P. (2000). Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology*, *68*(1), 19–30. <https://doi.org/10.1037//0022-006x.68.1.19>
- Kobayashi, A. (Ed.). (2020). *International encyclopedia of human geography*. Elsevier.
- Liu, H., & Clark, B. (2023). Socioeconomic factors in the age-graded effect of incarceration on depressive symptoms in early adulthood. *Social Science Research*, *111*, 102871–102871. <https://doi.org/10.1016/j.ssresearch.2023.102871>

- Madigan, A., & Daly, M. (2023). SES and depressive symptoms and suicidality: The role of subjective social status. *Journal of Affective Disorders*, 326, 36–43. <https://doi.org/10.1016/j.jad.2023.01.078>
- McLellan, A. T. (2017). Substance misuse and substance use disorders: Why do they matter in healthcare? *Transactions of the American Clinical and Climatological Association*, 128, 112-130. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5525418/>
- Midford, R. (2000). Does drug education work? *Drug Alcohol Review*, 19(4), 441-446. <https://pubmed.ncbi.nlm.nih.gov/28474449/>
- Miller, G. E., Chen, E., Yu, T., & Brody, G. H. (2020). Youth who achieve upward socioeconomic mobility display lower psychological distress but higher metabolic syndrome rates as adults: Prospective evidence from add health and midus. *Journal of the American Heart Association*, 9(9). <https://doi.org/10.1161/JAHA.119.015698>
- Mueller, C. W., & Parcel, T. L. (1981). Measures of SES: Alternatives and recommendations. *Child Development*, 52(1), 13-30. <https://doi.org/1129211>
- Najman, J. M., Farrington, D. P., Bor, W., Clavarino, A. M., McGee, T. R., Scott, J. G., Williams, G. M., & McKetin, R. (2022). Do cannabis and amphetamine use in adolescence predict adult life success: a longitudinal study. *Addiction Research & Theory*, 30(5), 314-322. <https://doi.org/10.1080/16066359.2022.2032679>
- National Center for Drug Abuse Statistics (NCDAS). (2023). *Drug use among youth: facts & statistics*. <https://drugabusestatistics.org/teen-drug-use/>
- National Center for Education Statistics. (2012, November). Improving the measurement of SES for the national assessment of educational progress: A theoretical foundation. Institute of Education Sciences. <https://eric.ed.gov/?id=ED542101>
- National Institute on Drug Abuse. (2020, July). *What are the other health consequences of drug addiction?* <https://nida.nih.gov/publications/drugs-brains-behavior-science-addiction/addiction-health>
- Navarro-Carrillo, G., Alonso-Ferres, M., Moya, M., & Valor-Segura, I. (2020). SES and psychological well-being: Revisiting the role of subjective SES. *Frontiers*, 11, 1-15. <https://doi.org/10.3389/fpsyg.2020.01303>
- Nickerson, C. (2023, September 29). *Critical period in brain development and childhood learning*. SimplyPsychology. <https://www.simplypsychology.org/critical-period.html>
- Nutakor, J. A., Zhou, L., Larnyo, E., Addai-Danso, S., & Tripura, D. (2023). SES and quality of life: An assessment of the mediating effect of social capital. *Healthcare (Basel)*, 11(5), 749. <https://doi.org/10.3390/healthcare11050749>

- OASH. (n.d.). *High school graduation*. Healthy People 2030. <https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries/high-school-graduation>
- Patrick, M. E., Wightman, P., Schoeni, R. F., & Schulenberg, J. E. (2012). SES and substance use among young adults: A comparison across constructs and drugs. *Journal of Studies on Alcohol and Drugs*, 73(5), 772-782. <https://doi.org/10.15288/jsad.2012.73.772>
- PD&R. (2021). *Prevalence and impacts of evictions*. <https://www.huduser.gov/portal/periodicals/em/Summer21/highlight2.html>
- Petruzelka, B., Vacek, J., Gavurova, B., Kubak, M., Gabrhelik, R., Rogalewicz, V., & Bartak, M. (2020). Interaction of SES with risky internet use, gambling and substance use in adolescents from a structurally disadvantaged region in central Europe. *International Journal of Environmental Research and Public Health*, 17(13), 4803. <https://doi.org/10.3390/ijerph17134803>
- Poudel, A., & Gautam, S. (2017, January 11). Age of onset of substance use and psychosocial problems among individuals with substance use disorders. *BMC Psychiatry*, 17(10). doi: 10.1186/s12888-016-1191-0
- Prasad, R., Wen, M., Ahmmad, Z., & Adkins, D., (2023). Investigating Moderation in the prospective relationship of marijuana use to subsequent illicit substance use: Evidence from add health. *Health Behavior Research*, 6(2). <https://doi.org/10.4148/2572-1836.1172>
- Rahman, H. (2021). *Ubiquitous technologies for human development and knowledge management*. IGI Global.
- Reiss, F., Meyrose, K., Otto, C., Lampert, T., Klasen, F., & Ravens-Sieberer, U. (2019). SES, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study. *PLoS ONE*, 14(3). <https://doi.org/10.1371/journal.pone.0213700>
- Russell, B.S. & Gordon, M. (2017). Parenting and adolescent substance use: moderation effects of community engagement. *International Journal of Mental Health and Addiction*, 15, 1023–1036. <https://doi.org/10.1007/s11469-017-9728-0>
- Sarsani, M.R. (2011). Socio-Economic status and performance on creativity tests. *Encyclopedia of Creativity (Second Edition)*, 360-363. <https://doi.org/10.1016/B978-0-12-375038-9.00179-5>

- Scheidell, J. D., Quinn, K., McGorray, S. P., Frueh, B. C., Beharie, N. N., Cottler, L. B., & Khan, M. R. (2018). Childhood traumatic experiences and the association with marijuana and cocaine use in adolescence through adulthood. *Addiction, 113*(1), 44–56. <https://doi.org/10.1111/add.13921>
- Shrider, E. A., & Creamer, J. (2023, September 12). *Poverty in the United States: 2022*. United States Census Bureau. <https://www.census.gov/library/publications/2023/demo/p60-280>.
- Shrier, C. (2014, June 27). *Young children learn by copying you!* Michigan State University Extension. https://www.canr.msu.edu/news/young_children_learn_by_copying_you
- Slade, E. P., Stuart, E. A., Salkever, D. S., Karakus, M., Green, K. M., & Ialongo, N. (2008). Impacts of age of onset of substance use disorders on risk of adult incarceration among disadvantaged urban youth: A propensity score matching approach. *Drug and Alcohol Dependence, 95*(1-2), 1-13. <https://doi.org/10.1016/j.drugalcdep.2007.11.019>
- Start Your Recovery. (n.d.). *What is rehab?* <https://startyourrecovery.org/treatment/rehab-centers>
- Stephoe, A., & Zaninotto, P. (2020). Lower SES and the acceleration of aging: An outcome-wide analysis. *Proceedings of the National Academy of Sciences of the United States of America, 117*(26), 14911-14917. <https://doi.org/10.1073/pnas.1915741117>
- Strong, C., Juon, S., & Ensminger, M. E. (2014). Long-term effects of adolescent smoking on depression and SES in adulthood in an urban african american cohort. *Journal of Urban, 91*(3), 526-540. <https://doi.org/10.1007/s11524-013-9849-0>
- Substance Abuse and Mental Health Prevention. (2023, July 26). *Prevention of substance use and mental disorders*. <https://www.samhsa.gov/find-help/prevention#substance-use-disorder-prevention>
- Tang, K. L., Rashid, R., Godley, J., Ghali, W. A. (2016, February 23). Association between subjective social status and cardiovascular disease and cardiovascular risk factors: a systematic review and meta-analysis. *BMJ Open, 6*(3). <https://bmjopen.bmj.com/content/6/3/e010137>
- The Australian Prevention Partnership Centre. (2021, June 4). *The value of prevention: a rapid review*. <https://preventioncentre.org.au/resources/the-value-of-prevention/>
- Vankar, P. (2024, April 3). *Lifetime prevalence of use of any illicit drug for grades 8, 10, and 12 combined from 1991 to 2022*. Statista. <https://www.statista.com/statistics/208420/us-lifetime-prevalence-drug-use-grades-8-10-12-since-1991/>
- Valojerdi, A. E., & Janani, L. (2018). A brief guide to propensity score analysis. *Medical Journal of the Islamic Republic of Iran, 32*, 122. <https://doi.org/10.14196/mjiri.32.122>

- VerBruggen, R. (2022, January 10). *The drug epidemic just keeps getting worse*. Institute for Family Studies. <https://ifstudies.org/blog/the-drug-epidemic-just-keeps-getting-worse>
- Waddell, J., & Howe, L. (2023). Relations among adolescent alcohol and cannabis co-use, adolescent impulsive traits, and prospective change in impulsive traits into emerging adulthood. *Cannabis*, 6(2), 89–103.
<https://publications.sciences.ucf.edu/cannabis/index.php/Cannabis/article/view/162>
- Willson, A. E., & Shuey, K. M. (2007). Cumulative advantage processes as mechanisms of inequality in life course health. *American Journal of Sociology*, 112(6).
<https://doi.org/4493043>
- Wittchen H. U. (1994). Reliability and validity studies of the WHO--Composite international diagnostic interview (CIDI): A critical review. *Journal of psychiatric research*, 28(1), 57–84. [https://doi.org/10.1016/0022-3956\(94\)90036-1](https://doi.org/10.1016/0022-3956(94)90036-1)
- World Health Organization. (n.d.). *Adolescent health*. <https://www.who.int/health-topics/adolescent-health>
- Young, J. (2023, August 9). *Representative sample: Definition, importance, and examples*. Investopedia. <https://www.investopedia.com/terms/r/representative-sample.asp>