SVOA Paediatrics
ISSN: 2755-1660

ScienceVolks Open Access

Research Article

Examining Risk and Protective Factors for Probable Youth Substance Use Disorder in a Diverse Statewide Sample

Rachel Pai BS[1]*, Mika D. Thompson MS[2], Jane Onoye PhD[3], John Valera MURP[4], Trevor Lee PhD[4]

[1]University of Hawai'i at Mānoa, John A. Burns School of Medicine, Honolulu, HI, USA.

[2]Office of Public Health Studies, University of Hawai'i at Mānoa, Honolulu, HI, USA.

[3]Department of Psychiatry, University of Hawai'i at Mānoa, John A. Burns School of Medicine, Honolulu, HI, USA.

[4]Alcohol and Drug Abuse Division, Department of Health, State of Hawai'i, Kapolei, HI, USA.

***Corresponding Author:** Rachel Pai, 1356 Lusitana Street, 4th Floor, Honolulu, Hawai'i, USA.

https://doi.org/10.58624/SVOAPD.2025.04.018

Received: October 16, 2025

Published: November 04, 2025

Citation: Pai R, Thompson MD, Onoye J, Valera J, Lee T. Examining Risk and Protective Factors for Probable Youth Substance Use Disorder in a Diverse Statewide Sample. *SVOA Paediatrics 2025,* 4:5, 116-126. doi: 10.58624SVOAPD.2025.04.018

Abstract

Objectives: The social-ecological framework of youth substance use posits that substance use arises from risk and protective factors (RPFs) on the individual, family, peer, school, and community levels. Less is currently known about protective factors compared to risk factors. The objective of this study is to examine a model for RPFs for probable substance use disorder (pSUD) in a large multi-ethnic sample of Hawai'i students.

Methods: A secondary analysis was conducted on a sample of students in grades 8, 10, and 12 from the Hawai'i Student Alcohol, Tobacco, and Other Drug Use Survey (n=2,794). RPFs across all social-ecological domains were selected for analysis based on existing literature. pSUD was based on the validated Car, Relax, Alone, Forget, Family/Friends, Trouble (CRAFFT) screener. Crude and adjusted prevalence ratios and 95% confidence intervals for pSUD were calculated using weighted Poisson regression models with a quasi-likelihood estimating method.

Results: Among protective factors, doing well in school, individual disapproval of substance use, and friends enjoying school had the highest magnitude of effect on pSUD. Of the risk factors, exposure to peer substance use, offers of substances by peers, and peer approval of substance use had the highest magnitude of effect on pSUD.

Conclusion: Although peer and community factors are known to increase risk for problem substance use, there are opportunities to reduce likelihood of pSUD by increasing protective factors, particularly within the school environment. Prevention and treatment programs should consider enhancing resources to provide at-risk students with academic, behavioral, and social support.

Keywords: *Probable Substance Use Disorder, Adolescents, Risk Factors, Protective Factors*

Introduction

Problem substance use (probable substance use disorder and screening) in youth

Substance use disorders (SUDs), defined as the uncontrolled use of a substance despite harmful consequences, and problem use, which is substance use which approaches a probable substance use disorder (pSUD), are associated with adverse outcomes including injury, criminal justice involvement, school dropout, and loss of life. Substance use among adolescents is common: in 2019, 15% of high school students reported having ever used select illicit drugs, and 14% reported misusing prescription opioids.[1] Among all substances, alcohol is the most commonly used among high school students, with 23% reporting drinking alcohol at least once within the past 30 days.[1]

The adolescent period is characterized by rapid developmental changes against the backdrop of a number of familial, cultural, and societal factors that may either increase the risk of or enhance protection from teen initiation and escalation of substance use.

Regular screening for substance use disorders is important for early intervention, and the American Academy of Pediatrics recommends universal screening for substance use among adolescents as part of routine primary care visits.[2] A number of validated screening tools have been developed for the identification of SUDs in adult and adolescent populations. Among these, the CRAFFT (Car, Relax, Alone, Forget, Family/Friends, Trouble) screening tool, which was specifically designed to be developmentally appropriate for teenagers, is the best-studied tool for identifying alcohol and drug use among adolescents.[3]

Risk and protective factors and social-ecological framework in youth substance use

Substance use in youth is influenced by a combination of risk and protective factors. Risk factors are "those characteristics, variables, or hazards that, if present for a given individual, make it more likely that this individual, rather than someone selected at random from the general population, will develop a disorder."[4] Protective factors, on the other hand, are those factors that lessen the "likelihood of problem behavior either directly or by mediating or moderating the effect or exposure to risk factors."[5] Risk factors often precipitate drug and alcohol use, whereas protective factors often shield youth from substance problems by strengthening an adolescent's coping skills, adaptability, and ability to resist the urge to use substances. Uniquely, this study does not view any one risk or protective factor as more important than another; rather, it posits that adolescent substance use is the product of a combination of risk factors, none of which can best explain a given behavior on its own. On the other hand, protective factors can either directly minimize alcohol, tobacco, and other drug (ATOD) use or may instead mitigate the relationship between risk factors and substance use.

The social-ecological framework for youth substance use is a comprehensive theoretical model that strives to understand the influence of individual, family, peer, school, and community domains on the likelihood of ATOD involvement.[5–9] This model emphasizes the importance of social, environmental, and organizational factors on substance use, and proposes that changes in these factors are essential to support behavioral changes in the individual. The present study draws from this framework to identify risk and protective factors across several ecological domains, which are summarized below.

Individual domain

One important individual risk factor is early initiation of substance use, which has been linked to an increased likelihood of developing significant alcohol-related problems.[10] The age of alcohol use initiation may be moderated by negative peer influence, perceptions of the harmfulness of alcohol use, parents' alcohol use, and proactive parenting in late childhood.[11] In addition, mental health (depression, anxiety) and behavioral health concerns,[12–14]such as antisocial behavior, impulsivity, aggression, and conduct use; pro-drug beliefs,[15–17] including greater perceived benefits from alcohol and tobacco compared to negative consequences; and decreased perceptions of harmfulness associated with substances[18–23] put adolescents at a greater risk of substance use.

Peer domain

Peer substance use and peer approval of substance use increase adolescents' risk of both lifetime and recent substance use as well as problem use.[24] Important risk factors on the peer level include exposure to peer substance use and offers of substances from peers.

Family domain

Many aspects of the bond between parents and children, as well as disruptions to that bond, may function as either risk or protective factors for youth substance use. Family support, parental supervision, and clear rules and consequences surrounding substance use are important protective factors.[25] Exposure to family alcohol or drug use, on the other hand, is not only a risk factor for adolescent substance use but is also considered to be one of seven categories of adverse childhood experiences (ACEs), a group of traumatic childhood exposures which are strongly associated with adult health risk behaviors, health status, and disease.[26]

School domain

School-related protective factors, including academic performance, educational aspirations, and school engagement, have been shown to reduce substance use among adolescents. Students with strong school protective factors tend to report less substance use.[27]

Community domain

The community domain encompasses the interactions of adolescents with individuals outside of their friends (peer domain), teachers and classmates (school domain), and relatives (family domain). Risk factors on the community level include illegal substance use, drug-selling, or crime in the youth's neighborhood[28], as well as ease of access to substances. Protective factors include having adults in the community who favor the prosocial non-use of substances by youth, as well as the overall encouragement of positive behaviors among youth.

Need for risk and protective factor framework for informing prevention and intervention approaches

Understanding the myriad risk and protective factors behind adolescent substance use is crucial to the design of prevention and intervention strategies. Substance use among youth has been linked to depression, suicide, teen pregnancy, delinquency, violence, and conduct problems,[29] and therefore, reducing risk for and enhancing protection against substance use could influence a variety of behavioral outcomes. While much of the literature on adolescent substance use has focused on risk factors, this study also places an emphasis on a wide range of protective factors across all five social-ecological domains.

While risk and protective factors for adolescent substance use are well-documented across the continental United States, less research currently exists on the uniquely demographically diverse population of Hawai'i, which includes a large number of racial minorities including Asian Americans, Native Hawaiians and other Pacific Islanders (NHOPI), and multiracial individuals. Therefore, the purpose of this investigation is to examine a model for risk and protective factors in a large multi-ethnic sample in the State of Hawai'i.

Methods

Sample

The retrospective dataset for this study was taken from the 2019-2020 Hawai'i Student Alcohol, Tobacco, and Other Drug (ATOD) Statewide Report, a statewide needs assessment which evaluated the nature and scope of ATOD use among Hawai'i middle and high school students.[30]

The response sample included 3951 students in grades 8, 10, and 12 from Hawai'i public middle and high schools who were surveyed during a class period using a primarily online method. Of the 3951 student respondents, 1157 were removed for missing information on relevant covariates, resulting in the final analytic sample of 2794 students. Data were weighted for analyses according to the sampling frame; the method for the needs assessment and survey items are fully described in the 2019-2020 ATODS report.[30]

Variables for analyses

The survey included items designed to assess substance use prevalence and onset, risk and protective factors, and demographic items. Variables were selected from among survey items that included several validated measures and sets of risk and protective factors across domains, from a theoretically driven approach. Variables and their corresponding survey items on the Hawai'i Student ATOD Survey are listed in Supplementary Tables 1 and 2.

PHQ-4

The Patient Health Questionnaire for Depression and Anxiety (PHQ-4) is a validated 4-item screening instrument for detecting both depression and anxiety disorders. The PHQ-4 combines the 2-item Patient Health Questionnaire-2 (PHQ-2), which includes the core criteria for depression, and the 2-item Generalized Anxiety Disorder 2-item (GAD-2), which includes the core criteria for anxiety.[31] The PHQ-4 questions were included on the Hawai'i Student ATOD Survey and were used to screen adolescents for mental health distress.

CRAFFT screening tool

The CRAFFT screening tool is a brief 6-item screening instrument which has been well-validated in identifying substance use and probable substance use disorders among youth ages 12-21. [32,33] A score of two or three indicates positive risk of developing a SUD (problem use), whereas a score of four or greater indicates a pSUD. The CRAFFT screen questions were included on the Hawai'i Student ATOD Survey and were used to screen adolescents for problem use and estimate their need for substance use treatment (based on a score of four or higher).

Demographics

Participants in the Hawai'i Student ATOD Survey indicated their gender based on a survey question which asked their current gender. Those students who indicated "Other" or "Transgender" were combined into the category of "Transgender and Other Gender Minority (TGGM)." Participants indicated their race/ethnicity on the survey by answering a question asking students which racial or ethnic group(s) they *primarily identified* with, and students who chose more than one response were categorized as "2 or more ethnicities." Some ethnic groups were combined into larger categories due to lower sample sizes: for example, the "Other Pacific Islander" category included students who primarily identified as Samoan, Chuukese, Marshallese or other Pacific Islander; the "Other Asian" category included students who primarily identified as East, South, or Southeast Asian other than Japanese or Filipino; and the "Other" category included students who primarily identified as African American, Native American, Alaska Native, or another ethnicity not listed.

Protective factors

As part of the Hawai'i Student ATOD Survey, participants were surveyed for protective factors across the individual domain (individual disapproval of substance use, academic achievement), family domain (ability to talk to a family member about a problem, clear rules and consequences about using alcohol and drugs), peer domain (whether friends enjoy school), school domain (climate/enjoyment of school), and community domain (community member encouragement, positive social norms for not using alcohol).

Risk factors

Participants were also surveyed for risk factors across the individual domain (suspension or expulsion, skipping class, done something crazy, symptoms of depression), family domain (exposure to parent alcohol use, relative marijuana use, living with someone with a substance use problem), peer domain (close friends offering marijuana/alcohol, peer exposure to marijuana/alcohol use, close friends' approval of marijuana/alcohol), and community domain (ease of access to substances, neighborhood use of substances, neighborhood crime/drug selling). One survey question addressing a risk factor in the family domain ("Did you ever live with anyone who had an alcohol-related problem or used street drugs?") was modified from the adverse childhood experiences (ACE) questionnaire.[26]

Analyses

All analyses, descriptive and inferential, adjusted for the complex sampling design used by the ATOD Survey. Descriptive statistics were calculated to summarize the demographic characteristics, risk factors, and protective factors for the total sample and by CRAFFT score weighted percentages.

Utilizing weighted Poisson regression models with a quasi-likelihood estimating method, we calculated crude and adjusted prevalence ratios (PR) and 95% confidence intervals (95%CI) for pSUD screens based on a CRAFFT score ≥ 4. The quasi-Poisson regression analysis was selected over multiple logistic regressions due to the potential for odds ratios to overestimate the prevalence ratio in situations where the outcome prevalence is greater than 10%. Multiple multivariable models were constructed to examine the adjusted PR for each risk and protective factor, controlling for student grade level, gender, and preferred race/ethnicity.

All analyses were conducted using R version 4.4.0 with integrated development environment RStudio version 2023.06.0.

Results

The sample consisted of 987 (33.70%) 8th graders, 949 (35.75%) 10th graders, and 848 (30.55%) 12th graders; self-reported gender included 1460 (52.96%) male, 1315 (46.31%) female, and 19 (0.72%) transgender and gender diverse students. Ethnic breakdown based on primary identification included 240 (8.60%) White, 8 (0.23%) American Indian/Alaska Native, 33 (1.34%) Black, 39 (2.03%) Chinese, 508 (17.15%) Filipino, 215 (9.63%) Japanese, 57 (2.59%) other Asian, 79 (2.82%) Latino, 284 (8.81%) Hawaiian, 150 (5.35%) other Pacific Islander, and 1181 (41.46%) two or more races.

Summary tables for percent of students endorsing protective and risk factors are shown in Table 1 and Table 2, respectively. Protective factors in the family domain (rules and consequences about using drugs 91.3%) and individual domain (individual disapproval of substance use 86.2%, mostly As and Bs in school 74.8%) were the most prevalent. Risk factors in the community domain (access to substances 57.0%), peer domain (peer offers of alcohol or marijuana 36.4%), and individual domain (doing "crazy" things that were dangerous in the past 12 months 41.9%) were the most prevalent.

Table 1. Weighted percent of students endorsing protective factors against probable substance use disorder, Hawai'i Student ATOD Survey (N = 2794).

Domain	Factor	Level	Unweighted N	Weighted col-% (95% CI)
Community	**Encouraging community**	Agree	1227	43.4% (41.4%, 45.4%)
		Neutral	753	27.2% (25.4%, 29.0%)
		Disagree	814	29.4% (27.6%, 31.3%)
	Community disapproval of underage drinking	Agree	1821	67.5% (65.6%, 69.3%)
		Neutral	607	20.5% (18.9%, 22.1%)
		Disagree	366	12.0% (10.8%, 13.4%)
School	**Enjoy school**	Always/Often	1333	47.2% (45.2%, 49.3%)
		Sometimes	938	34.0% (32.1%, 36.0%)
		Seldom/Never	523	18.7% (17.2%, 20.4%)
Family	**Parental support**	Agree	1866	67.0% (65.1%, 68.8%)
		Neutral	507	18.0% (16.5%, 19.6%)
		Disagree	421	15.0% (13.7%, 16.5%)
	Rules and consequences	Agree	2542	91.3% (90.1%, 92.4%)
		Neutral	174	6.1% (5.20%, 7.12%)
		Disagree	78	2.6% (2.04%, 3.32%)
Peer	**Friends enjoy school**	Agree	1142	40.4% (38.4%, 42.3%)
		Neutral	1147	41.6% (39.7%, 43.6%)
		Disagree	505	18.0% (16.5%, 19.6%)
Grades	**Individual disapproval of substance use**	Wrong	2408	86.2% (84.8%, 87.5%)
		Not Wrong	386	13.8% (12.5%, 15.2%)
	Grades	Mostly A's & B's	2078	74.8% (73.0%, 76.5%)
		Mostly C's	510	18.3% (16.8%, 19.9%)
		Mostly D's & F's	206	6.9% (5.99%, 8.01%)

Table 2. Weighted percent of students endorsing risk factors for probable substance use disorder, Hawai'i Student ATOD Survey (N = 2794).

Domain	Factor	Level	Unweighted N	Weighted col-% (95% CI)
Community	Access to substances	Easy	1572	57.0% (55.0%, 59.0%)
		Difficult	396	14.4% (13.1%, 15.9%)
		Impossible/I don't know	826	28.6% (26.8%, 30.4%)
	Neighborhood use	Monthly or more	874	30.7% (28.9%, 32.6%)
		Monthly or less	617	22.4% (20.8%, 24.1%)
		Not at all	1303	46.9% (44.9%, 48.9%)
	Neighborhood crime	Agree	565	18.8% (17.3%, 20.4%)
		Neutral	554	19.5% (18.0%, 21.1%)
		Disagree	1675	61.7% (59.7%, 63.6%)
Family	Parents use alcohol	Monthly or more	564	20.1% (18.5%, 21.8%)
		Monthly or less	991	36.6% (34.6%, 38.5%)
		Not at all	1239	43.3% (41.4%, 45.3%)
	Relatives use cannabis	Monthly or more	214	6.6% (5.76%, 7.66%)
		Monthly or less	450	15.6% (14.2%, 17.1%)
		Not at all	2130	77.7% (76.0%, 79.3%)
	Lived with someone who had a problem with alcohol/drugs	Yes	833	28.6% (26.9%, 30.5%)
		No	1961	71.4% (69.5%, 73.1%)
Peer	Around friends using alcohol/cannabis	Monthly or more	461	15.8% (14.4%, 17.3%)
		Monthly or less	583	20.3% (18.7%, 21.9%)
		Not at all	1750	63.9% (62.0%, 65.8%)
	Offered alcohol/cannabis by friends	Yes	1050	36.4% (34.5%, 38.3%)
		No	1744	63.6% (61.7%, 65.5%)
	Approval of alcohol/cannabis by friends	Would think it was cool	375	12.7% (11.5%, 14.1%)
		Wouldn't care	781	27.2% (25.5%, 29.1%)
		I don't know	362	11.8% (10.6%, 13.1%)
		Disapprove	1276	48.2% (46.2%, 50.3%)
Individual	Doing "crazy" things that were dangerous in past 12 months	Have	1187	41.9% (39.9%, 43.9%)
		Never have	1607	58.1% (56.1%, 60.1%)
	Age first suspended or expelled	13 years or younger	478	15.7% (14.3%, 17.2%)
		Older than 13 years	155	5.1% (4.32%, 6.07%)
		Never	2161	79.2% (77.5%, 80.7%)
	Number of skipped classes in past month	6 or more	115	3.8% (3.13%, 4.61%)
		5 or less	450	15.3% (13.9%, 16.8%)
		None	2229	80.9% (79.3%, 82.4%)
	Number of days feeling depressed in the past 2 weeks	More than half the days	475	16.4% (14.9%, 17.9%)
		Several days	655	23.4% (21.7%, 25.1%)
		None	1664	60.3% (58.3%, 62.2%)

Of the protective factors, grades in school (individual domain), individual disapproval of substance use (individual domain), and friends' enjoyment of school (peer domain) were the strongest protective factors (Figure 1). Among these, receiving As and Bs in school offered the strongest protective effect, with a prevalence ratio of 0.29 (95% CI = 0.22, 0.39).

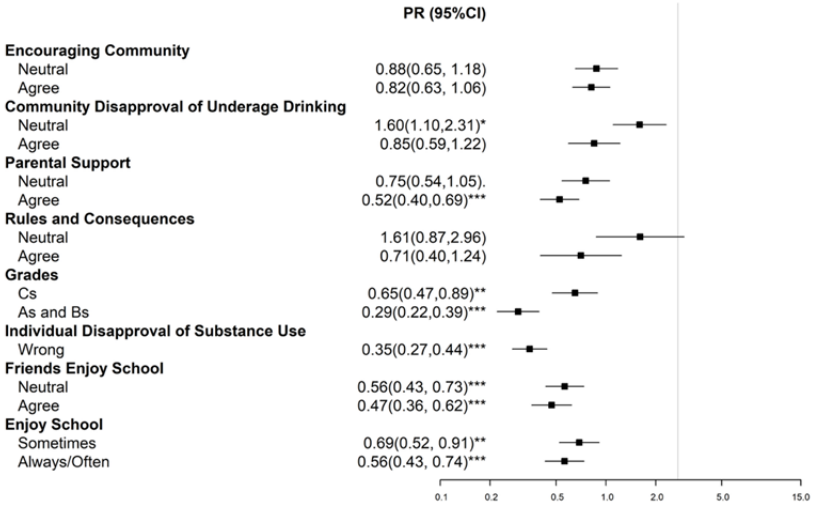

Figure 1. *Protective factors against risk of probable substance use disorder are displayed in a forest plot, where magnitude of effect left of 1.0 indicates decreased risk.*

Factors in the peer domain most greatly increased students' risk of pSUD, including being around friends using alcohol or cannabis, being offered alcohol or cannabis by friends, and approval of alcohol or cannabis by friends (Figure 2). Among these, being around friends using alcohol or cannabis on a weekly or greater basis put students at the greatest risk of pSUD, with a prevalence ratio of 13.81 (95% CI = 9.52, 20.02).

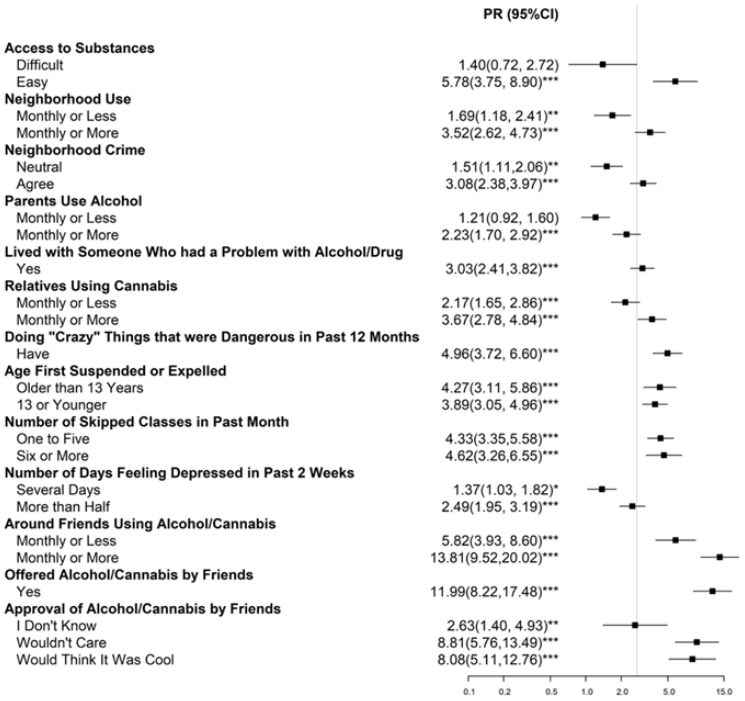

Figure 2. *Risk factors and probable substance use disorder. Risk factors are displayed in a forest plot, where magnitude of effect right of 1.0 indicates increased risk.*

Discussion

Risk and protective factors across all five social-ecological domains significantly influence adolescents' likelihood of probable substance use disorder. Protective factors in the family and individual domains were most prevalent among the students surveyed, whereas risk factors in the community, peer and individual domains were most prevalent. Analysis of the relationship between these factors and pSUD revealed that protective factors in the individual and peer domains most strongly reduced the risk of pSUD, whereas risk factors in the peer domain most strongly increased the risk of pSUD.

Among protective factors, those within the individual and peer domains appeared to be most influential in reducing risk of pSUD. This is consistent with the literature, which shows that individual risk factors, and, in particular, a robust personal belief against substance use, have been shown to be strong protectors against adolescent substance use. Those with awareness of the harmful effects of substances, which may be gained from messaging received either from personal interactions with family members and schools or the media, and who have a strong desire to maintain their personal health, are less likely to engage in substance use.[34] Higher academic grades, another individual-level protective factor, has also been shown to decrease the likelihood of substance use.[7,35,36] Academic achievement is an important component of "school bonding," a term used to describe a student's level of attachment to and commitment to school, which is positively associated with healthy youth development and is negatively associated with a number of social and behavioral problems, including substance use.[37] Relatedly, friends' enjoyment of school, which falls within the peer domain, also appears to be protective against pSUD. Given that teens tend to modify their behavior in response to peer influences, as well as the fact that high academic grades may be protective against substance use, it naturally follows that being surrounded by a peer group who enjoys school, and therefore is at lower risk of substance use problems, may also lower teens' likelihood of substance use in addition to academic achievement on the individual level.

On the risk factor side, the most influential factors were found within the peer domain. In particular, exposure to peer alcohol or cannabis use and offers of alcohol or cannabis use had powerful effects on likelihood of pSUD. Numerous studies have described the relationship between substance-using peer groups and the risk of adolescent substance use.[7,24,28,34,36,38,39] Although the association between an adolescent's substance use and peer use may partially result from selection processes, such as the tendency of substance-using adolescents to seek out other substance-using peers, interacting with peers who use substances may also directly facilitate substance use by allowing adolescents to observe drug-using models, learn and reinforce favorable attitudes towards substances, and gain access to substances.[40]

Household alcohol and drug use as an adverse childhood experience (ACE)

One of the risk factors included in the survey was whether the adolescent had ever lived with someone who had a problem with alcohol/drugs. This question is modified from the Adverse Childhood Experiences (ACE) study,[26] which links seven categories of household dysfunction during childhood, including household alcohol and drug use, to a number of lifetime health risks, including substance use problems. The results of the present study corroborate the link between childhood dysfunction and health outcomes demonstrated by the ACE study. Furthermore, while the ACE study focuses on the relationship between childhood dysfunction and lifetime health risks, the present study additionally demonstrates that the specific ACE of household alcohol or drug use may be linked to substance use problems beginning as early as adolescence. This finding underscores the importance of quickly identifying and assisting families who are currently experiencing or at risk of experiencing ACEs, as the associated detrimental health outcomes may manifest themselves even before adulthood.

Implications for practice and policy

The identification of some of the most influential risk and protective factors for pSUD has important implications for interventions designed to reduce adolescent substance use. The school setting, in particular, represents an opportune environment for such interventions, as many of the most influential factors, including academic grades and peer groups, are rooted in the activities and interactions that take place on school campuses. Given the importance of academic achievement, implementing and bolstering programming to support students academically and target students who may be struggling in school may have a direct impact on teen substance use disorder development. Additionally, the school setting may provide an opportunity for teachers and other professionals to raise awareness around the harmful health effects of substances, as well as to teach students psychological and social skills, such as peer resistance, that may help mitigate the strong effect of peer influence on adolescent substance use.

Beyond the school setting, the present study's findings may also have implications for clinical practice, as an understanding of the social factors that place adolescents most at risk for substance use problems may equip healthcare providers to better identify and screen high-risk youth, as well as connect them with behavioral health support and other community resources if a substance use disorder is suspected.

Strengths and limitations

While the CRAFFT questionnaire is a well-validated instrument for identifying substance use problems and probable substance use disorder in youth, it is not a diagnostic tool. Therefore, one of the limitations of this study is that SUD could not be definitively diagnosed among the students surveyed. However, one of the strengths of this study is that it was conducted in a highly ethnically diverse and gender diverse sample, including high percentages of Asian Americans, Pacific Islanders, multiracial students, and transgender and gender-diverse students. The broad ethnic and gender categories represented in this study increases the generalizability of these findings to a wider demographic spectrum.

Future directions

This study captures risk and protective factors and the pSUD status of adolescents at a single point in time. A key area for future research would be longitudinal studies that track the persistence of these factors over time in order to better understand their long-term impacts on adolescent substance use. Such studies could provide critical insight into the stability of protective influences and the evolving nature of risk factors, particularly during key transitional periods, such as the shift from middle to high school or high school to adulthood. Additionally, integrating longitudinal findings into school-based prevention programs could enhance their effectiveness by adapting interventions to address the changing needs of adolescents as they grow.

Conclusion

While important risk and protective factors were identified across all five social-ecological domains, protective factors in the individual and peer domains and risk factors in the peer domain appear to have the greatest influence on an adolescent's likelihood of developing a substance use disorder. These salient risk and protective factors are also those that could be modified by interventions in the school setting, including those aimed at supporting academic achievement and providing substance use prevention education. Prevention efforts which are clearly informed by the most important precipitants of and protectors against substance use problems will likely be the most promising in the endeavor to reduce youth substance use rates.

Acknowledgements

The authors wish to extend their greatest appreciation to all the school administrators, staff, and students who participated in the ATOD survey.

Conflicts of Interest

The authors report no conflicts of interest.

Author Contributions

Rachel Pai (Conceptualization, Writing – Original Draft, Visualization), Mika Thompson (Conceptualization, Formal Analysis, Data Curation, Writing – Review & Editing), Jane Onoye (Conceptualization, Investigation, Writing – Review & Editing, Supervision, Project Administration), John Valera (Investigation, Writing – Review & Editing), Trevor Lee (Investigation, Writing – Review & Editing)

References

1. Youth Risk Behavior Surveillance — United States, 2019. 2020;69(1).
2. Committee on Substance Use and Prevention, Levy SJL, Williams JF, et al. Substance Use Screening, Brief Intervention, and Referral to Treatment. *Pediatrics*. 2016;138(1):e20161210. doi:10.1542/peds.2016-1210

3. Pilowsky DJ, Wu LT. Screening instruments for substance use and brief interventions targeting adolescents in primary care: A literature review. *Addictive Behaviors*. 2013;38(5):2146-2153. doi:10.1016/j.addbeh.2013.01.015
4. Institute of Medicine (US) Committee on Prevention of Mental Disorders. *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*. (Mrazek PJ, Haggerty RJ, eds.). National Academies Press (US); 1994. Accessed November 5, 2023. http://www.ncbi.nlm.nih.gov/books/NBK236319/
5. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.
6. Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychological Bulletin*. 1992;112(1):64-105.
7. Connell CM, Gilreath TD, Aklin WM, Brex RA. Social-ecological influences on patterns of substance use among non-metropolitan high school students. *Am J Community Psychol*. 2010;45(0):36-48. doi:10.1007/s10464-009-9289-x
8. Aytur SA, Carlino S, Bernard F, West K, Dobrzycki V, Malik R. Social-ecological theory, substance misuse, adverse childhood experiences, and adolescent suicidal ideation: Applications for community–academic partnerships. *Journal of Community Psychology*. 2022;50(1):265-284. doi:10.1002/jcop.22560
9. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q*. 1988;15(4):351-377. doi:10.1177/109019818801500401
10. DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age at first alcohol use: a risk factor for the development of alcohol disorders. *Am J Psychiatry*. 2000;157(5):745-750. doi:10.1176/appi.ajp.157.5.745
11. Hawkins JD, Graham JW, Maguin E, Abbott R, Hill KG, Catalano RF. Exploring the Effects of Age of Alcohol Use Initiation and Psychosocial Risk Factors on Subsequent Alcohol Misuse. *J Stud Alcohol*. 1997;58(3):280-290.
12. Nation M, Heflinger CA. Risk factors for serious alcohol and drug use: the role of psychosocial variables in predicting the frequency of substance use among adolescents. *Am J Drug Alcohol Abuse*. 2006;32(3):415-433. doi:10.1080/00952990600753867
13. Poikolainen K. Antecedents of substance use in adolescence. *Current Opinion in Psychiatry*. 2002;15(3):241-245. doi:10.1097/00001504-200205000-00003
14. Swadi H. Individual risk factors for adolescent substance use. *Drug Alcohol Depend*. 1999;55(3):209-224. doi:10.1016/s0376-8716(99)00017-4
15. Collins RL, Ellickson PL, Bell RM. Simultaneous polydrug use among teens: prevalence and predictors. *J Subst Abuse*. 1998;10(3):233-253. doi:10.1016/s0899-3289(99)00007-3
16. O'Connor RM, Fite PJ, Nowlin PR, Colder CR. Children's beliefs about substance use: An examination of age differences in implicit and explicit cognitive precursors of substance use initiation. *Psychology of Addictive Behaviors*. 2007;21(4):525-533. doi:10.1037/0893-164X.21.4.525
17. Nawi AM, Ismail R, Ibrahim F, et al. Risk and protective factors of drug abuse among adolescents: a systematic review. *BMC Public Health*. 2021;21(1):2088. doi:10.1186/s12889-021-11906-2
18. Alter RJ, Lohrmann DK, Greene R. Substitution of marijuana for alcohol: The role of perceived access and harm. *Journal of Drug Education*. 2006;36(4):335-355. doi:10.2190/2780-G96W-J17N-R3H1
19. Bachman JG, Johnson LD, O'Malley PM. Explaining recent increases in students' marijuana use: impacts of perceived risks and disapproval, 1976 through 1996. *Am J Public Health*. 1998;88(6):887-892.
20. Danseco ER, Kingery PM, Coggeshall MB. Perceived risk of harm from marijuana use among youth in the USA. *School Psychology International*. 1999;20(1):39-56. doi:10.1177/0143034399201004
21. Johnson PB, Boles SM, Kleber HD, Vaughan RD, McVeigh KH. Age-related differences in adolescent smokers' and nonsmokers' assessments of the relative addictiveness and health harmfulness of cigarettes, alcohol, and marijuana. *J Subst Abuse*. 2000;11(1):45-52. doi:10.1016/s0899-3289(99)00019-x

22. O'Callaghan FV, Hannon T. Normalization of marijuana use: its effects on adolescents' intentions to use marijuana. *Subst Use Misuse*. 2003;38(2):185-199. doi:10.1081/ja-120017244

23. O'Callaghan F, Reid A, Copeland J. Risk Perception and Cannabis Use in a Sample of Young Adults. *Journal of Substance Use*. 2006;11(2):129-136. doi:10.1080/14659890500237366

24. Cleveland MJ, Feinberg ME, Bontempo DE, Greenberg MT. The role of risk and protective factors in substance use across adolescence. *J Adolesc Health*. 2008;43(2):157-164. doi:S1054-139X(08)00102-X [pii] 10.1016/j.jadohealth.2008.01.015 [doi]

25. Rusby JC, Light JM, Crowley R, Westling E. Influence of Parent–Youth Relationship, Parental Monitoring, and Parent Substance Use on Adolescent Substance Use Onset. *J Fam Psychol*. 2018;32(3):310-320. doi:10.1037/fam0000350

26. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*. 1998;14(4):245-258. doi:10.1016/S0749-3797(98)00017-8

27. Guo J, Hawkins JD, Hill KG, Abbott RD. Childhood and Adolescent Predictors of Alcohol Abuse and Dependence in Young Adulthood. *J Stud Alcohol*. 2001;62(6):754-762.

28. Shih RA, Parast L, Pedersen ER, et al. Individual, peer, and family factor modification of neighborhood-level effects on adolescent alcohol, cigarette, e-cigarette, and marijuana use. *Drug Alcohol Depend*. 2017;180:76-85. doi:10.1016/j.drugalcdep.2017.07.014

29. Mason WA, Hitchings JE, Spoth RL. The interaction of conduct problems and depressed mood in relation to adolescent substance involvement and peer substance use. *Drug and Alcohol Dependence*. 2008;96(3):233-248. doi:10.1016/j.drugalcdep.2008.03.012

30. Onoye J, Miao TA, Goebert D, et al. *2019-2020 Hawai'i Student Alcohol, Tobacco, and Other Drug (ATOD) Survey: Statewide Report*.; 2021. https://health.hawaii.gov/wp-content/uploads/2022/01/2019-2020-Hawaii-ATOD-Survey-Statewide-Comprehensive-Report.pdf

31. Kroenke K, Spitzer RL, Williams JBW, Löwe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics*. 2009;50(6):613-621. doi:10.1176/appi.psy.50.6.613

32. Knight JR, Shrier LA, Bravender TD, Farrell M, Vander Bilt J, Shaffer HJ. A new brief screen for adolescent substance abuse. *Arch Pediatr Adolesc Med*. 1999;153(6):591-596. doi:10.1001/archpedi.153.6.591

33. Shenoi RP, Linakis JG, Bromberg JR, et al. Predictive Validity of the CRAFFT for Substance Use Disorder. *Pediatrics*. 2019;144(2):e20183415. doi:10.1542/peds.2018-3415

34. El Kazdouh H, El-Ammari A, Bouftini S, El Fakir S, El Achhab Y. Adolescents, parents and teachers' perceptions of risk and protective factors of substance use in Moroccan adolescents: a qualitative study. *Substance Abuse Treatment, Prevention, and Policy*. 2018;13(1):31. doi:10.1186/s13011-018-0169-y

35. Hallfors D, Cho H, Brodish PH, Flewelling R, Khatapoush S. Identifying high school students "at risk" for substance use and other behavioral problems: implications for prevention. *Subst Use Misuse*. 2006;41(1):1-15. doi:T0L318784060U835 [pii] 10.1080/10826080500318509 [doi]

36. Kristjansson AL, Sigfusdottir ID, Allegrante JP. Adolescent substance use and peer use: a multilevel analysis of cross-sectional population data. *Subst Abuse Treat Prev Policy*. 2013;8(1):27. doi:10.1186/1747-597X-8-27

37. Catalano RF, Haggerty KP, Oesterle S, Fleming CB, Hawkins JD. The importance of bonding to school for healthy development: findings from the Social Development Research Group. *J Sch Health*. 2004;74(7):252-261. doi:10.1111/j.1746-1561.2004.tb08281.x

38. Trucco EM. A Review of Psychosocial Factors Linked to Adolescent Substance Use. *Pharmacology, biochemistry, and behavior*. 2020;196:172969. doi:10.1016/j.pbb.2020.172969

39. Nalven T, Spillane NS, Schick MR. Risk and Protective Factors for Opioid Misuse in American Indian Adolescents. *Drug Alcohol Depend*. 2020;206:107736. doi:10.1016/j.drugalcdep.2019.107736

40. Mason WA, Windle M. Family, religious, school and peer influences on adolescent alcohol use: a longitudinal study. *J Stud Alcohol*. 2001;62(1):44-53. doi:10.15288/jsa.2001.62.