MEMORANDUM OF UNDERSTANDING
BETWEEN
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
ON BEHALF OF ITS LOS ANGELES CAMPUS
AND
PERRIS UNION HIGH SCHOOL
DISTRICT

FOR REBECCA DUDOVITZ'S RESEARCH PROJECT ENTITLED:
Evaluating the impact of academic tracking and de-tracking on substance use and health during adolescence and the transition to adulthood.

Background of Project

This research project ("Project") effective as of the last date of signatures below ("Effective Date") is an Academic-Community Partnership between The Regents of the University of California solely on behalf of and limited to its Los Angeles Campus ("University") on behalf of Professor Rebecca Dudovitz ("Principal Researcher"), and Perris Union High School District ("The District"). The District, Principal Researcher, and the University may be referred to individually as a/the "Party," or collectively as the "Parties."

This Project aims to understand the impact of attending a school-wide Advancement Via Individual Determination ("AVID") program at high school that reduces racial/ethnic disparities in rigorous college-preparatory course completion by eliminating academic tracking of students. The Project aims to understand the following effects:

Main Effect 1: Test whether exposure to AVID is associated with lower rates of adolescent substance use in the past 30 days (primary outcome), defined as any alcohol, tobacco, vaping, cannabis, prescription, or illicit drug use in the prior 30 days, as well as other substance use behaviors, violence and delinquency, compared to students attending schools without AVID.

Main Effect 2: Determine whether exposure to AVID is associated with increased enrollment in college-preparatory course taking and healthier social networks (measured by fewer peers engaged in substance use, more peers engaged in school, and more school-related adults) compared to students attending schools without AVID.

Main Effect 3: Evaluate whether associations between AVID exposure and substance use are explained by reduced racial/ethnic disparities in college-preparatory course taking and healthier social networks.

The details concerning the Project background and goals are further detailed in the Project's Proposal/Summary submitted by the Principal Investigator, which is attached hereto as Exhibit A and incorporated herein by this reference.

Purpose

The purpose of this MOU is to establish the terms of the Project and ensure that it is a mutually beneficial research program. Ultimately, the Project will support the District's teachers, schools, and administration in their knowledge/understanding about whether AVID positively impacts ***all*** students on a school campus, not just the students participating in the AVID program. Such purpose is further detailed in the attached

Exhibit A, incorporated herein by reference.

Scope of Work

The research methods and instruments for the study have been reviewed and approved by the University's Institutional Review Board (IRB) – IRB #22-000352. No research procedures will be conducted for the study until approval is received from both the District and UCR.

The Project will recruit 3,570 (9th -12th grade students from intervention and control schools – 238 per school) into the study at the beginning of the academic year. All students attending study schools who are not participating in special education will be eligible. Special education students are excluded because college preparatory courses may not be in their Individualized Educational Plan. Based on the Project's sample size calculations, the Project will oversample Black students to ensure they make up at least 15% of our sample, so whether effects of AVID are moderated by race can be tested. In coordination with the participating schools, students will receive a recruitment packet including parental consent and student assent forms. Those returning signed consent/assent forms will be enrolled in the study. We will follow study participants for 4 years regardless of whether they switch schools or leave school during the study period. For most of our sample, this will include following participants through early adulthood and the transition to college or the work force.

Computer-assisted self-interview surveys will be conducted annually at the participating school(s) via a mobile tablet application, as adolescents are more likely to disclose sensitive information on computerized surveys. Those absent on the day of administration will be offered an alternative day. Participants will receive a ***ten dollars and zero cents*** ($10.00) gift card incentive following each in-school survey. Follow up surveys for participants who no longer attend a study high school will be brief (15-20 minutes) and completed online via a personalized link to a secure web-based survey or via phone, if desired by participants. We will use a ***thirty dollars and zero cents*** ($30.00) gift card incentive for participants who are no longer in high school and additionally, for hard-to-reach participants, will offer an extra incentive of up to ***fifty dollars and zero cents*** ($50.00).

The scope and research/design of this Project is elaborated on in the attached Exhibit A, incorporated herein by reference.

The data collected will be used solely for the study authorized pursuant to this MOU. At no point will this information be used to evaluate individual District personnel, teachers, students and/or schools. All identifying information will be removed from the data. The Researcher will collaborate with the District Point of Contact (as defined below) or personnel responsible to schedule all research activities.

Obligations, Duties and Responsibilities of Rebecca Dudovitz ("Researcher")

A. Administrator/Principal Participation: The participating schools/students chosen for this Research Project will be determined by the District and agreed to between the District and the Researcher after execution of this MOU. Consent by the School's Principal must be obtained prior to commencing research at the school.

B. Teacher/Student/RUSD Participation: The conditional approval, approval and/or approval of the Principal at the pilot school site does not necessarily imply participation approval by the teachers themselves. Individual teacher consent must still be obtained by the Researcher.

C. Informed Consent: This Project is strictly voluntary. Written consent must be obtained from the chosen pilot school site(s) (through the school's Principal), and each teacher, student and/or District employee who participates in the Project.

D. Term: This Project has a proposed four (4) year project from the Effective Date. All research and data collection related to this Project will be coordinated pursuant to the District's calendar and

participating school activities. All Parties are aware that school site access may be limited during the State testing window beginning in March of any particular year.

E. Subsequent/Re-contact of Participants: Since this Project is on-going over four (4) years, re-contacting the participants is an acceptable and understood part of the Project. However, a copy of any follow-up contact with the participants must be submitted to the District's Research Office for review ***prior*** to being distributed to the participants. Written consent of participants must be obtained prior to any subsequent contact with the participants.

F. Health/Security Clearance: The Researcher will not be spending *four (4) or more* hours per week having direct contact with District students at the school pilot site. Besides the Researcher, no one from University will be present at any District school.

G. Changes to Research: Any modification to the Project will require an amendment to this MOU, review by University and the District, and submission of an updated Research Request Application, with the changes duly noted therein. Before implementing any changes, the District Research Office must be notified in writing of any changes – and changes approved – to the research design, instruments, timeframe, recruitment approach, results dissemination and/or participant demographics. The District will submit the new and/or revised documents to expedited review process.

H. Termination: This MOU may be terminated by any Party with thirty (30) days prior written notice to the other Parties for any reason. Such notice shall be provided to the Point of Contacts listed below.

I. Dissemination of Results: University shall have the right to copyright, publish, disclose, disseminate and use, in whole and in part, any data, results and/or information developed in the conduct of the Research under this Agreement. A summary of the findings, in the format most appropriate for the audience, shall be submitted by the Researcher to the pilot school site (Principal and teachers) and to the District Research Office for informational purposes only. Subsequently, any publications and/or articles derived from the District's participation in this Project shall be submitted to the District's Research Office for review and comment thirty (30) days prior to publication.

1. Per the District's regulations, any published accounts of the Researcher's research results may NOT reference the identity of the District, District schools, and/or participants without the prior written permission/consent from the District Research Office.

Benefits to the District

Should support the District's knowledge/understanding of the impact of the AVID program on ***all*** of its students, not just the students participating in the AVID program. Ultimately, this Project will should help the district, its schools, and administrators better understand how AVID may be positively impacting all the students on campus, and the commitment and resources it takes to have a successful AVID program at a school. The District benefits are further elaborated on in Exhibit A, incorporated herein by reference.

The Researcher will provide the District access to results from this Project.

This Project is strictly voluntary, will be given on school grounds and/or online. Participants may receive compensation as detailed above under Scope of Work and/or in the attached Exhibit A, incorporated herein by reference.

Research Requests and Points of Contact

Successful implementation of this Project will depend on open lines of communication between District personnel and the Researcher. The following would be the point of contact ("Point of Contact") and their

information at the District and participating school(s) that is the subject of this Project:

Perris Union High School District
Attn:
Title/Position:
Address:
E-mail:

The following will be Point of Contact at the University for contractually related matters pertaining to this MOU:

UCLA Technology Development Group
Attn: ISR-MTA Group
Title/Position: Associate Director of ISR
Address: 10889 Wilshire Blvd, Suite 920, Los Angeles CA 90095
E-mail: ElinaKreditor@tdg.ucla.edu

The following will be Point of Contact for the Researcher for contractually related matters pertaining to this MOU:

Dr. Rebecca Dudovitz
UCLA
10833 Le Conte Ave. – 12-358 CHS
Los Angeles, CA 90095
Email: **RDudovitz@mednet.ucla.edu**
Phone: (310) 794-8833

Use of Student Data
This Project will be collecting identifiable student data from the participating students. The Principal Researcher and ALL Project Team Members will abide by ***any*** applicable statute or law related to confidentiality, including but not limited to, HIPAA, FERPA (see below), and COPPA.

Deliverables
Upon completion of data analysis, the District will receive a report of findings from the Researcher. The report will include, at a minimum, data, analysis and a summary regarding the findings.

FERPA Provisions
All parties shall comply with the provisions of FERPA in all respects to this MOU. Each party will use data collected and shared under this MOU for no purpose other than research authorized under §99.31 (6)(iii) of Title 34, Code of Federal Regulations. Nothing in this MOU may be construed to allow any Party to maintain, use, disclose, or share student information in a manner not allowed by federal law or regulation. In particular, no party shall disclose any data contained under this MOU in a manner that could identify any individual student or student's parent(s)/ guardian(s), per 34 CFR §99.31 (6)(ii)(A), except as authorized by FERPA.

Confidentiality
Confidential Information of the District refers to District's teachers names, parent/guardian names, District student names, District's student records, business plans, strategies, methods and/or practices, and any other information relating to the District or its business that is not generally known to the public,

including but not limited to information about the District's parents/guardians, students, personnel, products, customers, marketing strategies, services or future business plans ("Confidential Information"). All Confidential Information shared between the parties must be marked as "Confidential" including oral disclosures that need to be reduced to writing within thirty (30) days and marked as "Confidential". Notwithstanding the foregoing, "Confidential Information" specifically excludes (i) information that is now in the public domain or subsequently enters the public domain by publication or otherwise through no action or fault of the receiving party; (ii) information that is known to the receiving party without restriction, prior to receipt from the District under this MOU, from its own independent sources as evidenced by the receiving party's written records, and which was not acquired, directly or indirectly, from the District; (iii) information that the receiving party receives from any third party reasonably known by such third party to have a legal right to transmit such information, and not under any obligation to keep such information confidential; and (iv) information independently developed by or for the receiving party provided that the receiving party can demonstrate that those same employees had no access to the Confidential Information received hereunder.

Notwithstanding anything to the contrary in this MOU, records and information that identify individual teacher, parent, guardian or student names ("Student Information") shall not be considered public data and shall not be disclosed to any third party without the prior written consent of the District. Furthermore, such Student Information shall only be used by Researcher for the limited purposes outlined herein.

Insurance and Indemnification

A. Insurance: Each Party to this MOU shall secure and maintain, throughout the performance of this MOU, insurance or self-insurance in amounts appropriate to the conduct of each parties' activities or roles, or both, as contemplated by this MOU.

B. Indemnification: The University shall indemnify and hold harmless the District, its Board of Education, officers, employees, and agents from and against all liability, loss, damage, cost, and expense, including reasonable attorneys' fees, claims for injury or damages arising out of the performance of this MOU, but only in proportion to and to the extent such liability, loss, damage, cost, expense, attorney's fees or claims for injury or damage are caused by or result from the negligent or intentional acts or omissions of the University, University employees, officers, agents, or assigns, including the researchers involved in this Project.

   District shall indemnify and hold harmless University, its Board of Regents, officers, employees, and agents from and against all liability, loss, damage, cost, and expense, including reasonable attorney's fees, or claims for injury or damages, arising out of the performance of this MOU, but only in proportion to and to the extent such liability, loss, damage, cost, expense, attorney's fees, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of the District or District's employees, officers, or agents.

   The provisions of this paragraph shall remain in full and effect notwithstanding the expiration or early termination of this MOU.

Counterparts/Electronic Signatures

The Parties may execute this MOU in two or more counterparts, which shall, in the aggregate, be signed by all of the Parties; each counterpart shall be deemed an original instrument as against any Party who has signed it. The Parties further agree that signature sent by electronic mail, in PDF or similar format, as well

as by facsimile, shall be treated as original signatures to this MOU.

[Signatures provided on the following page]

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, SOLELY ON BEHALF OF AND LIMITES TO ITS LOS ANGELES CAMPUS

Elina Kreditor
Associate Director, ISR-MTA
10889 Wilshire Blvd, Suite 920
Los Angeles, CA 90095
Elina.Kreditor@tdg.ucla.edu

Date

DISTRICT REPRESENTATIVES AND CONTACT INFORMATION:

Name
Tittle
Address
Email

Date

(Point of Contact)
Title
Address
Phone:
Email:

Date

READ AND ACKNOWLEDGED BY:

Rebecca Dudovitz, Principal Investigator
Email: **RDudovitz@mednet.ucla.edu**

Date

Phone: (310) 794-8833

Exhibit A

Principal Researcher's Proposal / Project Summary
(18 total pages)

[attached hereto]

Academic tracking in schools is a widely used strategy that groups students into classes according to prior academic performance but has been criticized as a form of structural racism and discrimination. Proponents of tracking reason the practice supports differential instruction and improves individual academic performance. Critics, however, argue the practice systematically limits access to educational resources and opportunities for Black and Latinx students and other disadvantaged groups.[1] The negative impact of academic tracking may extend beyond education, given the strong link between lower education attainment and worse health outcomes, including chronic diseases, health behaviors, morbidity, and mortality.[2-5]

In addition to the potential long-term impact on education achievement and attainment, academic tracking may also have important direct effects on adolescent social networks and risky health behaviors by grouping students together with peers of similar previous academic performance and engagement.[6-8] While potentially beneficial to high-performing students, tracking may reinforce school disengagement and risky health behaviors like substance use, violence, and delinquency among lower-performing students.[9] These impacts may be particularly powerful for boys of color, who are more likely to experience harsh disciplinary practices when they engage in risky or disruptive behaviors. **While the educational merits of tracking are vigorously debated, [10-14] no known studies examine its health implications nor test whether interventions to dismantle tracking positively impact health behaviors.**

Advancement via Individual Determination (AVID) is a successful college preparatory program that works in part by "*de*-tracking" students.[11] Operating in nearly 5,000 U.S. high schools (about 20% of public schools nationally),[15] AVID expands access to rigorous college-preparatory courses for students who would not typically be placed in high-achieving academic tracks, while providing academic and social support to facilitate their success.[16] AVID is typically limited to a small group of students within a school who are performing in the academic middle (earning B- and C-average grades). We recently conducted the first randomized trial of this *traditional* AVID program in the US, and found students randomized to AVID had more prosocial peers and lower rates of substance use and delinquency compared to control group students at the same school. Additionally, boys randomized to AVID developed higher self-efficacy, grit, and school engagement and lower perceived stress than those randomized to usual educational programming.

In recent years, AVID has begun expanding the *traditional* small program to be delivered to a whole school, giving *all* students access to high-achieving track courses (*school-wide* AVID). Whether school-wide AVID improves education or health outcomes is unknown, but is important to understand since traditional AVID impacts a small percentage of the student body.

AVID's school-wide program offers a critical opportunity to study the impact of structural racism and discrimination via academic tracking on health. We propose a 4-year longitudinal study examining the impact of attending a school-wide AVID high school that reduces racial/ethnic disparities in rigorous college-preparatory course completion by eliminating academic tracking. We hypothesize that exposure to school-wide AVID will result in a) healthier adolescent social networks and improved psychosocial wellbeing; and **b)** lower rates of substance use and other risky health behaviors, like violence and delinquency. We will compare students attending 5 AVID schools with those attending 10 matched comparison schools (matched on location and student demographics) using typical academic tracking practices in racially and ethnically diverse communities in Southern California. We will follow 3,570 9th-12th grade students at intervention and control schools for 4 years, collecting administrative and survey data as they progress through high school and transition to adulthood. This study will yield critical knowledge that can inform education and health policy regarding academic tracking and the use of de-tracking interventions like AVID.
Through this study, we aim to:

1. Test whether exposure to AVID is associated with lower rates of adolescent substance use in the past 30 days (primary outcome), defined as any alcohol, tobacco, vaping, cannabis, prescription, or illicit drug use in the prior 30 days, as well as other substance use behaviors, violence and delinquency, compared to students attending schools without AVID.
2. Determine whether exposure to AVID is associated with increased enrollment in college-preparatory

course taking and healthier social networks (measured by fewer peers engaged in substance use, more peers engaged in school, and more school-related adults) compared to students attending schools without AVID.

3. Evaluate whether associations between AVID exposure and substance use are explained by reduced racial/ethnic disparities in college-preparatory course taking and healthier social networks.

B. SIGNIFICANCE

Academic tracking in schools is a form of structural racism with potential impacts on education as well as health behaviors and outcomes. Academic tracking is a widespread practice in which students are grouped into classes based on similar achievement levels. Proponents cite tracking as a strategy to facilitate differential instruction. However, typical strategies for assigning students into remedial, basic, or advanced courses include examining prior grades, standardized test scores and level of academic preparation, which results in the concentration of Black and Latinx students in lower achieving academic tracks. Underlying racist and discriminatory factors that contribute to this process include differential access to high quality pre-K and K-8th grade schools, bias in standardized test assessment, and biases in educators' expectations for students and responsiveness to parent advocacy.[1] Hence, critics argue academic tracking constitutes a form of structural racism and discrimination, due to evidence that the practice systematically limits educational opportunities for Black and Latinx students.[17-19] Assignment to a lower academic track may contribute to lower levels of educational attainment-- one of the strongest social determinants of long-term health.[2,5] Further, cohorting low-performing students together, may reinforce school disengagement and risky health behaviors, like substance use.[20] Given its widespread use,[18] the population health effects of tracking may be substantial.

Understanding the impact of academic tracking on health behaviors is timely and can inform school and health policy. The benefits and drawbacks of academic tracking are currently being debated. For example, an extreme form of tracking in New York City Public Schools (the largest school district in the nation) is the subject of a lawsuit filed earlier this year. Few educational studies have tested alternatives to tracking that increase access to academic rigor for all students. Furthermore, health is rarely considered in school academic tracking decisions since no studies have so far quantified its impact on health. Thus, the proposed study will have important implications for policy related to education, public health, and health equity.

Adolescence is a sensitive developmental period when interventions that target social relationships, health behaviors, and psychosocial wellbeing can have large impacts on long-term health and health disparities.[21,22] While early childhood is an important development period, certain key milestones do not occur until adolescence. Specifically, executive function is a critical component of brain function related to decision-making and risky behaviors that primarily develops during the teenage years.[23,24] In addition, substance use often first emerges during adolescence and can have negative impacts on brain development.[25] Further, health behaviors developed during adolescence strongly predict behaviors and health outcomes in adulthood.[26] Adolescence is also characterized by growing independence from parents and the increasing influence of peer networks, which shape important health attitudes and behaviors, and sets the stage for adulthood.

Substance use continues to increase dramatically during high school and effective prevention strategies are urgently needed. By 12th grade, 40% of teens regularly use e-cigarettes (vaping), 28% regularly use cannabis and 40% regularly use alcohol.[27] Adolescent vaping is growing at an alarming rate and predicts greater involvement with drugs over time.[27-30] The high prevalence of substance use is particularly disturbing in light of evidence that even intermittent adolescent use may have long-term impacts on brain development.[31-33] Black and Latinx youth are especially at risk, with high rates of cannabis and e-cigarette use,[34,35] and a greater likelihood of criminal justice system involvement with substance use.[36] A recent study suggests an urgent need for NIH investment in prevention research to identify and intervene on the risk factors for adolescent substance use in the context of cannabis legalization and the vaping and opioid epidemics.[37]

School environments present a critical yet under-utilized opportunity to shape health trajectories and reduce racial and ethnic health disparities. Differential access to K-12th grade educational opportunities shapes future health and life trajectories, influencing many downstream social determinants of health, such as educational attainment, employment, income, housing, and criminal justice involvement.[38-40] In addition, during adolescence, academic achievement and school engagement are closely tied to health behaviors, even after

controlling for family and neighborhood factors, and are influenced by school environments.[9,41] As a result, interventions to break down systemic barriers to educational opportunities for marginalized racial and ethnic groups have the potential to markedly reduce racial and ethnic health disparities over the life course.

Tracking may have an outsized impact on health for Black and Latino boys. We hypothesize AVID's impact will be largest for Black and Latinx students and boys, who are more likely to experience structural racism and discrimination through traditional academic tracking. Further, interventions targeting the school environment may be particularly effective at reducing substance use for vulnerable subgroups like boys of color, who often face more pressure to engage in problem behaviors[42] and experience more severe consequences, such as harsh disciplinary practices or criminal justice involvement, when they do so. In contrast, AVID has been particularly successful at improving education outcomes, such as school drop-out, for boys.[43] Schools might have greater influence on how boys form their social networks[44] and perceived norms may have a greater impact on boys' substance use.[45] In our group's predominantly Latinx RISE Up sample, we found more consistent effects of being offered admission to a supportive school on boys' substance use, social networks, and perceived school culture, compared to girls.[46]

C. INNOVATION

Few studies examine the impact of an intervention designed to directly address structural racism. Most studies investigating the impact of racism on health focus on interpersonal racism or describe associations between structural racism and health without testing solutions. Yet this information is critical for systemic change. To our knowledge, there are no studies examining the health effects of interventions targeting structural racism and discrimination by eliminating academic tracking. In this study, we capitalize on an existing de-tracking intervention to test whether and how it improves adolescent and young adult health behaviors.

Few prevention strategies target school environments and the social drivers of substance use. Most school-based substance use prevention interventions focus on individual knowledge and skill development rather than the structural and social drivers of risky behaviors.[47] This is despite evidence that schools influence many social stressors and supports associated with substance use and health behaviors.[48-52] This study will examine the effects of an intervention directly targeting how schools group students together and influence substance use and other risky health behaviors.

Most school-based substance use interventions require schools to divert instructional time away from academic content to implement them with fidelity and face dissemination challenges.[47,50,53] AVID presents a unique opportunity to test whether altering a school's practice with regards to academic tracking can simultaneously impact academic and health outcomes. Results from this study can identify new targets for school-based interventions that may be more easily integrated with instructional time or enhance other school-based substance use prevention efforts.

D. PRELIMINARY DATA AND STUDY TEAM

Within school segregation via academic tracking is associated with long-term health. We conducted a secondary analysis of the National Longitudinal Study of Adolescent to Adult Health to test whether racial/ethnic segregation between schools and racial/ethnic academic tracking within schools was associated with adult health outcomes, controlling for contextual factors.[54] To measure structural racism via academic tracking --whether students of color tend to be concentrated in different academic tracks --we created an index of dissimilarity[55] across levels of high school English courses participants were enrolled in (e.g. honors, general, remedial) to compare the racial/ethnic distribution across these course levels to that of the whole school. We found that, after controlling for contextual factors, greater within school segregation via academic tracking during high school was associated with substance use during adulthood and the direction of this association varied by race/ethnicity.

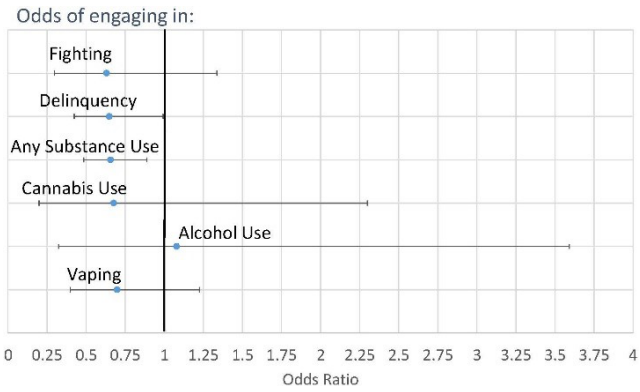
School environments influence adolescent social networks and risky health behaviors. We have conducted two natural experimental studies, RISE (Reducing Inequities in health through Social Educational change) and RISE UP (RC2MD004770, R01DA033362)**,** that examined the impact of school environments on adolescent social networks and health.[9,46,56,57] We used the admissions lottery to find comparable cohorts of adolescents from low-income Black and Latinx families exposed to high- and low-performing high schools

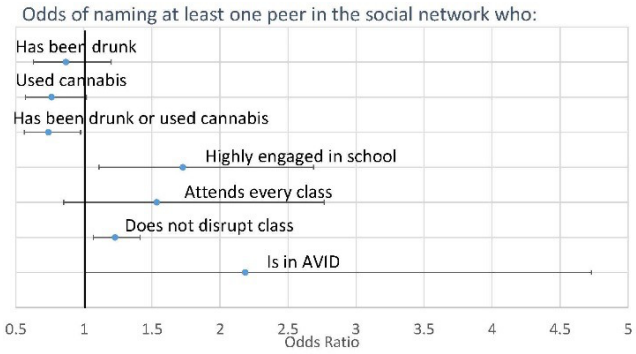
(performance determined by standardized test scores). We used intent-to-treat analyses to compare those who won and lost the lottery for admission to a high performing school. Lottery winners were less likely to engage in risky behaviors (e.g. binge drinking, using alcohol at school, carrying a weapon, cannabis misuse), had fewer substance-using peers in their social networks, engaged in less truancy, spent more time studying, and reported greater teacher support.[46] From this study, we have extensive experience obtaining informed study consent from students and parents, and recruiting, tracking and retaining students through and after high school. Between 8th grade and 11th grade we retained 88% of our initial 1270 students from low-income neighborhoods attending 147 different high schools in 9th grade.[46] Our yearly retention rates from the beginning of the study at age 15 through age 22 and the transition to college has been 95% or higher.

AVID is an academic de-tracking intervention that positively impacts social networks and health behaviors. From 2016-2019, we conducted a pilot randomized trial of AVID's *traditional program* at five large high schools in Los Angeles (1K23DA040733-01A1 PI-Dudovitz), serving predominantly low-income Latinx students. In its traditional form, AVID targets a small group of students in the "academic middle" (typically 25- 35 students per school earning B- or C-average grades) who are unlikely to be programmed into and succeed in college preparatory courses without additional support. Through AVID, students commit to a rigorous academic program, including honors and advanced placement courses, and attend an AVID elective, where they are taught study skills and the "hidden curriculum" regarding the college application process. At our participating study schools, we worked with the AVID coordinators over two consecutive years to identify more than twice as many students eligible for the program than available AVID slots. Eligible students were then randomized via an admissions lottery. Lottery "winners" were offered a slot in the AVID program (intervention group) and remaining students received usual programming (control group). We also recruited a comparison group of high-performing incoming 9th grade students from the same schools at the same time as the AVID and Control groups. We identified these high performing students by their grade point average greater than 3.5 during 8th grade. At both baseline and follow up, students self-reported their health behaviors, social-network composition, stress, self-efficacy, school engagement, and grit. We found:

1. Overall recruitment rate was 82% for the AVID and Control groups and our retention rate was 97%. Overall, 418 of the 431 initially enrolled students (117 AVID; 141 control; 160 high performing) completed the follow up survey at the end of 9th grade.
2. By the end of 9th grade, students randomized to AVID reported lower rates of substance use and delinquency and healthier social networks. As seen in **Figure 1**, in an intent-to-treat analysis using multi-level random effects models accounting for students clustered within schools and controlling for the baseline behavior, compared to the control group, **being randomized to AVID was associated with lower odds of any substance use (OR 0.66, p=0.006) and any delinquent behaviors (OR 0.65, p= 0.045)** in the past 12 months as well as lower odds of naming a peer in one's social network who has been drunk or used cannabis (OR 0.74, p=0.03) and higher odds of naming a peer who does not disrupt class (OR 1.23, p=0.004), was highly engaged in school (OR 1.73, p=0.015) and who was in AVID (OR 2.19, p=0.047). Though we were not powered to detect changes in 30-day substance use, similar patterns were observed.
3. Our study sample was demographically similar to the Los Angeles Unified School District student population, comprised primarily of Latinx students with immigrant parents, many of whom did not graduate high school. While there were no significant differences in demographics or baseline health behaviors between

Figure 1. Intent-to-treat analyses testing AVID effects on health behaviors and social networks





Intervention and Control students, those in the high performing group were less likely to be male and less likely to be Latinx, suggesting that even schools where most students identify as BIPOC (Black, Indigenous, or People of Color), academic tracking by race/ethnicity may still occur in the absence of a whole school detracking approach.

4. Intervention boys (**Table 1)** reported less stress and greater self-efficacy, grit, and school engagement, than control boys ($p<0.05$).
5. Among high-performing students, having an AVID peer in their network was not associated with increased risky health behaviors.

Table 1. Sex Stratified Intent-to-treat Analyses of AVID Effects on Social-Emotional Outcomes

	Males			Females		
Outcome	**Coefficient**	**95% CI**	**P-value**	**Coefficient**	**95% CI**	**P-value**
Stress	-0.21	-0.41 – -0.02	**0.033**	-0.07	-0.29 – 0.16	0.563
Self-Efficacy	0.32	0.09 – 0.55	**0.007**	-0.13	-0.48 – 0.21	0.456
Grit	0.28	0.04 – 0.53	**0.024**	-0.15	-0.40 – 0.09	0.221
School Engagement	0.24	0.09 – 0.40	**0.002**	-0.05	-0.26 – 0.17	0.660

The experience from our prior studies has prepared our interdisciplinary team well for the proposed study. First, it is clear that we can successfully partner with public schools to conduct rigorous research. We have experience collecting survey data, including from students about social-emotional outcomes and sensitive topics such as substance use, violence and delinquency behaviors for themselves and those in their social networks.[9,56-58] In addition, though limited by our small sample size, our pilot data suggest that by shifting students' academic track, the traditional AVID program impacts students' social interactions, social-emotional skills, and health behaviors for middle-performing students upon the transition to high school. However, because the traditional program targets only a handful of students without addressing underlying academic tracking practices across an entire school, its ability to mitigate structural racism and discrimination is limited. For example, at a typical school implementing AVID in this limited form, less than 14% of students in the whole school took a rigorous college-preparatory course. In contrast, AVID's whole-school approach eliminates academic tracking and expands access to educational opportunities for all students, regardless of race or ethnicity. <u>The effect of the *school-wide* AVID program on health behaviors has never been studied.</u>

Further, our pilot study demonstrated the impact of AVID during the transition to high school. However, we hypothesize that the impact of academic de-tracking on health is likely to increase as students progress academically through 12th grade and transition to college and/or the work force. These transition points also coincide with times of increased risk for substance use, delinquency, and criminal justice involvement.[59] Finally, our pilot study was conducted in communities with limited racial and ethnic diversity. While we hypothesize that in more diverse school environments, the impact of AVID on health will be larger for Black and Latinx students, who are more likely to be concentrated in low-performing academic tracks, it is possible that de-tracking in diverse schools will not shift social networks sufficiently to impact health behaviors; or that greater exposure to White students via more integrated classrooms will expose Black and Latinx students to more inter-personal racism. <u>Studying AVID's school-wide program offers an important opportunity to quantify the social network and health effects of structural racism and discrimination via academic tracking, as well as test a promising de-tracking solution.</u>

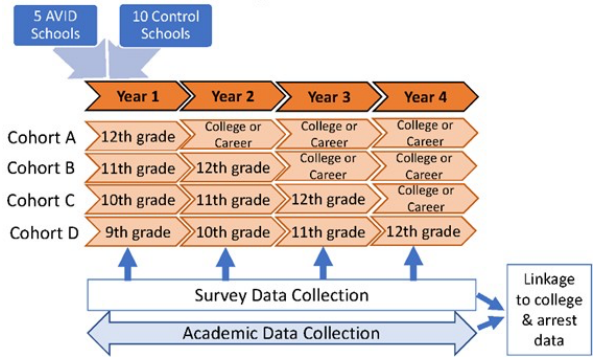
3.0 <u>Research Team</u> (see biosketches for details): Our research team has the experience and expertise to successfully execute the proposed study. **Rebecca Dudovitz, MD, MSHS** (PI) is a pediatrician and Associate Professor of Pediatrics. She led the pilot AVID study and has experience with community-based participatory research in schools, longitudinal data collection and analysis, including primary data collection with adolescents in school settings, and merging and analyzing education and health data. [9,57,60,61] She has strong relationships with public school systems throughout Southern California and AVID (see letters of support). She has collaborated with all co-investigators on previous grants and publication. **Mitchell Wong, MD, PhD** (Co-investigator) is a general internist and Professor of Medicine with experience studying health disparities and the impact of school environments and peer networks on adolescent substance use and risky behaviors. As PI of the RISE and RISE Up studies,[57,62] he has experience managing R01-level large-scale longitudinal studies that require recruiting and retaining low-income minority adolescents. He will apply his expertise to ensure our recruitment, retention, and data collection and management are effective and efficient. Our education expert, **Marisa Saunders, EdD** (Co-Investigator)**,** is an expert in the causes and consequences of educational inequity and has significant experience implementing and evaluating education interventions to reduce those disparities.[63-66] She has long-standing collaborations with public school systems throughout California studying

structural racism in education. She will contribute her expertise measuring academic tracking by race and ethnicity and will oversee collection and analysis of education data. **Nicholas Jackson, MPH PhD** (Co-investigator) is the study statistician. He has a master's degree in biostatistics and a doctorate in quantitative psychology. He will contribute expertise in longitudinal study design and analysis, including hierarchical modeling and repeated measures analysis. **Dennis Johnston, PhD** (Consultant) is the Senior Director and Chief Research Officer for AVID. He will contribute his extensive knowledge of AVID's program and implementation, strong connections to AVID schools, and expertise measuring of AVID fidelity.

E. APPROACH

Overview: As shown in **Figure 2,** we will conduct a longitudinal study comparing changes in social networks, substance use, violence, delinquency, and psychosocial wellbeing over 4 years among students initially in 9^{th}-12^{th} grade attending public schools using the school-wide AVID program to eliminate academic tracking, compared to students attending traditional public schools. We will conduct surveys with AVID and Control students annually for 4 years and link this prospectively and retrospectively with administrative education data from the whole school, as well as participating students' academic transcripts and college attendance data. We will measure structural racism and discrimination via academic tracking in AVID and control schools using an index of dissimilarity to quantify the degree to which the racial/ethnic composition of rigorous courses (e.g. advanced placement, international baccalaureate, or honors

Figure 2. Overview of Study Design & Data Collection



courses and dual enrollment in college courses during high school) differs from the racial/ethnic composition of the entire school. We will test for cross-sectional and longitudinal differences in social network characteristics, risky health behaviors and psychosocial wellbeing between intervention and control students using propensity matching to account for selection bias as students progress through high school and transition into college and/or careers. We will measure the degree to which AVID eliminates structural racism and discrimination via academic tracking and follow students with greater exposure to AVID both cross-sectionally (e.g. 9th graders vs. 12th graders) and longitudinally (e.g. 9th graders over time). By doing so, we can test for a dose response relationship between the intervention and outcomes while controlling for cohort effects. Finally, we will link to college and arrest data to explore whether tracking is associated with higher education and criminal justice involvement. Our primary outcome is substance use in the previous 30 days, as a marker for regular use. Secondary outcomes include polysubstance use, cannabis misuse, and illicit drug use, which indicate more risky and problematic use.

E.2 Study Design and Rationale: We will conduct a non-randomized controlled clustered trial, a quasi-experimental study design often used to test the impact of school-wide interventions. We will follow a cohort of students sampled from AVID and control schools over 4 years. Because the intervention is school-wide, assignment to intervention and control at the student-level is not feasible. Further, we cannot randomize schools to the intervention vs. control because schools typically take 3-4 years to implement AVID school wide due to adjustments in curriculum and teacher/staff training.

We have already conducted a randomized trial of the traditional AVID intervention delivered within a school to a small subgroup of students performing in the academic middle (i.e. AVID randomized at the student-level). However, the traditional AVID intervention does not fully address academic tracking throughout the school (and hence does not fully address the source of structural racism and discrimination). Studying whole school reform is more relevant to the active debate regarding academic tracking policies in schools and has bigger implications for how school policy changes might help reduce structural racism.

Given the proposed non-randomized study design, choosing comparable Control schools is critical. To mitigate this issue, we will match comparison schools on geographic area and student body demographics (racial/ethnic composition and socio-economic status as measured by the proportion of students eligible for free/reduced price lunch). Selection bias associated with students' decision to attend a school-wide AVID school and to participate in the study is another challenge. To address this, we capitalize on the availability of administrative education data for from middle school – prior to high school—regardless of study participation to conduct propensity weighting at the student-level, weighting intervention and control students on individual socio-demographics (gender, race, ethnicity, free/reduced price lunch status), middle school English Language Learner status, middle school grade point average, and middle school standardized test scores. Having a local comparison group allows us to account for confounding due to regional and secular trends in education and health behaviors over time. Further, by following multiple cohorts, we can adjust for cohort effects, which may be particularly important given the recent disruptions in education due to the COVID-19 pandemic and its potential reverberating effects on academic and health trajectories.

E.3. Rationale for the sample age and observation period: Substance use initiation and progression to regular and heavy or problematic use increases dramatically during high school and early adulthood.[67-69] Studies suggest that social networks are particularly important to health behaviors during transitions, such as the transition to high school and adulthood.[68] Hence this is an ideal time to study the impact of AVID's school-wide de-tracking intervention on social networks and substance use. Relationships between academic tracking and substance use are likely to vary as adolescents age, as substance use becomes more prevalent and risky, and as college-bound students begin taking a greater number of rigorous academic classes. Further, school-related social networks may become more salient as adolescent brain development matures and teens establish greater independence from their families.[22,70] We hypothesize that longer exposure as students progress through high school and mature developmentally in a school with academic tracking versus an AVID school without tracking will result in more dramatic differences in social support, social-emotional skills, school engagement, and substance use. Similarly, we expect that as students transition to adulthood, the social-

networks and health behaviors of those who transition to college will further diverge from those who do not pursue higher education. However, the impact of de-tracking interventions (such as AVID) on social networks and health behaviors during adolescence and the transition to adulthood have never been examined. Hence, we propose to follow 9th-12th grade Intervention (AVID) and control students for 4 years, to determine whether and how academic de-tracking via AVID impacts social networks and substance use trajectories.

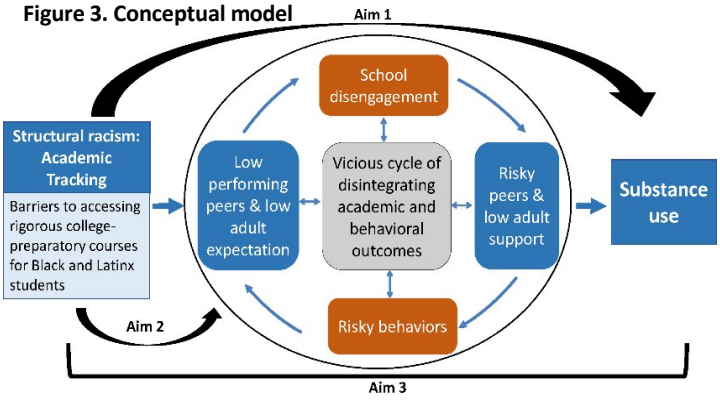


Figure 3. Conceptual model

E.4. Conceptual model: Academic tracking is a form of structural racism and discrimination that impacts health. This study is informed by literature describing how a) structural racism contributes to health disparities; b) Jessor's problem behavior theory;[71,72] and c) the impact of social networks on adolescent health.[73] Structural racism refers to the "macro level systems, social forces, institutions, ideologies, and processes that interact with one another to generate and reinforce inequities among racial and ethnic groups,"[74,75] and are the forces that perpetuate racial and ethnic disparities even in the absence of interpersonal racism. Within schools, this can take the form of differential access to educational opportunity. As seen in **Figure 3**, academic tracking (i.e. academic programming based on prior performance) is a common educational practice employed by schools to facilitate differential instruction for high-performing versus middle- and low-performing students. However, by relying on previous grades, test scores, and evidence of academic preparation to place students into tracks, this practice systematically disadvantages Black and Latinx students, concentrating such students in low-performing tracks.[17-19] Hence academic tracking results in racially segregated classes and limits access to rigorous college preparatory coursework such as Advanced Placement and honors courses for Black and Latinx students.[18,19] In addition to impacting academic performance and educational attainment, both critical social determinants of health,[2,9,26] this practice also likely impacts adolescent health behaviors by altering social networks.[61]

Jessor's theory suggests teens form friendships with peers based on similar levels of school engagement and risk behaviors. Within schools, this process can be reinforced by placing similar students in the same classrooms. This theory is strongly supported by evidence that adolescent health behaviors such as substance use, violence, and delinquency are closely tied to the behaviors and attitudes of individuals in their social network.[76-81] Policies like academic tracking determine to which school-related adults and peers a student is exposed. Social networks then determine sources of support, transmission of social norms, and access and opportunity to engage in substance use.[73,79,80,82] Although peers are powerful points of influence during adolescence,[83] relationships with supportive adults can continue to protect against substance use.[84,85]

Through the proposed study, we will test whether de-tracking via AVID reduces substance use **(Aim 1)** and leads to healthier social networks **(Aim 2)**, and whether the impact on substance use is explained by reduced disparities in rigorous college preparatory course taking and social network changes **(Aim 3)**.

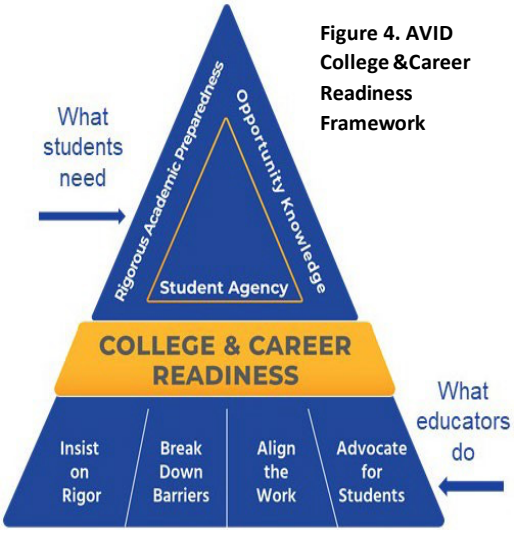


Figure 4. AVID College &Career Readiness Framework

https://www.avid.org/cms/lib/CA02000374/Centricity/Domain/1037/AVID_CollegeAndCareerReadiness_White%20Paper_20200510.pdf

E.5. Intervention: Established in 1980 by a San Diego high school teacher, AVID is an international non-profit seeking to expand access to educational opportunities for students with risk factors associated with low college attendance and graduation, such as being low-income or from a marginalized racial/ethnic group.[86] The AVID framework, illustrated in **Figure 4,** posits all students need rigorous academic preparation, opportunity knowledge, and student agency to be successful. Key aspects of the program include:

1. Students commit to enrolling in their school's most academically challenging courses, such as honors or Advanced Placement, and teachers communicate high expectations for their performance and reinforce students' ability to overcome challenges and that all students have the potential to go to college.
2. School leadership use data and self-reflection to identify and remove barriers to college readiness for all students. For example, schools are prompted to eliminate prerequisites for taking honors and Advanced Placement courses.
3. Students are offered an AVID elective course, where they receive

academic support, specific study skills, and instruction on college application requirements and process. In addition, classroom interactions are designed to foster a collaborative and supportive environment emphasizing peer tutoring and learning "soft skills" like problem solving, self-advocacy, time management, and organization.

4. The school cultivates a college-readiness environment with college banners and pennants to reinforce a college-going culture. College tutors mentor students on academic skills and expose them to successful role models. School counsellors explain the college application process and encourage all students to take pre-collegiate exams (e.g. SAT).
5. Teachers receive professional development at the AVID Summer Institute to develop and reinforce skills in culturally relevant teaching. AVID emphasizes the importance of student-teacher relationships and *how* rather than *what* material is taught. Teachers are encouraged to spend time throughout the year intentionally building relationships with students. They start with low-risk relationship-building activities that progress into deeper connections, allowing teachers to form authentic meaningful bonds and are encouraged to serve as a student advocate on their campus.

Through these practices School-Wide AVID directly addresses academic tracking and the resulting structural barriers to accessing and succeeding in rigorous college-preparatory classes for Black and Latinx students.

Table 2. Example Criteria for School-Wide AVID Certification	
≥ 60% staff AVID trained	>70% staff routinely using AVID teaching strategies
> 50% school leadership team on the AVID site team >60% 11th and 12th grade students taking at least one course of rigor (e.g. AP, honors)	>80% of all seniors have completed college entrance requirements. ≥70% of all students are enrolled in rigorous courses, enabling them to fulfill four-year college or university requirements.
At least 70% of students have taken pre-collegiate exams, (e.g., PSAT, ACT, SAT), appropriate for their grade level.	≥90% students believe their teachers expect them to attend college, as evidenced by student surveys.
There are few master schedule conflicts between courses of rigor and the AVID elective.	Performance, enrollment, and/or staffing data are analyzed to ensure all students' access to and success in rigorous advanced courses.

E.6 Study Sites: Based on our sample size calculation (see section E.13.), we will conduct the study at 5 intervention high schools and 10 control schools (described in next section). We have identified 5 intervention schools that meet the following selection criteria and have strong interest in participating in this study (see **Table 3 & Letters of Support**): a) certification by the national AVID program as achieving school-wide implementation (Note: certification is conducted annually and based on performance on criteria described in **Table 2**); b) location in Southern California; c) serving a racially and ethnically diverse student body; and d) in the same district as similar schools without School-Wide AVID.

Table 3. Characteristics of Study Intervention High Schools

County	School	Enrollment	% Asian	% Black	% Latinx	% White	% FRPL*
Riverside	Elsinore	2083	1.5	4.1	57.4	28.8	63.3
Riverside	Heritage	2878	0.9	5.8	67.6	16.7	70.3
Riverside	Lakeside	1806	1.4	3.0	73.4	16.6	77.8
Riverside	North	2254	3.3	10.3	71.9	8.8	77.2
Orange	Santiago	1967	13.5	0.1	81.9	1.8	84.2

* % qualifying for Free or Reduced Price meals, which is a measure of socioeconomic disadvantage.

E7. Control Sites: We will identify 10 control schools from the same regions as intervention sites, first matching on racial/ethnic student body distribution, followed by percent qualifying for free/reduced price meals. These characteristics are highly correlated with school resources, and academic and health outcomes. We will approach schools within 10 percentage points of intervention schools on these factors. Given that we have 53 high schools in Riverside and 62 high schools in Orange to choose from, we do not anticipate difficulty finding 10 control sites.

E.8. Recruitment and Retention: We will recruit 3,570 (9th -12th grade students from intervention and control schools (238 per school) into the study at the beginning of the academic year. All students attending study schools who are not participating in special education will be eligible. We exclude special education students, as college preparatory courses may not be in their Individualized Educational Plan. Based on our sample size calculations (Section E.13), we will oversample Black students to ensure they make up at least 15% of our sample, so that we can test whether effects of AVID are moderated by race. In several prior school-based studies (Section D.2.-D.3.), our team has developed and refined highly effective recruitment and retention methods. In coordination with participating schools, students will receive a recruitment packet including

parental consent and student assent forms. Those returning signed consent/assent forms will be enrolled in the study. We will follow study participants for 4 years regardless of whether they switch schools or leave school during the study period. For most of our sample, this will include following participants through early adulthood and the transition to college or the work force. In our prior longitudinal studies with similar samples, we have recruited 80% or more of our target sample and maintained over 95% retention rates on a yearly basis from 9th grade through age 22 and the transition to college.[46]

E.9.Measuring academic tracking: We hypothesize that academic tracking leads students of color, such as Black and Latinx students, to be disproportionately underrepresented in more rigorous courses, like honor or advanced placement-level classes. We will examine **the index of dissimilarity**, used in previous studies of within school segregation via academic tracking, [54,55] to measure the degree to which students from different racial or ethnic backgrounds are evenly distributed across course levels within a school. This school-level measure is calculated from course enrollment data. For our primary measure, we will examine the level of English course taken, as all students take English all 4 years during high school. However, we will also examine other subjects, including Social Studies, Math, and Science. We will create a separate index of dissimilarity for each racial and ethnic group represented at the school (e.g. separate indices for Black vs. non-Black, Latinx vs. non-Latinx, and White vs. non-White). The index is represented by the formula $D = 100*[0.5\sum|(b_i/B) – (nb_i/NB)|]$, where b_i represents the number of Black students in the i^{th} level of the English curriculum at the school, B is the number of Black students at the school, nb_i is the number of non-Black students in the i^{th} level of the English curriculum, and NB is the number of non-Black students at the school.

In addition, for each student in the sample, we will calculate the proportion of all high school courses (from 9th-12th grade) that are rigorous college-preparatory courses (defined as Advanced Placement (AP), Honors, International Baccalaureate (IB), Advanced International Certificate of Education (AICE), or End-of-Course (EOC) dual high school and college enrollment) and compare AVID and control students by race and ethnicity.

E.10. Study Measures: All measures are summarized in **Table 4**. Substance use measures are based on the Monitoring the Future (MTF) and Youth Risk Behavior Surveys (YRBS) [87,88] and ask about the frequency and intensity of use in the last 12 months and last 30 days. **The primary outcome of interest is 30-day substance use** (alcohol, cannabis, tobacco, e-cigarette, prescription drug or illicit drug use in the previous 30 days). Our secondary outcomes include polysubstance use (use of more than one substance in the previous 30 days), cannabis misuse, and 30-day illicit drug use, which indicate more risky and problematic use. Additional outcomes include the frequency of cannabis, alcohol, tobacco, e-cigarette and illicit drug use in the past 12 months and 30-days, as well as at-school substance use, binge drinking, and alcohol misuse. The alcohol and cannabis misuse scales (RISE Up sample alpha =0.88 and 0.85 respectively)[46] assess a variety of substance-use related problems (such as getting into trouble because of substance use) and high-risk behaviors (such as polysubstance use) that are associated with developing a substance use disorder.[89]

Table 4. Study Measures

Variable	Domain	Measure	Frequency	Source
Outcome, Aims 1 &3	Substance use	YRBS, MTF, and RISE measures of frequency of past 12 month and past 30-day use of cannabis, alcohol, vaping, and other drugs, and alcohol and cannabis misuse.[62,90]	Annually, years 1-4	Student Survey
Outcome, Aim1	Other risky health behaviors	YRBS, MTF, and RISE measures of violence exposure (engaging in and exposure to fighting, weapon carrying, gang involvement in the past 12 months and past 30 days); Add Health delinquency scale (alpha 0.70)	Annually, years 1-4	Student Survey
Outcome, Aim2; Intervention dose	Academic tracking by race/ethnicity	Index of dissimilarity[54,55], proportion of courses that are college-preparatory courses of rigor (e.g. AP, Honors, IB, AICE, EOC) by student race/ethnicity	Each high school semester	High School Transcript
Outcome, Aim2; Mediator, Aim3	Social network	RISE personal social network measures of proportion of peers engaging in risky health behaviors and pro-social behaviors[91] and number of school-related adults	Annually, years 1-4	Student Survey
Alternative mediators, Aim3	Social-emotional skills	General Self-Efficacy (alpha 0.94),[92] Harter Self-Perception Profile for Adolescents academic, behavioral, and self-worth subscales (alpha 0.68-0.79*), [93] Duckworth Grit Scale (alpha 0.71)[94]	Annually, years 1-4	Student Survey

	Mental health & wellbeing	Well-being (alpha 0.91**),[95] Perceived Stress Scale (alpha 0.70),[96] Mental Health Inventory (alpha 0.80)[97,98], CES-D 10 Depression Scale(alpha 0.85**)[99,100]	Annually, years 1-4	Student Survey
	Interpersonal racism	Adolescent Discrimination Distress Index Institutional, Educational, and Peer subscale (alpha 0.60-0.72**)[101]	Annually, years 1-4	Student Survey
	School climate	Delaware School Climate Survey (alpha 0.86),[102] Rise school culture (alpha 0.93),[41] RISE school disciplinary style,[103] RISE teacher support (alpha 0.87)[91,103]	Annually, years 1-4	Student Survey
	School engagement	High School Survey of Student Engagement (alpha 0.96),[104] time studying, unsupervised time, expectations for educational attainment	Annually, years 1-4	Student Survey
Variables for propensity weighting; Additional outcomes	Academic performance	8th-12th grade academic grades, standardized test scores, attendance, suspensions/expulsions, credits earned, A-G courses	Year 5, retrospective 8th-12th grade	High school Transcript
Additional outcomes	College attendance	Post-high school college enrollment and persistence.	Year 5, retrospective	National Clearinghouse college database

	Arrest reports	Date, location, and reason for arrest from public arrest records	Year 5, retrospective	United Reporting
Intervention dose	AVID exposure	Number of semesters enrolled in intervention vs. control school	Each high school semester	High School Transcript
	AVID fidelity	AVID school certification measures from AVID Center, student course enrollment, pre-collegiate exam taking, familiarity with AVID concepts study skills	Annually, years 1-4	National AVID Center, Student Survey
Moderators	Demographics	Gender, age, race/ethnicity	Year 1	Student Survey
Confounders	Family factors	Free/reduced price lunch status, parental level of education, family structure, nativity, index of parenting style,[105] family substance use, Communities That Care Family Cohesion (alpha 0.89**)[106]	Year 1	Administrative School Data, Student Survey
	Neighborhood factors	Communities That Care neighborhood cohesion (alpha 0.65**),[106] access to substances[67], substance use prevalence[106]	Year 1	Student Survey
Except where indicated, Cronbach's alpha is reported for the AVID pilot sample, which most closely matches our anticipated study sample. *reported alpha is from the RISE study sample; **reported alpha is from the sample described in the citation.				

Social Network Outcomes: We propose a personal network approach, in which respondents provide information about the members of their network and the relationships among network members. This strategy is in contrast to a whole network approach in which each member of a network is interviewed to provide information about his/her/their own behaviors. For this study, a personal network approach is more appropriate because it is more feasible and we expect that de-tracking via AVID will have impacts across students' peer and adult networks. Further, studies suggest that perceptions of peer behaviors have as much association with changes in respondents' behaviors as the actual behaviors of their peers.[107] To assess network composition, we employ a similar protocol to what we used in the AVID pilot and the RISE Up studies. We will ask respondents to list 20 individuals (alters) that the respondent knows well and has had contact with in the past year (face-to-face or online), using a standard personal network generation methodology that protects alter anonymity. We will then ask a series of questions about each alter: age, gender, and relationship with the respondent (e.g., relative, friend, teacher); emotional closeness; supportiveness; and frequency of contact in the past 30 days. We will also ask about each Alter's behaviors (e.g., alcohol use, cannabis use, other drug use, and school performance) and about shared behaviors (e.g., engaging in substance use together, doing schoolwork together). To assess network structure, for each unique pair of network alters, we will ask if these two people know each other and how often they interact (response options: never, rarely, sometimes, or often). This allows for the calculation of variables that measure different structural characteristics of the respondent's personal network (e.g., network density, whether the respondent bridges social groups). For 20 alters, this amounts to 210 different questions, but with specialized social network software, these can be asked and answered very quickly (about 1.5 seconds each).

Psychosocial Wellbeing & Mental Health: Measures of psychosocial wellbeing and mental health focus on outcomes potentially influenced by academic tracking and targeted by the AVID program that are also associated with substance use and could be alternative mediators of the intervention effect.[9,56,58,108] We measure school engagement, expectations for educational attainment, self-efficacy, academic and behavioral self-concept, self-worth, grit, perceived stress, general mental health, well-being, and depression, all using validated scales that we have pilot tested in the AVID pilot or RISE Up study. To assess whether AVID changes experiences of interpersonal racism, we use the validated Adolescent Discrimination Distress Index, including the Education Discrimination Distress and Peer Discrimination Distress Subscales.[101]

School Climate: It is possible that schools implementing AVID school-wide also have other policies and practices that lead to healthier school climates, and these factors (unrelated to academic tracking) could drive differences in substance use. Hence, we will measure school climate to test for alternative mediation effects.

Academic Achievement: Measures of academic achievement will be obtained from student's high school administrative records at the end of each semester and in year 5. We will also obtain data on enrollment and persistence in college. Based on our experience in the RISE Up study, by obtaining participants' name, birthdate, sex, and California Student ID number at baseline, we can easily track students through state and federal educational databases, regardless of loss to follow up.

Criminal Arrest Data: As in RISE Up, we will obtain criminal arrest data from United Reporting, a private firm

that obtains public arrest records across California through agreements with law enforcement agencies and freedom-of-information act requests. These records are public and cover arrests from every county in California, except Modoc, Sierra and Siskiyou counties. These three counties, however, are rural areas of Northern California far from the study area, and represent less than 1% of the population. The data include date, location, and cause of arrest using arrest codes. Arrest codes can be categorized into indicators for property-related offenses (e.g. vandalism and theft), drug and alcohol-related offenses (e.g. possession or sale of drugs, driving under the influence, public intoxication), violent offenses (e.g. assault or battery) and other offenses. United Reporting conducts the matches on name and date of birth using a fuzzy match algorithm.

Potential moderators: To test whether intervention effects are greater for Black and Latinx students and for boys, we will ask students to self-report race, ethnicity, and gender.

Other Measures. We will measure other known predictors of substance use to account for potential confounding. At the individual and family level, these includes age and interview date, family structure, family functioning, socioeconomic status, parenting style, and family substance use.[109] At the environmental level, this includes neighborhood social cohesion, availability of substances and prevalence of substance use.[110,111]

E.11. Data Collection: Computer-assisted self-interview surveys will be conducted annually at school via a mobile tablet application, as adolescents are more likely to disclose sensitive information on computerized surveys.[112] In our prior work, this strategy allowed for rapid, inexpensive, secure data collection. Those absent on the day of administration will be offered an alternative day. Participants will receive a $10 gift card incentive following each in-school survey. Follow up surveys for participants who no longer attend a study high school will be brief (15-20 minutes) and completed online via a personalized link to a secure web-based survey or via phone, if desired by participants. We will use a $30 gift card incentive for participants who are no longer in high school and additionally, for hard-to-reach participants, will offer an extra incentive of up to $50. We have achieved high levels of participant retention through age 19-22 using a similar strategy in the RISE Up study.

E.12. Data Analysis: Variable distributions will be inspected graphically using histograms and box-plots and the appropriate descriptive statistics for numeric (e.g. mean, SD, median, IQR) or nominal variables (e.g. frequency) will be used to summarize values for demographics, substance use, academic performance, and social network measures. Differences between those with and without attrition will be examined for AVID and control groups based on t-tests (or Wilcoxon Rank Sum) and chi-square tests (or an exact test), as appropriate. Variables found associated with attrition at $p<0.20$ will be included as covariates in our models.

Though we will recruit control schools with the same geographic location and similar sociodemographic profiles to the AVID intervention schools, the threat of unmeasured confounding is present due to potential selection bias in 1) students within a school who consent to participate and 2) between students enrolled in AVID versus control schools. To account for potential biases from these sources, our analyses will employ a weighting scheme using a two-step process. First, we will use administrative data on all students attending each school to conduct logistic regression models estimating the probability of consenting to participate within a school based on demographic (e.g. age, sex, race, free/reduced price lunch status) and middle and high-school academic performance measures (e.g. standardized test scores, GPA). Results from separate models for each school will be used to create a sample weight that represent the probability of selection (i.e. consenting) within a school. Second, using data from study participants, a logistic regression model predicting attendance at an AVID school will be constructed to create an inverse probability weight (IPW) that represent the propensity towards attending an AVID vs. non-AVID school. Model predictors will include student demographic, family socio-demographic (e.g. parental level of education, family income), and student middle-school academic measures, such as middle school site, attendance rate, English Language Learner status, grade point average, and standardized test scores. Covariate balance between the groups will be examined descriptively based on observing standardized weighted differences less than 0.1 as well as through formal statistical testing using an omnibus test for covariate balance (i.e. over identification test). Both the sample weight and IPW will be used to estimate the average treatment effects from an inverse-probability-weighted regression adjustment with sample weighting (IPWRA-SW).[113] The IPWRA-SW approach is doubly robust to potential model misspecification and will employ the use of cluster-robust standard errors to account for within-school

clustering. While this approach can be employed for many analyses using the built routines of standard statistical software, for some analyses, include testing of treatment effects over time using interactions terms as well as estimating dose-response associations with the index of dissimilarity, obtaining a propensity weighted treatment effect is not possible using provided routines. In these cases, we will use a generalized linear model with a single weight created from the scaled multiplication of the IPW and sample weight, as indicated by Ridgeway et al. Despite the use of the IPWRA-SW approach, there is potential for hidden bias from unmeasured confounding. Hence, we will conduct sensitivity analyses per Rosenbaum (2010) examining how the odds of treatment assignment (Γ), when varied, will alter the possible treatment effects,[114] to examine uncertainty in our estimates as a function of hypothesized amounts of non-randomization bias.

Aim 1: Test whether exposure to AVID is associated with lower rates of adolescent substance use and other risky health behaviors, compared to students attending schools without AVID. *Hypothesis: Students attending AVID schools will have lower rated of 30-day substance use than students attending control schools.*

Cross-sectional differences between students attending AVID and controls schools on past 30 day substance use will be examined using the aforementioned IPWRA-SA approach implemented in a logistic regression model. The model will adjust for the school year, grade level (i.e. cohort), and the potential demographic, family and neighborhood level confounders listed above. In addition, variables used in creating the IPW such as middle school academic achievement variables, will be adjusted for. Models will be built hierarchically, moving from unadjusted to fully adjusted, to examine model stability.

Longitudinal differences in the amount of change over time (i.e. over study years) in substance use between the intervention and control schools will additionally be examined through use of a group-by-time interaction term in a weighted logistic regression model. Similar approaches will be used to assess the intervention effects for the other past 30-day substance use outcomes (e.g. poly substance use, cannabis use etc.).The frequency of substance use over the past 12 months and cannabis misuse outcomes will be modeled using a negative binomial model with the IPWRA-SW approach. Analyses will also use the **index of dissimilarity** (described in section E.9.) in-place of the intervention group variable to capture dose-response associations of academic tracking with substance use. While this measure of "treatment effect" will exist on a continuum, the weights from the IPWRA-SW technique can still be used to account for differences between intervention and controls schools through use of the combined IPW and sample weight. Similar analyses will test whether exposure to AVID is associated with lower rates of other substance use outcomes, violence, and delinquency.

To test whether de-tracking via AVID is associated with greater reductions in substance use, violence and delinquency for Black and Latinx students and boys we will use the same IPWRA-SW approach with generalized linear models specified using family distributions and link functions appropriate to the various outcomes with the addition of interaction terms with race, ethnicity, or gender.

Aim 2: Evaluate whether exposure to AVID is associated with increased enrollment in college preparatory courses and healthier social networks compared to students attending schools without AVID. *Hypothesis: Students attending AVID schools will have a) a higher proportion of college preparatory courses and b) a lower proportion of substance using peers, a higher proportion of pro-social peers, and more school-related adults in their social network, compared to students attending control schools*.

Similar to above, we will use the IPWRA-SW approach, adjusted for covariates, to test whether participants attending an AVID school have a higher proportion of total courses taken that are college preparatory (e.g. AP, Honors, IB, EOC, AICE), and healthier social network measures, such as a greater number of school-related adults in the network and lower proportion of substance using peers. Variables that are counts (e.g. number of school-related adults) will be modeling using negative binomial regression models. Because variables that are proportions (e.g. proportion of college-preparatory courses, proportion of substance using peers) will be dependent on the total number of courses or peers in the denominator, these models will be estimated using logistic regression for Bernoulli distributed responses. Dose-response analyses will use the index of dissimilarity in-place of the intervention group variable. We will explore whether AVID is associated with greater differences in college preparatory course taking and social networks for Black and Latinx students and boys with the addition of interaction terms with race, ethnicity, or gender.

Aim 3: Evaluate whether associations between AVID and substance use are explained by reduced racial/ethnic disparities in college-preparatory course taking and healthier social networks. *Hypothesis: The magnitude of associations between AVID exposure and substance use will diminish when controlling for the index dissimilarity, the proportion of courses that are college-preparatory, and social network composition.*

Although our pilot data suggests AVID reduces substance use, it is possible that mechanisms other than changing social networks through academic de-tracking are responsible. If results from Aims 1 and 2 support our hypotheses, we will quantify the amount of the association between AVID exposure and 30-day substance use that can be explained by differences in the index of dissimilarity, reduced racial and ethnic disparities in college-preparatory course enrollment, and social network changes. First, we will determine whether the magnitude of the association between AVID exposure and 30-day substance use is attenuated when controlling for the index of dissimilarity, proportion of courses that are college-preparatory, and social network variables. We will then apply the KHB test, described by Karlson, Holm, and Breen, to estimate the percent of the association between AVID exposure and substance use that is accounted for by each of these variables.[115] We will conduct a similar analysis with the index of dissimilarity as the predictor, substance use as the outcome, and social network variables as potential mediators to determine whether social networks mediate associations between structural racism via academic tracking and substance use.

E.13. Sample Size and Power: We intend to recruit 5 AVID intervention schools and 10 matched control schools. Each school serves approximately 2,000 students. We will aim to consent 238 students per school across grades 9-12, for a total sample of 3,570 in year 1. We conservatively assume 5% attrition per year (~15% over 4 years) resulting in a complete sample size of 3,054 students (~200 per school). Our analyses from the K23 AVID trial showed an intervention effect of 0.58 (odds ratio) on any substance use in the past 30 days and a control group prevalence of 16% in 9th grade. From RISE-UP, we have found intraclass correlations (ICC) of ~0.3 for clustering of substance use measures within schools. With this number of schools, sample sizes per school, and ICC, using a two-sided alpha of 0.05 we have 80% power to detect an odds ratio of 0.6. This estimate is based on a Monte Carlo simulation for a single year using model parameters obtained from our K23, which is conservative as we anticipate higher rates of substance use in this older sample. Using a two-sided alpha of 0.05, we also have 80% power to detect a standard mean difference (Cohen's d) of 0.10 between the intervention and control groups for the social network outcomes measured as counts (or on a continuum) and 80% power to detect an odds ratio of 1.3 for college-preparatory course taking, which corresponds to a 4.5 percentage point difference between the groups. For Aim3, assuming even weak correlations between AVID, the index of dissimilarity (or social network metrics) and substance use (e.g. rho=0.20), we would have 80% power to detect an indirect effect of 0.04, or to detect if 20% or greater of the AVID effect is mediated by reduced racial/ethnic disparities in course taking or healthier social networks.

E.14. Feasibility and Threats to Validity: The proposed study requires significant investments in subject recruitment, maintained enrollment, and survey administration. To facilitate subject recruitment, we will coordinate our efforts with study schools. Using a similar strategy, we were able to achieve more than 80% participation in prior studies. Although we do not anticipate significant challenges, if initial recruitment and retention efforts do not achieve our target sample, we have the option to recruit a second cohort of participants during years 2-5 and/or to add additional schools. Data collection challenges are mitigated by surveying students in school, during the school day, using a mobile tablet computer-assisted self-interview and via a web-based survey for those no longer in schools. In our experience, this strategy achieves rapid, secure data collection on a conservative research budget. Finally, because AVID is an existing program, we can focus our efforts purely on studying the effects of this de-tracking intervention, rather than delivering the intervention.
Program Fidelity: To ensure program fidelity, we will only sample from schools that have achieved School-Wide AVID certification by the National AVID Center. The National AVID Center will share annual certification data so that we can verify implementation of all AVID components. In addition, using student report card and course schedule data, we will verify that intervention students are enrolling in college preparatory coursework and measure the impact of AVID on academic tracking by race and ethnicity.
Social Desirability: Self-reported substance use measures may be subject to social desirability bias and that bias may vary by school. The use of computerized self-administered surveys will minimize this risk and self-

reported use has been shown to correlate highly with biologic testing.[116] Further, biologic testing would likely introduce bias into our sample, as many students would likely decline to participate and those no longer in high school would be difficult to sample within study resources.

Unmeasured confounding: As with all non-experimental studies, the potential for unmeasured confounding limits the ability to draw causal inferences. We address this by measuring and controlling for a wide set of potential confounders at the individual, family, school, and neighborhood level, using matching at both the school and individual participant levels, as well as incorporating sample weighing with inverse probability weights to ensure the representativeness and comparability of the samples. If we encounter challenges recruiting control schools to match our intervention sample, we can always reduce the number of control schools to 8 and increase our sample size within each school from 238 to 324 (from ~12% to ~16% of each school) while retaining more than 80% power to detect a significant difference in our primary outcome. Finally, we will conduct a sensitivity analysis to determine how sensitive our results are to unmeasured confounding.

Attrition: Although we plan to follow study participants who drop out or change schools throughout the study period, there is still the possibility that we will find differential attrition across intervention and control schools and attrition may be related to our outcomes. If this arises, we will conduct an analysis based on a pattern mixture model with multiple imputation as a sensitivity analysis to evaluate the robustness of our findings. In addition,[117] education administrative data sources (such as state test scores, 2-year and 4 year college enrollment) and arrest data will be available for all study enrollees, regardless of loss to follow up. Hence, we can use this data to characterize those lost to follow up and incorporate predictors of attrition into our sample-weighting scheme in the IPWRA-SW method to adjust for this in our analyses.

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