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Outcome of the AVID College Preparatory Program on Adolescent Health: A Randomized Trial

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abstract

BACKGROUND AND OBJECTIVES: Academic tracking is a widespread practice, separating students by prior academic performance. Clustering lower performing students together may unintentionally reinforce risky peer social networks, school disengagement, and risky behaviors. If so, mixing lower performing with high performing youth (“untracking”) may be protective, leading to better adolescent health.

METHODS: Advancement via Individual Determination (AVID), a nationally-disseminated college preparatory program, supports placing middle-performing students in rigorous college-preparatory classes alongside high-performing peers. We conducted the first randomized, controlled trial of AVID in the United States, randomizing 270 students within 5 large public high schools to receive AVID (AVID group) versus usual school programming (control group). Participants completed surveys at the transition to high school (end of eighth grade/ beginning of ninth grade) and the end of ninth grade. Intent-to-treat analyses tested whether AVID resulted in healthier social networks (primary outcome), health behaviors, and psychosocial wellbeing.

RESULTS: At follow-up, AVID students had lower odds of using any substance (odds ratio [OR] 0.66, 95% confidence interval [CI] 0.48–0.89) and associating with a substance-using peer (OR 0.74, 95% CI 0.45–0.98), and higher odds of associating with a peer engaged in school (OR 1.73, 95% CI 1.11–2.70). Male AVID students had lower stress and higher self-efficacy, grit, and school engagement than control students ($P < .05$ for all). No adverse health effects among high-performing peers were observed.

CONCLUSIONS: AVID positively impacts social networks, health behaviors, and psychosocial outcomes suggesting academic untracking may have substantial beneficial spillover effects on adolescent health.



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Dr Dudovitz conceived of and oversaw all aspects of the study, including study design, data collection, analysis, interpretation of results, and drafting of the manuscript; Drs Chung, Phillips, Tucker, Pentz, Tseng, and Wong contributed to the study design, analysis plan, data interpretation, and critical revision of the manuscript; Ms Dosanjh, Ms Galvez, and Ms Arellano contributed to data collection, interpretation of results, and critically reviewed and revised the manuscript; Mr Biely contributed to data analysis, interpretation of results, and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

WHAT'S KNOWN ON THIS SUBJECT: Academic tracking is a widespread practice, separating students by prior academic performance. Clustering lower performing students together may unintentionally reinforce risky peer social networks and health behaviors. However, there are no studies investigating the health effects of academic tracking.

WHAT THIS STUDY ADDS: Advancement via Individual Determination is an “untracking” intervention mixing lower performing and high-performing youth in college preparatory courses. In this randomized trial, we found positive impacts of Advancement via Individual Determination on social networks, health behaviors, and psychosocial outcomes suggesting academic untracking may impact adolescent health.

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Through near-daily exposure, schools have potential to shape adolescents' relationships, social norms, and social-emotional skills—factors strongly associated with health behaviors.^{2,3} Educational interventions that alter these factors may have important spillover effects on health. However, this has been rarely studied.

Academic tracking is a widely used strategy that groups students in classrooms according to prior academic performance. Critics argue tracking perpetuates structural disadvantage and racism by limiting access to educational opportunities for students of color and from low-income families.⁴ Although the educational merits of tracking are vigorously debated,^{5–9} no known studies examine its health implications. Academic tracking might directly influence social networks by grouping students together with peers of similar academic performance and engagement.^{10–12} Although 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.^{13,14}

Studies suggest teens tend to form friendships with peers based on similar levels of school engagement and risk behaviors.¹⁵ Within schools, this process can be reinforced by placing similar students in the same classrooms.¹⁶ This theory is strongly supported by evidence that adolescent health behaviors, including substance use, violence, and delinquency, are closely tied to behaviors and attitudes of individuals in their social network.^{14,17–21} Academic tracking may determine to which peers a student is exposed, further impacting sources of support, transmission of social norms, and access to and

opportunities for risky health behaviors, and psychosocial wellbeing.^{19,20,22,23}

Advancement via Individual Determination (AVID) is a college preparatory program operating in nearly 5000 US high schools across 46 states (about 20% of all public high schools).²⁴ AVID targets students in the academic middle (earning B or C grades, on average) who would not typically be placed in high-performing, college preparatory academic tracks.²⁵ Through AVID, participating students are encouraged to enroll in college preparatory courses and as a result, AVID has been described as an academic untracking intervention.⁶ Although prior studies examined AVID's educational outcomes,^{26–31} there are no randomized trials of AVID in the United States and no studies examining its impact on health.

To fill this gap, we conducted the first randomized trial of AVID in the United States to test whether AVID improved adolescent health. We hypothesized that students randomized to AVID would be exposed to more academically successful peers, resulting in more prosocial networks, and would have improved psychosocial wellbeing and reduced risky health behaviors. Because prior studies suggest the influence of schools on social networks and health behaviors may be stronger for boys versus girls, we aimed to test whether intervention effects vary by sex.^{32–34} Finally, we examined whether social connections with AVID students were associated with risky peer networks and behaviors among high-performing students. Our initial study aimed to follow students through 11th grade, however the coronavirus disease 2019 pandemic-related school closures disrupted typical AVID delivery. Hence, we present our findings before COVID-related school closures, following

student during their transition to high school, through the end of ninth grade.

METHODS

We conducted a multisite randomized trial testing whether AVID impacts adolescent health and wellbeing during the transition to high school among students attending schools in predominantly low-income, minority communities (Clinical Trials registration number NCT03059433).

AVID Intervention

AVID's secondary school program targets ninth through 12th grade students from demographic groups underrepresented in higher education who are performing in the "academic middle" (earning B or C average grades) and are less likely to be placed in and succeed in college preparatory coursework without additional academic and social support.²⁵ Students enter in ninth grade and are encouraged to remain in AVID through 12th grade. AVID students enroll in rigorous college-preparatory courses, placing them in an academic track typically targeting higher-achieving students, and attend an AVID elective class during which teachers provide academic skills coaching, explain the college application process, and facilitate social-emotional skill development, including persistence in the face of challenges, problem solving, and coping skills. Finally, the program emphasizes the student and teacher relationship and cultivates a family-like atmosphere.²⁷

School Recruitment

We partnered with a large urban school district in Southern California to recruit high schools (serving only grades 9–12) into the study. We invited schools that served low-income minority families, had been certified by the national AVID office as achieving adequate program

fidelity, and had more students who meet AVID eligibility criteria than the AVID program had the capacity to serve. We sought to enroll 5 schools to achieve adequate power. Of the first 6 schools approached, 5 agreed to participate. School and participant recruitment took place over 2 consecutive school years (2017–2018). Like the participating school district, participating schools served largely low-income Latinx students (Supplemental Table 2).

Participant Recruitment

At participating schools, AVID recruitment followed the school's typical practice, including presentations at feeder middle schools and student and parent meetings. Interested students completed an application and interview with the school's AVID coordinator. Eligibility for AVID participation included: eighth grade, grade point average (GPA) of 2.0 to 3.5, enrolling in ninth grade at a study school, student commitment to taking rigorous college-preparatory courses, and parent permission for AVID participation. AVID-eligible students entered into a random admission lottery, regardless of study participation. Approximately twice as many students as each school had the capacity to serve entered the lottery (330 applicants for 138 AVID slots). Although study schools oversaw identification of students entering the lottery, the investigators conducted the lottery via a random number generator. A separate lottery was conducted for each school. Given the nature of the intervention, blinding was not feasible. Although students typically remain in AVID throughout high school, students were permitted to drop out of AVID over the course of the school year and open slots were filled, as per usual practice, on a first-come-first served basis, regardless of initial lottery result.

These practices were agreed upon with each participating school before study initiation according to the tenants of community-based participatory research.³⁵

All students entering the AVID lottery were eligible for study participation and received a study enrollment packet, including consent forms. Students returning a signed parental consent form and student assent form were enrolled in the study. Study participation had no bearing on AVID lottery results. Of the 2625 students matriculating into a study school, 330 entered the AVID lottery and 270 consented to participate in the study (participation rate = 81.8%). Of those enrolled in the study, 124 “won” the lottery and were offered an AVID program spot (AVID group), whereas the remaining 146 participants were not offered an AVID spot (Control group) (Fig 1).

Finally, we recruited a comparison group of high-performing incoming ninth grade students from the same schools at the same time as the AVID and Control groups. We identified these students (High performing group) by their grade point average of >3.5 during eighth grade. Of the 214 eligible students, 161 consented to participate in the study (participation rate = 75.2%).

Data Collection

Students completed a baseline computer-assisted survey in school at the end of eighth grade or beginning of ninth grade (April–October), and follow-up interview at the end of ninth grade (May–June). At the time of survey administration, students were reminded that the study goal was to learn about schools, social networks, and substance use and all answers would remain confidential. There was no difference in survey completion or retention by study arm. Overall, 418 of the 431 initially enrolled students (117 AVID; 141 control; 160 high performing)

completed the follow up survey (retention rate = 97.0%). Of the 13 students lost to follow up, 12 switched schools, and 1 refused participation.

Survey Measures

Social Network: we assessed students' personal social networks using a standard procedure.³⁶ At baseline, students named 20 people (alters) in their network and answered questions describing each person. Alters could include friends or family. At follow up, students named 10 alters outside their family. At each wave, alters identified as “about my age” were considered peers. For each peer, students reported whether that peer is in AVID, has ever been drunk, and ever used marijuana. Participants also reported whether the peer “tries hard in school,” “thinks it's important to do well in school,” “thinks they should attend every class,” “does not disrupt class,” and “does not cause trouble.” Peers having all of these characteristics were considered highly engaged in school.

Psychosocial wellbeing: at baseline and follow up, students completed the Mental Health Inventory to assess general mental health (range 1–25, $\alpha = .80$)³⁷; the Perceived Stress Scale (range 0–16, $\alpha = .61$)³⁸; General Self-Efficacy Scale (range 8–40, $\alpha = .95$)³⁹; Duckworth Grit Scale (range 13–40, $\alpha = .67$)⁴⁰; and a 29-item school engagement scale from the High School Survey of Student Engagement (range 29–116, $\alpha = .96$).⁴¹ For these outcomes, higher scores indicate better mental health, more stress, and higher levels of self-efficacy, grit, and school engagement, respectively.

Health risk behaviors: at baseline and follow up, using measures from the Youth Risk Behavior Survey,⁴² students reported their frequency of alcohol, marijuana, vaping device

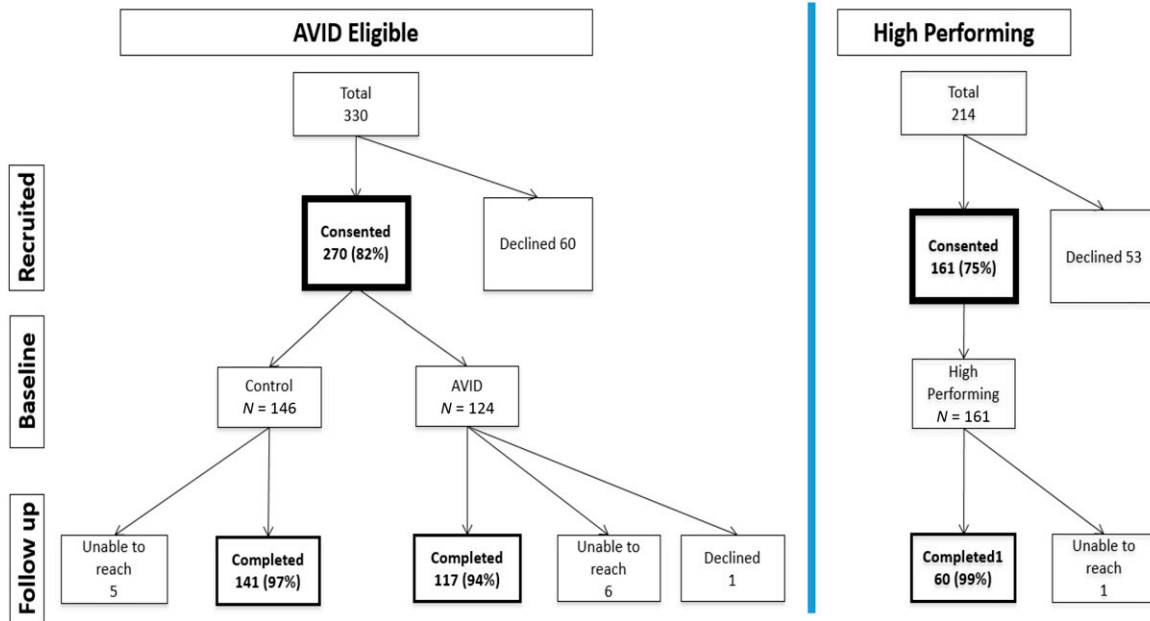


FIGURE 1
Recruitment and retention consort diagram.

use, tobacco, or other drug use in the previous 12 months. We created dichotomous measures of any alcohol, any marijuana, any vaping, and any substance use in the prior 30 days and prior 12 months. Using measures from the National Longitudinal Study of Adolescent to Adult Health,⁴³ students reported their engagement in 8 delinquent behaviors in the previous 12 months (painting graffiti, damaging property, lying to a parent or guardian about where they had been or who they were with, stealing, running away from home, driving a car without permission, entering a house or building to steal something, using or threatening to use a weapon to get something from someone, or selling marijuana or other drugs) and if they had been in a physical fight in the last 12 months.

Socio-demographic characteristics and intervention exposure: at baseline, students reported demographic (birthplace, home language, family structure, race and ethnicity) and parental characteristics (educational attainment, employment,

birthplace), and whether they participated in AVID during middle school. At follow-up students reported whether they participated in AVID during the fall and spring semesters of ninth grade. Sex and grade point average came from eighth grade academic transcripts.

Analytic Strategy

T-test and χ^2 analyses compared demographic characteristics and baseline health behaviors across groups. Intent-to-treat analyses tested whether intervention students had improved outcomes relative to control students. We used multilevel mixed effects models to account for clustering within schools and control for baseline values of the outcome of interest. Psychosocial outcome measures were standardized on follow-up sample values with a mean of 0 and SD of 1. As prespecified, interaction terms tested whether effects were moderated by sex and, when significant, we estimated sex-stratified models. Our prespecified primary outcomes on which the study was powered was the difference in proportion of prosocial

peers in the network and difference in 30-day marijuana use between AVID and Control groups at the end of 11th grade. Although we present interim findings from the end of ninth grade, we maintained these primary outcomes. We also examined the odds of naming a prosocial peer in the network and past-12 month substance use. Finally, similar to other studies seeking to measure negative peer influence,^{13,14,18} we tested whether naming an AVID student in the social network was associated with more risky networks and higher odds of substance use, violence, or delinquency for students in the high-performing comparison group. All outcome data were complete.

RESULTS

The sample is similar to low-income communities in Southern California with 82.8% identifying as Latinx (Table 1) and 78.9% reporting at least 1 parent born outside the United States. Just over half the sample (53.6%) had at least 1 parent who graduated high school and

TABLE 1 Baseline Characteristics of Study Participants by Study Arm

	AVID Group, N = 124, %	Control Group, N = 146, %	High Performing Group, N = 161, %	AVID Versus Control Difference, P	AVID Versus High-Performing, P
Male	48	38	34	.10	.01
Latinx	88	88	74	.91	.003
Asian	4	5	25	.76	<.001
Born in US	95	92	86	.36	.01
English first language	70	60	43	.09	<.001
≥1 parent born outside US	71	72	91	.86	<.001
2-parent household	77	75	86	.71	.05
≥1 parent graduated high school	56	60	46	.33	.02
≥1 full-time working parent	65	73	76	.16	.04
MS AVID participant	27	22	19	.37	.11
Mean eighth grade GPA	2.69 (0.57)	2.67 (0.59)	3.74 (0.24)	.80	<.001
Any fighting	27	30	12	.60	.001
Any delinquency	38	45	31	.23	.23
Any alcohol use	8	11	9	.42	.85
Any marijuana use	6	8	2	.73	.05
Any vaping device use ^a	8	10	4	.53	.11
Any substance use ^b	15	19	12	.41	.48

MS, middle school.

^a Vaping includes any use of a vaping device, regardless of whether it was used to vape nicotine or cannabis.^b Any substance use includes any positive response to items assessing any alcohol use, marijuana use, tobacco use, vaping device use, or other drug use in the previous 12 mo.

22.0% participated in AVID during middle school. There were no significant differences in demographics, baseline health behaviors, social network, or psychosocial outcomes between AVID and control arms. However, compared with the AVID group, the high-performing group had significantly fewer males, more Asian students, more students from immigrant families, and lower rates of fighting (12% vs 27%, $P = .001$) and marijuana use (2% vs 6%, $P = .05$).

Of those who won the AVID lottery (AVID group), 81% participated in the program for at least 1 semester and 66% participated for both ninth grade semesters; 5% of the Control group participated in AVID for 1 semester and 5% for both semesters. Lottery “winners” who participated for both semesters were more likely to have a full-time working parent, less likely to report any delinquent behaviors at baseline, and had a higher eighth grade GPA compared with those who participated for just 1 semester (Supplemental Table 3).

Intent-to-treat analyses (Fig 2, Supplemental Table 4) revealed a greater proportion of peers who do not disrupt class (odds ratio [OR] 1.44, 95% confidence interval [CI] 1.11 to 1.86) but no difference in the proportion of substance using peers between AVID and control students (OR 0.95, 95% CI 0.73 to 1.28). However, the AVID Group had lower odds of naming a peer in their social network who has been drunk or used marijuana (OR 0.74, 95% CI 0.56 to 0.98) and higher odds of naming a peer who does not disrupt class (OR 1.23, 95% CI 1.07 to 1.41), was highly engaged in school (OR 1.73, 95% CI 1.11 to 2.70) and who was in AVID (OR 2.19, 95% CI 1.01 to 4.73), compared with the Control group. In addition (Fig 3), although there were no differences in 30-day substance use between groups, the AVID group had lower odds of any substance use (OR 0.66, 95% CI 0.48 to 0.89) and any delinquent behaviors (OR 0.65, 95% CI 0.42 to 0.99) compared with the Control group. These effects did not vary by sex

(interaction terms all $>.05$). Ad hoc analyses tested whether AVID was associated with lower odds of substance use, controlling for having a substance using peer, a highly engaged peer, or a peer in AVID (Supplemental Table 5), to explore whether intervention effects on substance use are explained by social network changes. Results suggest having a peer in AVID may account for some AVID effects on substance use.

For psychosocial wellbeing, intervention effects varied by sex (interaction terms $<.05$) for all outcomes except general mental health, hence we conducted sex-stratified analyses. Although there were no differences between AVID and Control girls, for boys, the AVID group had lower levels of stress ($\beta -0.21$, 95% CI -0.40 to -0.02) and higher self-efficacy ($\beta .32$, 95% CI 0.12 to 0.51), grit ($\beta .28$, 95% CI 0.04 to 0.52), and school engagement ($\beta .23$, 95% CI 0.05 to 0.41) (Fig 4 and Supplemental Table 6) compared with Control

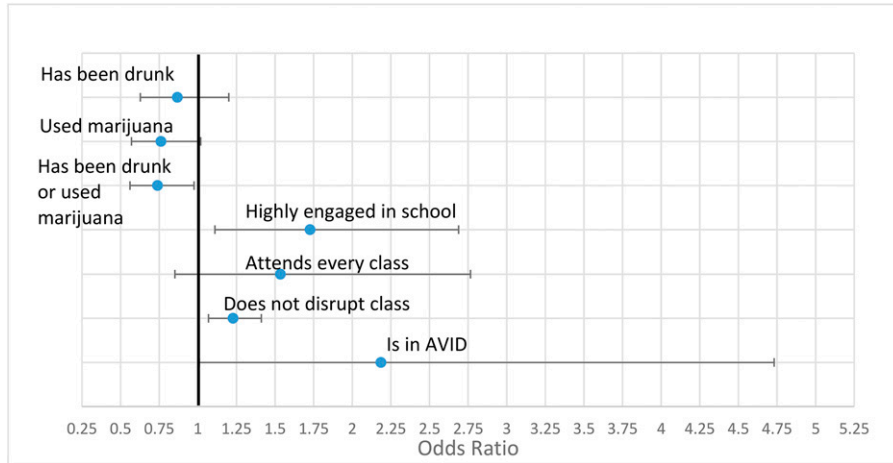


FIGURE 2

Intervention effects on the odds of naming a peer in the social network with the following characteristics. All models used intent-to-treat mixed-effects regression models with a random intercept for school and cluster-robust standard errors to account for clustering within schools, after adjusting for baseline values of the outcome of interest to test whether outcomes for students randomized to AVID differed from those randomized to the control group. Statistical significance is represented by a 95% confidence interval bar that does not cross 1.

boys. There were no effects on general mental health.

As treated analyses examined outcomes among students who participated in 1 or 2 semesters of AVID relative to those who did not participate in AVID to check the robustness of our findings (Supplemental Table 7). Results show a similar pattern to intent-to-treat analyses and improved

outcomes for those who participated for 2 versus only 1 semester.

Finally, among high-performing students, naming an AVID-involved peer in the social network was associated with increased odds of naming a substance using peer in the network (OR 1.99, 95% CI 1.11 to 3.55 for marijuana use, OR 2.21, 95% CI 1.16 to 4.22 for marijuana or alcohol use), but was not

associated with peer school-related behaviors nor self-reported health behaviors (Supplemental Table 8).

DISCUSSION

We found significant health benefits to adolescents randomized to AVID during the transition to high school, including more prosocial peer networks, decreased substance use, and, for boys, improved psychosocial wellbeing. These findings are notable because not only is this the first experimental study of AVID in the United States, but it demonstrates that academic interventions can have substantial spillover benefits to health.

AVID expands access to rigorous courses for middle-performing students, thereby creating more connections between and among academically middle- and high-performing youth. In addition, AVID simultaneously improves health behaviors. We found that connections with AVID-related peers may partially explain the program's impact on substance use. Of note, this study focuses on the transition to high school, which may be a sensitive period when social

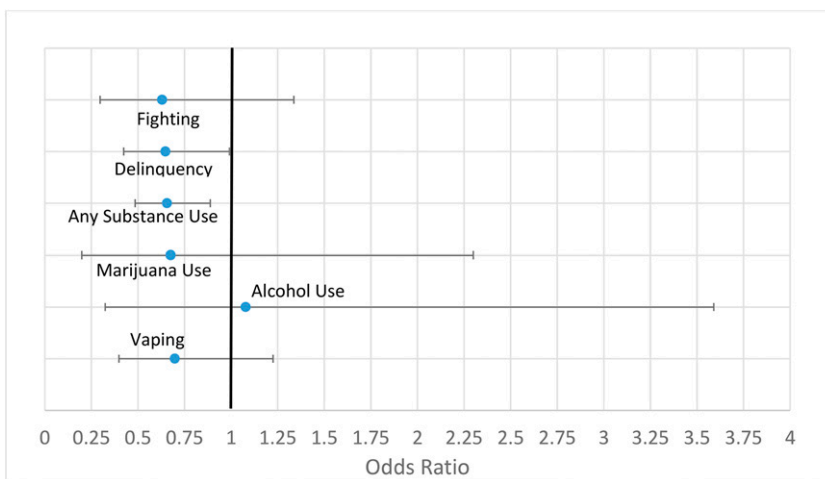


FIGURE 3

Intervention effects on risky health behaviors. All models used intent-to-treat mixed-effects regression models with a random intercept for school and cluster-robust standard errors to account for clustering within schools, after adjusting for baseline values of the outcome of interest to test whether outcomes for students randomized to AVID differed from those randomized to the control group. Statistical significance is represented by a 95% confidence interval bar that does not cross 1.

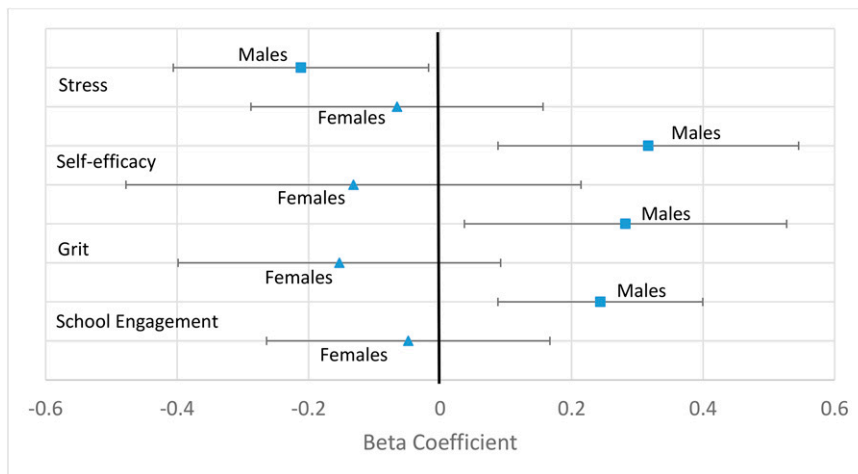


FIGURE 4 Intervention effect on psychosocial wellbeing, stratified by sex. All models used intent-to-treat mixed effects models stratified by sex with a random intercept for school and cluster-robust standard errors to account for clustering within schools, after adjusting for baseline values of the outcome of interest to test whether outcomes for students randomized to AVID differed from those randomized to the control group. Statistical significance is represented by a 95% confidence interval bar that does not cross 1.

networks are in flux and high-risk behaviors often emerge. Together, findings suggest the social network and health implications of academic tracking may be substantial and are critical to consider, particularly in light of critiques that low-income, Black, and Latinx students may be less likely to gain access to more advanced academic tracks.⁴⁴ Although not studied here, it is possible that low-performing and less engaged students may also benefit from increased access to rigorous college-preparatory courses. Applying AVID school-wide may be 1 strategy to accomplish this. Identifying the health effects of such an approach to more broadly reduce academic tracking can provide important insights into the public health implications of education tracking policies.

Our findings are consistent with prior research demonstrating educational practices in schools can influence adolescent health behaviors.⁴⁵ Potential mechanisms include changing adult and peer social networks, school engagement, and noncognitive skills. Traditional

school-based substance use prevention strategies rarely target a school's social and academic environment, despite recognition that school environments are consistently related to substance use.^{32,46-48} The appeal of targeting the larger school environment for substance use prevention is two-fold. First, this approach may be more successful and can simultaneously influence multiple education and health outcomes. Second, this approach does not require carving out instructional time to deliver specific substance use prevention curricula, which is often a barrier to implementation.⁴⁹

AVID improved psychosocial wellbeing particularly for males, including grit, self-efficacy, stress, and school engagement, which are associated with multiple positive life and health outcomes.^{13,50-53} The coronavirus disease 2019 pandemic has highlighted the impact of schools on adolescent wellbeing and the potential need for interventions to support these areas during the recovery period.^{54,55} AVID might be one such tool. It is notable that

these effects were largely observed in males. Although we cannot determine the reasons for this finding, it is consistent with studies suggesting that supportive school environments have a greater impact on boys of color, perhaps by buffering the negative impact of traditional school environments.^{16,32,56}

Although multisite, all study schools were from the same district serving mostly low-income and Latinx students and findings are from only 1 school year. Future analyses are needed to test whether effects are generalizable and sustained over time and identify specific mechanisms through which AVID impacts substance use. Though all study schools met national certification criteria, we did not directly observe or measure AVID implementation and cannot examine whether higher fidelity improves outcomes. We did not examine whether AVID achieves its primary objective of increasing college enrollment and persistence. Although we examine multiple outcomes, they are highly correlated. We rely on self-report substance use measures, though studies suggest high correlation with biologic testing, particularly when measured via computerized surveys employed here.⁵⁷ Blinding participants to study arm was not possible and we cannot rule out the possibility that AVID participants were more susceptible to social desirability bias.

CONCLUSIONS

Despite these limitations, this study has important implications for the role schools play in influencing adolescent health trajectories. First, AVID might be considered an evidence-based program that simultaneously prevents adolescent health risk behaviors and promotes wellbeing. More importantly, many of the

strategies AVID uses, including disrupting typical academic tracking practices and providing academic and social-emotional support, could be implemented outside the program. Ensuring schools have the resources and

structures necessary to expand access to educational opportunities and facilitate healthy social connections, particularly in marginalized communities, may be key to achieving education and health equity more broadly.

ABBREVIATIONS

AVID: Advancement via Individual Determination
GPA: grade point average
OR: odds ratio
95% CI: 95% confidence interval

Clinical Trial Identification: Leveraging School Environments to Shape Social Networks and Reduce Adolescent Substance Use—A Pilot Randomized Trial of a Social Networks Intervention. Registration number: ClinicalTrials.gov ID: NCT03059433, <https://www.clinicaltrials.gov/ct2/show/NCT03059433?term=dudovitz&draw=2&rank=1>. Registered February 16, 2017.

DATA SHARING STATEMENT: Data dictionaries, study protocols, the statistical analysis plan, and the informed consent form will be made available upon request. In accordance with our IRB approval from the participating school district, de-identified individual participant data will only be made available with approval from the school district. The data will be made available upon publication to researchers who provide a methodologically sound proposal for use in achieving the goals of the approved proposal and whose request is submitted and approved by the participating school district's Committee for External Research Review. Proposals should be submitted to the corresponding author at rdudovitz@mednet.ucla.edu.

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