Testing Peer-led Network Intervention to Prevent Adolescent Vaping
Principal Investigator – Peter A. Wyman
Last approved: 1/26/2026

1. PURPOSE OF STUDY

The goal of this project is to test the efficacy of *Above the Influence of Vaping* (*ATI-V*) in preventing the use of electronic vaping products (EVPs) among high school students. *ATI-V* is a school wide Peer Leader (PL) intervention that targets adolescents' peer group norms, connections to supportive adults, and the social influence of non-using peers. *ATI-V* trains peer nominated 8th-9th grade key opinion leaders, and adult advisors. PLs develop personal narratives about their reasons for rising above vaping ("what I gain by rising above/what I lose by vaping") and skills to disseminate those narratives through their peer networks. PLs implement 4 school-wide prevention campaigns using templates informed by communication science (Crano, Brewer, & Lac, 2014), with ongoing adult mentoring.

Aim 1: **Efficacy**. The primary study aim is to determine the impact of *ATI-V* in preventing vaping use (past 30 days any vaping, nicotine vaping, and regular use). Using an RCT design developed with New York State partners, 20 schools will be stratified (region, size) and randomly assigned to: (a) immediate *ATI-V* in grades 8-9, or (b) wait-list for *ATI-V* training after 24 months. The full cohort of all 8th graders per school will be invited to complete assessments into grade 10. We hypothesize that vaping use will be lower among students in schools randomized to implement the 2-year *ATI-V* program compared to control schools. This hypothesis is based on strong preliminary data that *ATI-V* Peer Leader (PL) prevention campaigns reach a majority of students, including students at higher risk, and PLs disseminate non-use norms and practices. We will test for differences in *ATI-V* impact for youth in low-risk and high-risk groups and by sex. High risk groups will be defined by prior vaping, prior tobacco use, mood and problem behaviors, and sensation seeking and reactance. We will also examine differences as a function of school climate (staff reports) prior to initiation of *ATI-V*.

Aim 2: **Mechanisms**. Our second aim is to test hypothesized mediators of *ATI-V* impact from our intervention causative model. Understanding change mechanisms is critical for identifying essential intervention elements, improving efficacy and, if warranted, for transitioning to effectiveness. Studies document that peer and broader social-ecological factors are major drivers of adolescents' decisions to vape (Alexander, Williams, & Lee, 2019; Tsai et al., 2018). We hypothesize that *ATI-V* will increase: (a) students' perceptions that vaping is unacceptable to peers and has social costs; (b) connections to positive adults who support non-use decisions; and (c) social influence of non-using students through changes in peer network structure (H1). The effect of *ATI-V* on reducing vaping will be mediated by those changes (H2).

2. BACKGROUND AND RATIONALE

Need for Research-Informed Vaping Prevention Programs in Schools. The US Surgeon General's 2016 report, *E-Cigarette Use Among Youth and Young Adults* (DHHS, 2016), concluded that expanded research and prevention programs are urgently needed to protect young people from initiating or continuing vaping. No school- or community-based prevention program was identified as reducing vaping behaviors among adolescents or young adults. Schools are a key environment for socialization and peer influence and a primary platform for youth substance

abuse prevention programming.

Unprecedented Increases in Adolescent Vaping. Current high school student use of electronic vaping products rose from 1.5% in 2011 to 20.8% in 2018 - an increase from 220,000 to 3.05 million adolescent users (Cullen et al., 2018). The proportion of 10th and 12th graders regularly vaping nicotine in 2018 (16.1% and 21%, respectively) was double that in 2017, the largest 1-year increase recorded for any substance in the nearly 50-year history of the national Monitoring the Future Survey (e.g., Johnston et al., 2019). In this application, we use the term 'electronic vaping products' (EVPs) to capture the multiple forms/uses of these devices.

Adverse Vaping Effects. Although EVPs contain few of the toxins and carcinogens found in conventional cigarettes (Talhout et al., 2011), the aerosol used contains multiple harmful compounds that cause cellular changes (Aherrera et al., 2017). Vaping is associated with increased risk of respiratory symptoms (Li et al., 2019). Exposure to nicotine, the primary stimulant used in EVPs, increases risk for adverse health outcomes in adolescents and can act as a 'gateway' to other drug use (Volkow, 2018). High nicotine exposure during adolescence increases the likelihood of psychiatric disorders and attention problems (Goriounova & Mansvelder, 2012). EVP use may renormalize cigarette smoking (Grana, Benowitz, & Glantz, 2014; Stanwick & Society, 2015); EVP use increases future use of combustible tobacco products among adolescents (Barrington-Trimis et al., 2016; Leventhal et al., 2015; Wills et al., 2017) and young adults (Primack et al., 2015; Unger, Soto, & Leventhal, 2016), although the extent of long-term use is unknown.

Social-Ecological Factors are Major Drivers of Adolescent Vaping. Social-ecological factors are major drivers of adolescents' EVP behaviors, and findings underscore product-specific risk factors (e.g., having friends who vape). Three theoretically-informed domains are key intervention targets for *Above the Influence of Vaping* (*ATI-V*): 1) EVP norms, 2) peer network structure, and 3) youth-adult connections.

EVP Norms. Adolescents who over-estimate EVP prevalence are more likely to vape (Agaku et al., 2017; Noland et al., 2016; Pepper et al., 2017). Overestimating peer use increased the likelihood of recent EVP use by 8 times among 6th-12th graders (Agaku et al., 2017). Use also increases when adolescents view peers as approving (Noland et al., 2016). For example, 91% of adolescent EVP users indicated their close friends would be friendly regarding use vs. 30% of nonusers (Barrington-Trimis et al., 2015). These findings accord with research showing that adolescents influence each other's health behaviors through perceived norms (Rimal & Real, 2003). One influential model conceptualizes norms as comprising: 1) perceptions of how widespread a behavior is (i.e., descriptive norms) and 2) the pressures individuals experience to conform (i.e., injunctive norms) (Cialdini, Reno, & Kallgren, 1990; Lapinski & Rimal, 2005). Descriptive and injunctive norms explain patterns of alcohol use (Rimal & Real, 2003), and modifying norms has reduced use (e.g., Dejong et al., 2006).

Peer Networks-EVP User Influence. Peer affiliation groups are critical for adolescents' exposure to EVPs and for decisions to use. Vaping is a highly social activity (Hall et al., 2016); users frequently share products in school, perform and watch vaping 'smoke tricks', and post about products on social media sites (Pepper et al., 2017). Peer groups are the most common settings for EVP use; out of 1,700 regular users aged 15–17, only 7.9% report vaping as a solitary activity (Pepper et al., 2017). Having more friends using EVPs increases the likelihood an adolescent will become a regular user. Among current EVP users, 49.5% had 3 or more friends using EVPs, whereas only 3.4% of never-users had 3 or more such friends (adjusted OR: 104) (Barrington-Trimis et al., 2015). Peer group influences on EVP use are consistent with

extensive social network modeling which shows that many adolescent health behaviors (e.g., cigarette use, suicidal behavior) reflect person-to-person spread within social clusters (Mercken et al., 2010; Valente, 2010; Wyman, 2019) and the importance of close affiliates in adopting new behaviors (Diffusion of Innovations (Rogers, 2003)). While the use of network methods for EVP prevention is just beginning, our preliminary findings show *ATI-V* increases the influence of trained 8th grade PLs and reduces their friends' EVPs use (see E4 preliminary studies) .

Youth-Adult Connections. Acceptance and use of EVPs by guardians and other family members are key factors contributing to normalizing EVP behavior (Barrington-Trimis et al., 2015). A family member or guardian using EVPs is reported as a top reason for first use (Bold et al., 2016). Adolescent participants in focus groups describe implicit support from some adults for using EVPs; 'virtuous vapers' characterize a portion of current users, i.e., those who see EVP use as a healthy alternative to other substances (Yule & Tinson, 2017). In contrast, positive adult monitoring and engagement may reduce the likelihood of EVP use: less parental monitoring was reported by adolescent EVP users compared to nonusers (Wills et al., 2015). Our preliminary data examining 8th graders' peer and adult networks in three middle schools showed that 8th graders who had used EVPs were half as likely as never-users to name a 'trusted adult' at school (see E4 preliminary studies). To our knowledge, our data are the first to link youth-adult connections at school to EVP use.

Social-Emotional-Cognitive Vulnerability Factors. Our proposed study measures potential moderators of *ATI-V* impact including social context (e.g., home vaping policies), prior tobacco use, and problem behaviors. It also uses a state-of-the-art mental health assessment tool (K-CAT) to investigate for whom *ATI-V* is effective and factors that may interact with EVP social risk/protective factors. Smoke-free home/vehicle policies are protective for tobacco use (Ossip et al., 2018), and home policies regarding EVP use may be even more important given lower perceived harm involved. Adolescent EVP users vs. nonusers scored higher on sensation seeking, rebelliousness, and emotion dysregulation in a large state sample (Wills et al., 2015). Those findings are consistent with problem behavior theory, which posits that adolescent substance use derives from opposition to conventional values, rule breaking, and cognitive and emotional vulnerabilities (Jessor, 1998). Research evidence shows that mental health problems, including depression and anxiety, increase the likelihood of youth transitioning from nonuse to first use for many substances, including alcohol and marijuana, as well as from use to problem use (Conway et al., 2016). This work suggests that adolescents vary in their vulnerability to psychosocial influences for substance use, which may extend to EVP use, and it is critical to determine if *ATI-V* is effective for students from groups that are more vulnerable using EVPs.

Peer Leaders as Effective Implementers of Prevention Programs. Key opinion leaders delivering prevention programming has been used successfully for various health problems (Campbell et al., 2008; Kelly, 2004; Wyman et al., 2010) but has not yet been deployed systematically for substance use or EVP prevention. In HIV prevention, preparing influential PLs to serve as behavior change endorsers (i.e., to communicate HIV risk reduction messages to peers) reduced community-wide prevalence of high-risk sexual behaviors by approximately a third (Kelly, 2004). PLs intervention models are grounded in social diffusion theory (Rogers, 1983) and on the influence adolescents have on each other through social ties and networks (Valente, 2015). A metanalysis showed that peer-led interventions reduce smoking and alcohol use among youth ages 11-21 (Macarthur et al., 2016) but also concluded that the evidence base is characterized primarily by small studies. No PL programs are among current widely used school-based smoking or substance use prevention programs.

3. ADMINISTRATIVE ORGANIZATION

This project brings together a diverse, complementary scientific team spanning peer-led interventions (mental health/suicide), tobacco control, vaping prevention, communication science, substance abuse prevention, social network methods, school climate and school-based trials. This outstanding team of investigators, consultants, state partners, and data and safety monitoring experts ensures that we have the practical and scientific resources to achieve study aims, conduct safe and ethical research, and make wise decisions in the face of any unforeseen challenges that emerge. All team members have well-defined roles and report to the PI. The table below delineates the selected areas of expertise and contribution of each team member and their institution.

Study Investigators/Institution, Consultants, and Partners

Peter A. Wyman, PhD	Professor of Psychiatry, University of Rochester Academic Chief, Child & Adolescent Psychiatry	School-based prevention research; Network-informed interventions; Randomized trial methods	PI; Oversees all aspects of study including ATI-V training and ongoing support for schools; integrity of data collection and storage. Directs analyses, interpretation, and writing.
Anthony R. Pisani, PhD	Associate Professor (Psychiatry and Pediatrics), University of Rochester	Safe and ethical use of technology to extend face-to-face prevention; Longtime collaborator with Dr. Wyman	Co-I, Technology (text messaging, tailored video messaging), Program fidelity.
Deborah J. Ossip, PhD	Professor (Public Health Sciences, Oncology), Co-Director of the Smoking Research Program, University of Rochester	Tobacco cessation intervention development;	Co-I, Intervention implementation and safety of peer leader messaging; ensuring accurate information for staff and Adult Advisor training about EVP and tobacco use; issues that intersect with school policies about EVPs; up-to-date info

			related to EVP norms
Scott McIntosh, PhD	Associate Professor (Public Health Sciences), Co-Director of Smoking Research Program, University of Rochester	E-cigarette research, qualitative work; Observation Framework, Key informant focus groups, coding; educational systems and smoking cessation;	Co-I, Measurement of EVP behaviors and context; measurement of tobacco products; Qualitative evaluation of implementation barriers/faciliators, focus groups
William D. Crano, PhD	Professor (Psychology), Co-Director of Health Psychology and Prevention Science Institute, Claremont Graduate University	Development of persuasive communications to prompt healthy behavior.	Co-I, Development of project messaging; Precise targeting of message to receiver characteristics; review peer leader messaging, make sure it's aligning with messaging strategies;
Eusebio M. Alvaro, PhD	Associate Professor (Research), Co-Director of Health Psychology and Prevention Science Institute, Claremont Graduate University	Creation of substance use prevention messages for middle and high school students.	Co-I, Development and assessment of project messaging/communications; intervention development;
Todd D. Little, PhD	Professor, Texas Tech University, Director of the Institute for Measurement, Methodology, Analysis and Policy	Biostatistics; Study design and implementation; Structural Equational Modeling	Co-I, Lead methodologist and biostatistician; Study design and randomization; Analysis of outcomes using latent models; Consultation on using/analyzing adherence data to select schools for Aim

			3
Kelly Rulison, PhD	Associate Professor (Public Health Education), University of North Carolina at Greensboro, NC	Biostatistics; Social network analysis.	Co-I, Biostatistician; Social network analyses; construction of networks in each school; RSIENA models
Dorothy Espelage, PhD	Professor (Psychology), University of North Carolina-Chapel Hill	Bullying and interpersonal violence prevention research School climate, middle school – and different outcomes; effectiveness based on climate	Co-I, Measurement of school climate, moderation; School-level implementation barriers/facilitators

Participating research locations will be 20 New York State middle-high schools–in which 8th – 10th grade students are located in the same building or in which one middle school is 'feeder' to one high school. As of 03/01/2020, 11middle-high schools have provided letters of participation. Specific sites will be added by modification with their letter of participation. As more schools are recruited, the school names and letters of participation will be added to the application.

4. STUDY DESIGN

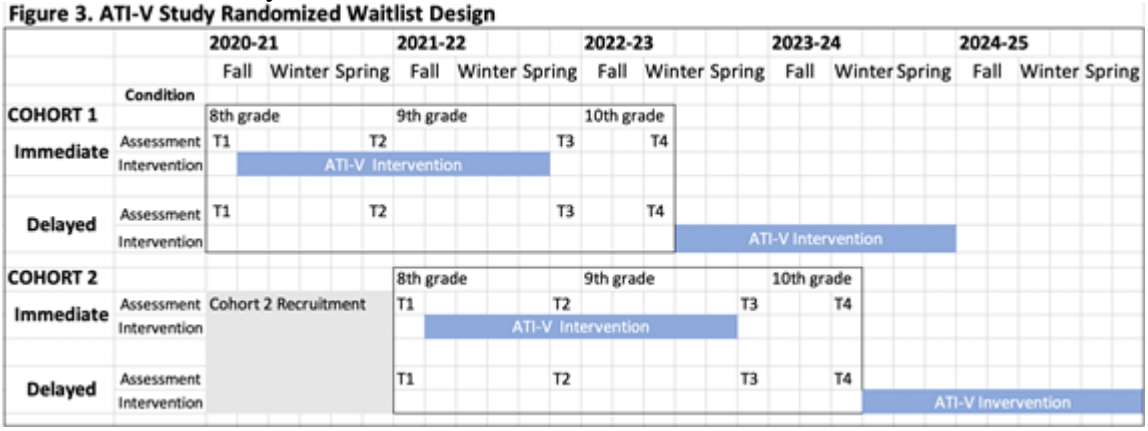
We will conduct this trial with two separate cohorts of schools over five years to distribute the intervention workload. 10 middle -high schools will be enrolled in Fall 2020 (Cohort 1) and another 10 schools in Fall 2021 (Cohort 2).

Randomization will occur at the school level since *ATI-V* is a school-wide intervention. In each cohort, schools will be matched as pairs based on location (rural/urban using RUCA scores) and size for a total of 5 pairs per cohort. Size is an important stratification characteristic since Peer Leader programs tend to diffuse more quickly through smaller schools (Pickering et al., 2018). Baseline student assessments (T1) will occur prior to schools being randomly assigned (to eliminate potential bias from assignment) and before any school receives training in that cohort. One school from each pair will be randomly assigned to begin *ATI-V* training within a few months (Immediate Intervention) and the other school will be assigned to a wait-list condition to receive training approximately 24 months later (Delayed Intervention).

The active phase of evaluating *ATI-V* in each cohort will span ~24 months to test the impact on

the full cohort of students (enrolled as 8th graders) of *ATI-V*: 8th grade spring semester (year 1) through 10th grade fall semester (year 3), see timeline below. After baseline (fall of 8th grade), students in the two conditions will complete an additional three assessments: (1) end of 8th grade (8 months), (2) end of 9th grade (20 months), and (3) final assessment mid-year 10th grade (end of fall semester, 28 months). Assessments at the 24-month interval will occur before training begins in the Delayed Intervention schools. Schools assigned to the Delayed Intervention condition will receive training and begin program implementation 24 months after their matched cohort schools, and we will provide those schools with training and technical assistance to complete the intervention over 16 months, fully comparable to the early intervention schools. We expect 3840 students to enroll, leaving a probable sample of 3080 after attrition. Also enrolled as subjects will be 430 Peer Leaders (given surveys at the end of the 8th and 9th grade years; those who leave school or decide to discontinue will be replaced), and 54 Adult Advisors (providing implementation fidelity data). An anonymous sample of about 560 school staff will participate in school climate surveys.

Figure 3. ATI-V Study Randomized Waitlist Design



5. SUBJECT POPULATION

Participants will be drawn from 20 Schools in which 8th – 10th grade students are located in the same building or in which one middle school is 'feeder' to one high school will be eligible, to minimize potential contamination across conditions (which could occur if middle schools in the same community were assigned to different conditions).

- 8th Grade Full Cohort: All 8th grade students from each of the 20 participating schools will be invited to enroll and participate for three years in four longitudinal assessments (vaping behaviors, attitudes). We projected the average size of each 8th grade (total students) of 200, with 12 new students in the spring, and 40 new in both 9th and 10th grade, would lead to a total of 252 per school. Of these, 210 are expected to enroll (80%) and 168 to complete the study (20% attrition, but addressed via multiple imputation). A total of 4200 are expected to enroll, leaving a probable sample of 3360 after attrition. Students are expected to be equally divided between males and females. The race/ethnicity of participants is expected to be as follows based on upstate New York communities: 8% Hispanic and 92% Non-Hispanic; 9.8% Black, 3% Asian, 0.3% American Indian/Alaska Native, 87% White. All of the approximately 4200 students are potentially exposed to the ATI-V Peer Leader prevention campaigns.
- Student Peer Leaders: Approximately 430 students will be recruited and trained as Peer Leaders to conduct schoolwide prevention campaigns with ongoing adult mentoring and supervision. In 8th grade, 360 will be recruited and trained: 15% of the total population of 2400 in the ten schools assigned to immediate ATI-V intervention. An additional 70 students will be

recruited and trained as Peer Leaders in 9th grade to replace Peer Leaders who leave the school after 8th grade or decide not to continue as Peer Leaders into 9th grade (i.e., 20% attrition). These 430 students are expected to have similar gender and race/ethnic distributions as non-Peer Leaders in the total cohort. Peer Leaders are also eligible to enroll and participate in assessments as part of the full student cohort. At the end of the school year, we will recruit 2-4 Peer Leaders from each school to complete a key informant interview.

- Student Peer Mentors: Approximately 60 high school students will be recruited and trained as Peer Mentors to assist Peer Leaders and adult advisors. Two to four students in each school will be invited to participate. Peer Mentors will model healthy attitudes about peer influences designed to help younger students stay above negative influences. These 60 students are expected to have similar gender and race/ethnic distributions as the student community of their middle and high school.
- School Staff: Approximately 560 8th and 9th grade school staff (teachers, administrators) from the 20 enrolled schools will be invited to participate in surveys of school climate (anonymous surveys) of school climate. We project 560 based on total 8th and 9th staff from recent schools participating in ATI-V and projecting 65% staff participation (the rate we achieved in our recent trial of Sources of Strength in 20 Colorado schools). 60% are projected to be female.
- Adult Advisors: One or two of the school staff who are trained as Adult Advisors (1 per 8 Peer Leaders) will be eligible to participate in end-of-year key informant interviews. We expect some Adult Advisors will participate more than once, and some (as schools may change who advisors are) will have different staff participate each year, so we expect about 25 Adult Advisors to participate.

6. INCLUSION AND EXCLUSION CRITERIA

No person shall be excluded from participation, denied benefits, or discriminated against because of race, color, national origin, sexual orientation, sex, gender identity, age, or ability (i.e., special education status). Recruited schools will be primarily English speaking so all measures will be completed in English. One school district was recruited in 2022 with a large number of Spanish-speaking students and we decided we could enroll. All consents, information sheets, opt-out forms and surveys were translated into Spanish and a recording of the survey script was made in Spanish to be played in classrooms prior to surveys. In the 2023-24 school year, staff in this district noted that while students were likely to be proficient in English, some parents spoke only Haitian Creole. Thus, parent permission forms for Peer Leaders were translated, and opt-out forms to be sent to parents, information sheets and survey were also translated, so if requested, these could be sent to parents. At spring 2024 surveys, a small number of students at one school were found to be fluent in French, so for the final surveys in winter 2024, survey, information sheet and opt-out forms were translated into French.

7. RECRUITMENT METHODS

- Schools: To engage/enroll schools we will use the same collaborative model we used successfully in three prior trials of Sources of Strength with 76 schools in Georgia, New York, North Dakota, and Colorado (Brown et al., 2006; Petrova et al., 2015; Wyman et al., 2010). This collaborative model involves partnership with community coalitions, prevention advocates, local and state governmental entities, to engage interactive dialogue with schools and communities to learn about that community's needs, including experience with vaping. As of February 28, 2020,

11 middle-high schools have provided letters of participation, which include agreement to be randomized to immediate or delayed condition for this study. Letters of participation include description of the student participants and the roles and responsibilities of school and University of Rochester. Seven of the schools are combined middle-high schools (a common structure in upstate New York) and four are in communities with one middle school and one high school (See school letters of participation).

- 8th Grade Full Cohort: All 8th grade students from each of the 20 participating schools will be invited to enroll and participate for three years in four longitudinal assessments. Because this study involves analyzing diffusion of *ATI-V* through peer friendship networks, our recruitment is designed to successfully enroll a high proportion to meet criteria for valid network data (Valente, 2010). We will employ a strategy for school population recruitment that proved successful in our NIMH-funded effectiveness trial of SoS (MHRO1095112) and yielded a mean 84.3% participation of all secondary school students across 40 schools (20,015 students enrolled). Students that newly enroll in the school after fall of 8th grade will be invited to participate. Recruitment will occur by the school sending an information letter to each parent/guardian in the fall of 8th grade. See below for parent permission process.
- Student Peer Leaders: Student peer leaders, a subset of the overall population, will only be recruited after baseline assessments are complete in Early Intervention schools. Peer Leaders will be nominated by anonymous surveys of the entire 8th grade population (using an on-line survey). Students are told, "Our school will be starting a new program to help all students rise above negative influences and be themselves. We are looking to invite students to help lead this program. Please name one or two 8th grade students who you think should be involved in the program." These surveys are anonymous, so there is no way to link nominations with students. Adult Advisors are sent a list of top nominations, with about 20% more names than needed, hoping to identify ~15% of the population from a variety of groups and 'cliques'. Adult Advisors will remove known substance users and might add a small number of students in order to reach friendship groups or strong leaders. This is consistent with how schools identify students for other leadership roles and prevention programs. Students who receive the most nominations and are selected by Adult Advisors will be approached by an Adult Advisor and invited to attend an informational meeting. For students who indicate interest in being trained, a parent permission process will be used. The student will be given a packet to take home with parent permission form that includes detailed information about why their student was selected. Peer Leaders are also invited to participate in the grade level assessments. Eligible students - whose parents provided signed permission forms - will be eligible to enroll, with students providing signed assent forms (see below). For Peer Leader key informant interviews, Adult Advisors will suggest a few Peer Leaders who have been active in the program to participate in the interviews.
- Student Peer Mentors: Teachers and/or administration will nominate high school students who would serve as a positive role model for the Peer Leaders. Nominated students will be invited to attend an informational meeting. For students who indicate interest in being trained, a parent permission process will be used. The student will be given a packet to take home with parent permission form that includes detailed information about why their student was selected. Eligible students - whose parents provided signed permission forms - will be eligible to enroll, with students providing signed assent forms (see below).
- School Staff: All staff will be invited to complete an anonymous on-line survey. Staff will be invited during staff orientation. Research staff will distribute the information sheet and answer questions. Data will be collected from school staff, teachers (8th- 9th grade) and

administrators using a School-Environment Survey at two time points (fall 8th grade, fall 9th grade). Data will be anonymous in order to enhance validity of the data. School climate scale scores will be evaluated as moderators of *ATI-V*. The rationale for staff surveys will be presented in project orientations at each school and selected results presented in a yearly report.

- Adult Advisors: At the end of the school year, Adult Advisors will be asked to participate in a key informant interview to elicit in-depth feedback on the program implementation in their school. A lead Adult Advisor may do this themselves or ask 1 or 2 other active Adult Advisors to participate.

8. CONSENT PROCESS

Peer Leaders and Peer Mentors:

For students who are nominated as Peer Leaders and Peer Mentors, the school will email or use school-based electronic communication to send a link to an invitation letter/permission form as part of an eConsent in the REDCap system. The IRB-approved consent form is developed in REDCap, a secure, web-based, HIPAA- compliant, data collection platform with a user management system allowing project owners to grant and control varying levels of access to data collection instruments and data (e.g. read only, de-identified-only data views) for other users. URMC staff ensure real-time identity verification prior to consent by requesting verification of an established passcode. An agreed school-level passcode is communicated between parents and the study team (via the school). This passcode is saved as part of the subject's record on REDCap for verification use later. Parents must then enter the passcode which is compared with the stored version entered by URMC staff. Matching responses to the passcode grants entry and non-matching responses block the individual based on specified settings. Parents will be able to read and if interested, e-sign the parent permission. Parents will be able to download a pdf (or we can send a written copy) when they have completed signing the eConsent. All eConsent includes a detailed description of the study procedures, along with statements regarding participants' rights to withdraw from the procedure at any time without consequences. It is explained to participants in easy-to-understand language. eConsent is documented by the signature of the participant on the eConsent, accompanied by the signature of a member of the research team. All signatures are captured using a stylus, finger, or mouse on the tablet/computer and are stored in REDCap.

The forms also have a number for a contact person to answer questions. If a school would prefer to use paper permissions, two copies of consent documents will be given to parents and students. They will be asked to keep a copy and return a copy to the research staff. Parent permissions in Spanish and Haitian Creole will be sent in paper versions to parents at the school's discretion. Following parent permission, youth assent forms will be used to attain assent from students prior to training by trained research team staff. Students will be given a link to an eConsent assent form and school-level passcode at the beginning of training. Trainers will explain the study, answer questions, and ask students to complete the forms. They will also be able to download a pdf or request a paper version of their signed assent. Parents will be given information that project staff are available and interested to talk to parents and answer their questions. The survey completed by Peer Leaders (end of 8th and end of 9th grades) covers their view of program, training, and their participation. Peer Mentors will also complete a survey at the end of the school year(s) of their participation which covers their view of the program, training, participation and attitudes about common pressures teens face. The surveys contain no sensitive questions, and no PHI will be collected. HIPAA authorization is not required. Also, while the research team will send text messages or emails to Peer Leaders to support their activities and

Peer Leaders will send text messages or emails to their peers, these will not be of an interactive nature, thus we will not include email-related language to assent and parent permission documents. No PHI will be collected via email or text. Examples of texts include reminders of meetings and of skills learned during training. Texts are being sent out via a secure system, TextIt, which is a commercial SMS service that meets evolving healthcare industry standards, including compliance with HIPAA, HITECH, HITRUST and ISO. The phone numbers are entered in groups by school without names attached. Texts are not being sent through personal phones. Any emails sent will be sent from a dedicated, password protected email account behind University of Rochester firewalls, so that email addresses provided by participants are protected and can be deleted once active participation is complete.
For Peer Leaders who agree to participate in the key informant interview, both they and their parents will be given an information sheet explaining this addition to the study. As this interview is low risk (no personal information will be collected, only a transcription of their responses), we are asking for a waiver of documentation of consent.

8th Grade Full Cohort:
All 8th-grade students will be invited to participate in on-line surveys through REDCap. For participation in this survey, which we deem minimal risk, we are requesting a waiver of documentation of parent permission. School districts in New York routinely conduct annual surveys for middle and high school students without parents providing signed consent, so there is precedent. Following the protocol that we used in our study of Sources of Strength [RSRB #32551] using student surveys, we use the following procedures: at the beginning of the semester, a letter describing the study will be sent to parents of 8th grade students, explaining the purpose of the study, procedures and all students' role in completing surveys. The letter describes the questions that students will be asked. The letter also states that the study does not follow individual students (students do not put their names on the survey) for the purpose of providing services. The focus is on the school population. Parents are provided information about how they can decline their child's participation in the survey. Each school will mail, email or use school-based electronic communication to send the information letter. If the parent chooses not to have his/her child participate, the parent can contact the school (name and number provided) to decline. Letters will be sent in the spring of the first year and prior to the last two assessment points (spring year 2 and 3) to any new students to the district. Letters in Spanish and Haitian Creole will be sent by schools at their discretion.
Rationale for Waiver of Documentation Parent Permission: Participation is deemed minimal risk. The survey takes place in two sections.

1. As described in section 9.d, the first section completed on REDCap contains questions about attitudes, relationships and behaviors and does not ask questions about illegal behaviors. Several questions pertaining to substance use ask about (a) whether they have ever used a vaping device; (b) how likely in the future students believe they are to vape, use cigarettes, alcohol and drugs (i.e., not prior use of illegal substances) and (c) whether few or many of their friends - in general (not friends identified as individuals) - use alcohol/drugs.
2. The second section is completed on the CAT-MH™ platform (see Study Procedures) that contains **no identifying information about the participant**. This section has questions about common emotional and mental health symptoms (depression, anxiety). In addition, there are two questions about vaping behaviors that are associated with EVALI (which

stands for e-cigarette or vaping associated lung injury): whether the student has vaped marijuana/THC. The purpose is to determine if the ATI-V intervention reduces behaviors that could cause lung injury.

Students are ages 13-16 and in the adolescent age range similar to the parent study [RSRB #032551]. Parent permission and student assent will not be documented by signature since this would be the only means of identifying the names of specific student participants, since data is de-identified when pulled from REDCap. The process if being driven by the school, which distributes the letter on school letterhead to parents and collects forms back if parents decline. The school letters of participation in research include agreement to lead this process.

School Staff:

For participation in this survey, which we deem minimal risk, we are requesting a waiver of documentation of consent. Prior to surveying school staff, an information sheet will be distributed with information about the study and their participation. The document will state clearly that the survey is anonymous, participation is voluntary and only summarized information will be presented at meetings or any publications. **Rationale for Waiver of Documentation of Consent**: Participation is deemed minimal risk. No compensation will be offered to staff. Staff consent will not be documented by signature since this would be the only means of identifying the names of specific staff participants.

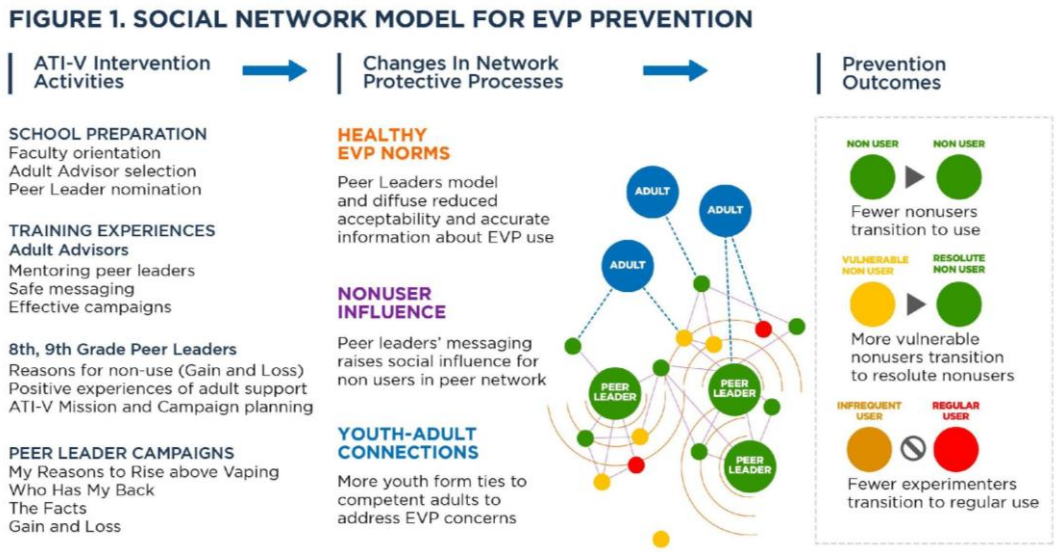
Adult Advisors: As in the Peer Leader key informant interviews, we will not be asking any personal information about participants and will only keep a transcription of their responses. Thus, we ask for a waiver of documentation of consent for this minimal risk addition to the study. Participants in the key informant interviews will receive a copy of the information sheet prior to the interview.

9. STUDY PROCEDURES

ATI-V Intervention

Schools will be randomized after baseline assessments. At that point schools assigned to immediate *ATI-V* will begin the preparation/peer leader selection phase. Procedures for recruitment, training, and implementation are described in *ATI-V* Training Materials. 8th-9th grade PLs receive training and ongoing mentoring to become influential change agents. They exert influence through a combination of natural friendship interactions (Diffusion of Innovations, Rogers, 2003) and structured campaigns that promote norm changes and engage peers with intervention concepts (Petrova et al., 2015). *ATI-V* has three phases:

a. School Preparation-PL Selection. *ATI-V* is introduced to 8th grade administration/staff. *ATI-V* has a major focus on vaping prevention and also gives students room to identify other pressures and negative influences they experience. This broader focus respects varying 8th grade peer group experiences and avoids misimpression that EVP pressures are ubiquitous. Staff Adult Advisors (1 per 8 students) are selected (typically counselors, health teachers) and their responsibilities are agreed to. 'All staff' orientation prepares staff to reinforce concepts and support students. Adult Advisors are trained (6 hrs.) in supporting PLs through their campaigns and safe messaging. PL Selection: All 8th graders are surveyed to identify influential students with 'reach' to diverse subgroups of students. Adult Advisors review nominations (excluding students using EVPs or other substances) and select ~15% of student population, based on evidence that diffusion increases up to 15% of population trained (Pickering et al., 2018). School preparation includes engaging HS administration/key point-of-contact to prepare for *ATI-V* continuity into 9th grade, and identifying and preparing 2-4 non-using high school students ("Peer Mentors") to participate in training of 8th grade Peer Leaders.



b. PL Training & Development. Training to promote PLs becoming intervention 'adopters', build group efficacy and cohesion through a 4-hr workshop (led by 1-2 Masters-level U Rochester trainers) with Advisors and 2-4 HS Peer Mentors. Trainers elicit the pressures students experience including, but not limited to, vaping. Peer Mentors are invited in a structured way to share ATI-related strengths that helped them to rise above pressures to vape. A major focus is on increasing three strengths:

- *My Reasons for Rising Above Vaping.* PLs are asked to identify what they "Gain" by rising above vs. what they "Lose" by vaping. PLs learn that 'gain' messages often work best to reinforce continued positive behaviors, whereas 'loss' messages are more persuasive when facing risky situation, such as vaping or considering vaping (Prospect Theory; Rothman & Salovey, 1997; Tversky & Kahneman, 1981).
- *The Facts:* PLs learn accurate data on relatively low EVP use by 8th graders (< 1 in 10) and how overestimating use can make vaping seem normal and natural (Perkins, Haines, & Rice, 2005).
- *Who Has My Back:* PLs learn how relationships with supportive adults and friends help in resisting negative influences including vaping. Peer Mentors share examples of adults that helped them resist EVPs.

The 4-hr workshop ends with invitations for PLs to participate in 4 campaigns and sign up for interactive text messages. Text messages (automated) to reinforce PL competence, relatedness, and agency (Pisani et al., 2019) were developed using motivational theory (Ryan & Deci, 2000).

Because the training allows youth to communicate about pressures they feel, trainers are vigilant in identifying youth needing support.

c. Diffusion to Student Population. PLs plan and carry out four campaigns (see Figure 1). Adult-Advisor facilitate meetings (2 per campaign) using detailed manualized guidelines and internet-based resources (posters templates). Each meeting has activities to promote PLs' application of *ATI-V* skills to their lives and to develop personal narratives. PLs sharing personal examples of skills (e.g., My Reasons) is congruent with evidence that adolescents rate more favorably 'indirect' vs. directive substance use prevention messages (Crano et al., 2007). Tailored (automated) Gain vs. Loss Campaign: PLs text/email to friends a link to a single question on vaping intentions (responses kept anonymous); depending on answer, students are directed either to a 'gain' video (no intentions to use) or 'loss' video (some intentions). Tailored messaging draws on prior work by Drs. Crano and Alvaro distinguishing "resolute nonusers" (youth consistently indicate they will not use) from "vulnerable nonusers" (uncertain or say they will), with the latter having dramatically higher future use and sensitivity to different prevention messages (Crano et al., 2008; Siegel et al., 2014). ATI-V for 9th Grade: 9th grade instructions extend campaign concepts after re-training PLs as 9th graders.

Implementation monitoring. To monitor and strengthen the consistency and quality of *ATI-V* implementation, we will use our multi-method, Peer Leader Stages of Completion measure (Wyman et al., 2015). PI Wyman collaborated with Dr. Lisa Saldana, creator of the Stages of Implementation Completion (Chamberlain, Brown, & Saldana, 2011; Saldana et al., 2012) to develop a theory informed approach to monitor adherence to peer led school-based programs (Wyman et al., 2015). The approach, validated with Sources of Strength and adapted for *ATI-V*, uses multiple sources to capture three key phases. The phases are: (a) Peer Leader (PL) selection (e.g., following sequence of standardized PL nomination steps); (b) PL Training/Preparation (e.g., % Peer Leader participation in campaign meetings); and (c) Population Diffusion (e.g., % non-peer leaders' self-reported exposure to *ATI-V* campaigns via end of year surveys). Adult Advisors are trained in using an on-line measure to document steps and record PL attendance at each meeting. The advantage of the SIC approach is that it relies on documenting clear markers of implementation rather than relying on subjective adult implementer ratings of quality, or coding of video/audio events which are unfeasible for most prevention implementation studies. Each school receives a sum score for each implementation phase (e.g., average PL attendance) reviewed in technical assistance. In our SoS trial we found wide variation in adherence, such as PL attendance (M=61%; school range: 39.4 – 87.1%).

Safety monitoring. *ATI-V* training for Adult Advisors emphasizes safe messaging guidelines and campaign materials have examples of safe messages (and messages to avoid, e.g., Peer Leaders do not refer to peers who vape or share examples of others' negative influences). U Rochester staff provide monthly technical assistance 'skype' sessions and collect campaign materials and examples to monitor safety. As an added step, Drs. Ossip and McIntosh will review 20% of collected campaign materials for safety.

Reducing threats to internal and external validity. To identify existing programs currently operating within project schools, we will use the *Practices and Programs Inventory* that Dr. Espelage used in the Safe and Responsive Schools Project (Peterson, Larson, & Skiba, 2001). The procedure entails: (a) a structured interview with school administrators to list programs/practices, and (b) ratings of programs by a sample of school staff to determine the degree to which various programs are already implemented in a school; whether they are known by staff; and the degree to which they are perceived as effective. Thus, *ATI-V* outcomes can be

correlated with existence or degree of implementation of these practices and tested as moderators in analyses.

d. School Population Assessment Procedures. We will use procedures for collecting students' on-line surveys that have been proven effective, safe and efficient in PI Wyman's randomized trials with over 70 schools. Surveys will be administered to students at least three weeks after the beginning of school and completed in each school in 1-2 days, or up to four days for larger schools.

In-person and online assessment options:

Surveys will be administered by research staff to students in classrooms when COVID-19 public health conditions and school policies allow in-person visits by our team, or in videoconferences when health conditions or policies prohibit in-person visits. Students will completed all survey questions on REDCap and CAT-MH™ platforms. **When conducted with staff present in classrooms**, students will sit at separate desks in groups of approximately 15-25. An information sheet is given or emailed to each student describing the study purpose, procedures, and explaining that their participation is voluntary. The trained research staff person reviews the content of the information sheet and students are given the opportunity to ask questions. Each student who wishes to participate will be given a sheet of paper that has a one-time use access code and the URL for logging on to the secure server at the University of Rochester to complete the survey. In the 2022-23 school year, a video of the survey script was created in Spanish for students in a district with a large population of Spanish-speaking students. Information sheets in English and Spanish are available for download at the start of the survey (survey is also available in Spanish). For the 2024-25 school year, a video of the survey script was created in French for a small group of French-speaking students at one school. Information sheets and surveys are also available in French. **When conducted with staff present via videoconference,** each student will be at their own computer either in a classroom or at home. The information sheet describing the study purpose, procedures, and explaining that their participation is voluntary will be emailed to each student immediately prior to the assessment meeting. During the videoconference meeting, the trained research staff person reviews the content of the information sheet and students are given the opportunity to ask questions. Each student who wishes to participate will then be sent a one-time use access code and the URL for logging on to the secure server at the University of Rochester to complete the survey. Emails will be sent from a dedicated, password protected email account behind University of Rochester firewalls, so that email addresses provided by participants are protected and can be deleted once surveys are complete.

Participants will complete the first section of the survey on REDCap and then be automatically directed (after an information screen informing them) to the CAT-MH™ platform through an embedded URL to answer questions about emotional health and the two questions about EVALI vaping risk factors (see measurement batter for measures completed on each platform). CAT- MH™ platform is a separate, secure web application that administers questions (i.e., "interview") using computer adaptive testing algorithms and other brief measures to maximize efficiency. The component runs on a Java application server and reside on a U.S.-located, hardened server and store results in a SQL Server database. The client interface is based on HTML5 and all communication between it and the server use an encrypted transport layer (256-bit SSL encryption) for privacy and message integrity. The only information collected as

part of the CAT-MH interview process is: start date/time of the interview, which questions were adaptively administered, the subject's responses, and the length of time to select that response. The questions asked and the responses selected during the interview are encoded based on table indexes in a separately encrypted and secured database. The databases are only accessed by the web applications and are not 'exposed' to the Internet at all. **No data about the participant** are stored. The only information related to an individual is a code number to link the survey responses over time within the database. Importantly, CAT-MH data will never be sent directly to the University of Rochester, so there is no ability to re-link participants identity with their CAT-MH/EVALI risk factor data.

At the conclusion of the study, University of Rochester and the CAT-MH administrator will send de-identified data along with the survey codes to the University of Texas Department of Biostatistics where it will be merged and codes removed, and then sent to the research team at the UR.

Measurement Battery

The assessment package and procedures were selected to (a) assess key outcomes of EVP use and hypothesized mediators (individual, relationship, school-community) and moderators (student, school climate) multiple times; (b) create sustainable assessment procedures; (c) protect participants' confidentiality, and (d) collect high-quality data. We choose valid, reliable, widely used measures. Our measurement of hypothesized mediators specific to *ATI-V* draws on our extensive prior research with *ATI-V* and other peer-led programs. Outcome, mediator, and moderator measures are administered at all timepoints. Role of moderators may change over time, so those variables are also measured at each occasion.

Construct	Purpose[1]	Reference	Description/Example Item(s)
Completed on RedCap			
EVP Use	Outcome	Monitoring the Future	Vaping Behaviors (any, nicotine, flavorings) past 30 days, past year, number of days/mo.
EVP Frequency, setting, preferences	Outcome	(Snow et al., 2018)	"How often to you use e-Cigs? [daily-- 1X week]. How long on average? [<5 -- >20 min]; at home/school?
Vaping Intentions /Nonuser status	Mediator/ Moderator	(Crano et al., 2008)	"How likely is it you will vape, even 1x or 2x, over next 12 mos.?" Used to operationalize resolute/vulnerable
EVP Attitudes	Mediator	(Ajzen, 2001)	"*Vaping* is…good, fun, interesting, exciting…"
EVP Normative Views	Mediator	(Crano et al., 2008)	Percentage of friends/kids in your grade at school who have vaped even once or twice in the past 12 months
EVP Harms	Mediator	(Johnston et al., 2019)	"How much do you think people risk harming themselves (physically or in other ways) if they use electronic vapor products every day?"
Peer Network	Mediator	(Pickering et al., 2018)	Students nominate their closest friends in their grade (up to 7); students "who are leaders others

			listen to."
Trusted Adults	Mediator	(Wyman, 2019)	Students name adults at school "who you trust and feel you can talk to about personal things."
School Belonging	Mediator	(Kessler & Walters, 2002)	"At my school, I feel close to other students"
Tobacco Use	Moderator	(Johnston et al., 2019)	Age first use, product type/frequency
Home EVP, Smoking Policy	Moderator	(Li et al., 2019)	"Rules about smoking at home" "Rules about e-cigarettes at home"
Reactance	Moderator	(Hong & Faedda, 1996; Hong & Page, 1989)	"I break the rules", and "When I am told to do something, I want to do the opposite"
Sensation Seeking	Moderator	(Hoyle et al., 2002)	"I would like to explore strange places"
Parental Monitoring	Moderator	(Kerr & Stattin, 2000; Ramirez et al., 2004)	"When I am not home my parents know: where I am, who I am with, what I am doing"
ATI-V Exposure	Intervention Diffusion	(Pickering et al., 2018)	"Have you seen ATI presentation, video, participated in activity.." Spring survey in implementing schools
Demographics	Descriptive	n/a	Sex, gender identity, age, race/ethnicity, GPA, family
School Climate-Staff	Moderator	(Csuti, 2008; Espelage, Polanin, & Low, 2014)	Teacher-staff-student interactions, students helping others, teachers/adults intervening to help others.
Completed on secure CAT-MH Platform (no identifiers)			
Depression, Anxiety, ADHD	Moderator	(Gibbons et al., 2019)	*Kiddie-Computerized Adaptive Testing for Mental Disorders*. Administration of items individually tailored; psychometrically robust measure.
EVALI Risk Factors	Outcome		Vaped Marijuana, THC

Staff Assessment Procedures. Schools can choose to distribute information sheets and link to the staff survey at a staff meeting or send to school staff via email. Each school will have a specific link to a survey, so staff do not have to name their school at the start of the survey, but we can still link data to a specific school. Schools can send 1-2 reminders over a 3-4 week period to increase participation.

Peer Leader and Peer Mentor Assessment Procedures. Surveys given approximately 7 months after training (at the end of 8th and 9th grade years for Peer Leaders) will ask questions pertaining to their: level of participation and engagement in the program, extent to which they have told friends and others about the intervention, and their satisfaction with the training and program.

Peer Leader and Adult Advisor Training Feedback. To assess acceptability and engagement of online training, current Peer Leaders and Adult Advisors will receive a voluntary survey at the end

of the training. Trainers will explain and request participants to fill out the survey at the end of the training session. Questions will assess learned concepts, impact of training, helpfulness of various technology used (e.g., breakout rooms, polls), and comfort with sharing in an online setting. Similar surveys will be given after trainings return to in-person to compare quality and assure that training fidelity across mode of delivery is comparable.

Peer Leader and Adult Advisor key informant interviews. At the end of each school year, the research team will ask for volunteers to participate in key informant interviews. We hope to interview 1-2 Adult Advisors and 3-4 Peer Leaders per school. Adult Advisors may participate more than once. The interviews will ask for in-depth feedback on the training, campaigns, their experience as a Peer Leader or Adult Advisor and impact on self and students. Peer Leaders will also be asked about vaping products being used in their school. The structured interviews will be recorded and coded for common themes and used to improve the program.

10. AUDIO/VIDEO RECORDINGS

Trainings will be video or audio recorded for quality control purposes only and not retained as study data. Peer Leader and Adult Advisor key informant interviews will also be recorded to create transcriptions for qualitative coding. Recordings of both trainings and key informant interviews will be made directly onto a secure, encrypted hard drive, and uploaded to University of Rochester secure servers. Participants will be informed that trainings will be audio/video taped. A URMC research staff member will review to 'check off' that all training components were delivered, and then the audio recordings will be deleted at the earliest opportunity. During training, trainers will create a 'gain' and a 'loss' video using study-owned iPads. These videos will be edited and stored on a secure department server at UR. These videos will be attached to a REDCap survey distributed by PLs to their classmates as part of the tailored Gain vs Loss Campaign. The video creation will be included in the parental permission and assent forms for PLs. PLs who do not have a signed assent and parent permission form will not be included in the videos. Videos will be stored on a Wistia site and only available through the REDCap survey. Recordings of both trainings and key informant interviews will be deleted at the close of the study. For key informant interviews, no personal information will be recorded in the transcriptions.

11. RISKS TO SUBJECTS

Potential risks associated with participation are as follows:

1. Although no adverse effects have been reported from ATI-V, there is potential for youth peer leaders to feel some discomfort during portions of the training that covers common stressors that students experience.
2. It is possible that school staff trained as an Adult Advisor do not provide adequate supervision for Peer Leader groups, resulting in insufficient oversight of their messaging activities.
3. There is potential for student Peer Leaders who conduct school-wide messaging to choose inappropriate messaging content to distribute to other students in the school.
4. There is a potential for loss of confidentiality if students' survey responses are seen by others.

Protection against risks

Several procedures will be followed to minimize the potential of known and unknown risks.

1. All trainers have extensive experience delivering ATI-V and are supervised. Training

prepares them to observe and respond to any student or adult who is distressed and announce their presence if any adult or student seeks support and regularly 'check-in' with students during breaks.

2. To ensure that Adult Advisors are performing their supervising role, several steps are taken. First, two or more staff from each school receive approximately 6 hours of training. If staff who attend training are not deemed appropriate, they will be asked to support the program in another way but not serve as Adult Advisors. During the intervention phase, all Adult Advisors are offered and strongly encouraged to attend the monthly technical assistance tele- or video-conference calls which review the progress of the Peer Leader groups, their meetings, and the content of the messaging that their PLs have planned and conducted. Trainers make a minimum of one site visit to observe Peer Leader team meetings and observe Adult Advisors. We have had experience with Adult Advisors not following through with their role and they have been replaced (new ones trained). Another reason for having at least two Adult Advisors is that if one advisor is not able to perform the role, there is another trained advisor to oversee until a second one is trained. We also can temporarily 'suspend' the Peer Leader meetings and all messaging activities in a school if there are any concerns about the supervision and conduct of the groups.

3. Regarding safety of messaging: the major focus of the training and follow-up meetings with Peer leaders is on positive messages that encourage healthy norms and identifying positive adults and peers. Training for Adult Advisors in each school emphasizes the importance of mentoring Peer Leaders in creating their specific messaging, and the manual has guidelines for safe messages and templates and examples of safe messaging are provided. The Peer Leaders meet approximately bi-weekly with Adult Advisors to plan, review and practice messaging. Students are informed in their training that Adult Advisors will review their messaging. Approximately 20% of campaign videos and materials will be reviewed by Dr. Ossip and/or McIntosh and any concerns about safe messaging will be addressed by the PI.

4. We will train all research staff in standardized procedures to protect privacy and confidentiality for students that participate in surveys, including how to 'set up' classrooms of students to ensure that students complete the survey privately (spaced apart at separate desks). **S**tudents will complete surveys on-line, and we will take several steps to minimize the possibility that students' surveys could be identified through linking their ID code to a name. We are using an 'honest broker' system to keep names separate from survey answers and minimize the possibility that any students' responses could be identified. Students will log onto a secure University of Rochester (UofR) website to fill out the survey using an access code to enter the REDCap system. In addition to the regular survey questions, students will provide social network information. No student names will be listed with survey answers. The access codes that students use to log onto the website (generated by the REDCap system) will not be attached to data that are sent to the research team. The UR data manager will be the only person that can see the names with IDs and will not retain links to access codes after administration of the survey. Final data sent to collaborators outside UR will have IDs replaced with new random codes. This process will keep survey answers as confidential as possible. No parents or school personnel will see any individual survey responses. Students are informed of this system, which is explained to them during the assent process, and they will be given the

opportunity to ask questions.

Alternatives to Participation

The alternative is not to participate. Subjects involved in training do not have to complete the surveys. Likewise, staff do not have to participate.

12. POTENTIAL BENEFITS TO SUBJECTS

For students trained as Peer Leaders, those students may learn about positive strategies for friendships and drawing on adults and positive peers to overcome pressures to vape and other negative peer influences. Students and school staff are not anticipated to receive any benefits of participation in surveys.

13. COSTS FOR PARTICIPATION

Participants will not have any costs associated with participation in the research study.

14. PAYMENT FOR PARTICIPATION

No compensation will be given for participation to Peer Leaders, Adult Advisors, 8th grade students in the school population or school staff. For key informant interviews, participants (Peer Leaders and Adult Advisors) will be given a $25 Amazon card.

15. SUBJECT WITHDRAWALS

We do not anticipate any reason why investigators would withdraw any subjects from the research without their consent. If subjects withdraw, any information already provided will be kept confidential. Students taking surveys are free to participate or not at any time. Students who leave study schools will not be followed for later surveys.

16. PRIVACY AND CONFIDENTIALITY OF SUBJECTS AND RESEARCH DATA

Surveys will be collected via REDCap. REDCap servers are housed in a local data center at the University of Rochester and all web-based information transmission is encrypted. REDCap was developed in a manner consistent with HIPAA security requirements and is recommended to University of Rochester researchers by the URMC Research Privacy Officer and Office for Human Subject Protection. Survey data will contain code numbers for each school and student, but labels for these codes will not be included in any data used for analysis or sent to coinvestigators. De-identified data will be pulled from REDCap and stored on University servers and Box. Peer Leader and Adult Advisor Training Feedback surveys will also be administered via REDCap. Survey link will be presented/sent to participants at the end of the training session. Campaign-related videos will be recorded on study-owned iPads. Edited videos will be stored on Wistia.com and can be accessed via a private URL that is accessible within login but not indexed on the web (i.e., cannot be found via search engine). Participants will be informed about how videos are stored, and their participation is voluntary. No videos will contain sensitive information and will not be retained as study data.

All project staff will be trained in confidentiality and safe record keeping. All research staff will be required to complete IRB certification for the conduct of ethical research through the University of Rochester (or home university for collaborating faculty). Procedures will include storing records in a locked cabinet in a locked area. One staff person will be the key point of contact for transfer and receipt of all data. Only those project staff who are authorized to handle the data will have access to the data. Upon receipt of the surveys and data, staff will record what is received. To

maintain confidentiality, names of students, parents and school staff do not appear on any output. All research information on computers will be encrypted and password protected.
To distribute text messages, we have selected a commercial SMS service that meets evolving healthcare industry standards, including compliance with HIPAA, HITECH, HITRUST and ISO. In order to personalize text messages (which was requested by pilot participants and is suggested as best practice in the literature, Fjeldsoe, Marshall, & Miller, 2009; Head et al., 2013), participants' first names will be entered into the texting system along with their phone number. No sensitive information will be sent or received and stored. A few "polls" may be conducted that invite optional 'numerical" responses. Participation in polls and clicks onto the videos may be examined as indicators of involvement with the text messaging. Participants will be informed that texts are computer-generated and are not for texting interaction with study personnel. Participants will be informed how they can stop receiving texts at any time. When the response data is extracted and stored, any identifiers including email address and phone numbers will be separated from this data, which will be used to document level of participation.
De-identified data may be transferred to co-investigators via email or cloud-based programs with the understanding that data will be removed from these locations within 24 hours. Dr. Todd Little will receive the full de-identified student survey data, implementation data and Peer Leader survey data for main analyses. Dr. Kelly Rulison will received de-identified student survey data focusing on social network data. Drs. Deborah Ossip and Scott McIntosh will review 20% of collected campaign materials for safety. School and participants names will be removed from any material they receive.

15. DATA / SAMPLE STORAGE FOR FUTURE USE

Identified data will not be stored for future use. Once data collection is completed, all names will be removed from all research records so student IDs will not be able to be matched to names. Upon completion of data collection, data which is deidentified by subject and coded for school will be shared with the SPARKE Research Collaboration at the University of Newcastle, School of Medicine and Public Health, Australia. SPARKE employs prospective meta-analysis (PMA) of individual participant data (IPD) from randomized control trials (RCTs), providing rigorous evidence for policy and practice decision making. The aim of this group is to synthesize the evidence on vaping by young people to inform policy. Data will contain codes for school names, but those names will not be sent to SPARKE. No individually identifiable data will be included. The PI will initiate a data use agreement with SPARKE on approval of the modification.

16. DATA AND SAFETY MONITORING PLAN

Although this study involves a low-risk vaping prevention intervention, participants are minors and are therefore a vulnerable population. Therefore, we have assembled a highly experienced Data Safety Monitoring Board to provide oversight and advice.

DSMB Membership

The DSMB has been formed to include members with expertise spanning randomized trials, smoking cessation, and substance use interventions.
Dr. George Howe, PhD will chair the DSMB. Dr. Howe Professor, Departments of Psychology and Psychiatry and Behavioral Sciences, George Washington University. Dr. Gould is a noted prevention scientist and will serve as the biostatistician for the board. He is an expert in quantitative techniques for analyzing randomized trials including modeling heterogeneity in treatment effects over time and in harmonizing data from multiple randomized trials. Dr. Howe

served on the Psychosocial Development, Risk, and Prevention (PDRP) Study Section, Center for Scientific Review, National Institutes of Health from 2008 – 2012.

Mark Swogger, PhD is an Associate Professor in the Department of Psychiatry, University of Rochester School of Medicine and Dentistry. Dr. Swogger is an NIH funded researcher who develops and tests interventions aimed at reducing substance use and violence among justice-involved individuals.

Alexander Prokhorov, MD, PhD is a Professor, Department of Behavioral Science, Cancer Prevention and Population Science, University of Text, MD Anderson Cancer Center. Dr. Prokhorov has extensive expertise and relevant experience from his research on smoking prevention and cessation among youth and adolescents.

DSMB Function

The function of our Data Safety and Monitoring Board (DSMB) is to (1) ensure continuing safety of the study participants, and (2) review the ongoing conduct of the trial.

Above the Influence of Vaping (ATI-V) has been pilot tested in three middle schools with over 330 students without adverse effects of the program being reported. Evidence available to date demonstrates that trained student 'peer leaders' spread healthier vaping norms to friends and reduced vaping behaviors. However, no previous evaluation has examined longer-term effects into 10th grade (as this study will do) nor examined the potential for adverse effects that could occur within certain subgroups of students.

Prior to the start of the trial and before data is collected, the DSMB will review the study protocol including enrollment steps, consent process and forms, collection and storage of study information. Board approval for the protocol will be required before the start of the trial.

Adverse Events

A serious and unexpected adverse event will be deemed to have occurred if rates of EVP use reported by students in the intervention condition was significantly greater than the control condition (using primary outcome: past 30-day any use of electronic vaping product; or secondary outcome of past 30-day nicotine vaping). Rates will be compared after each assessment time.

Training for *ATI-V* trainers, research staff conducting assessments, Adult Advisors and school administrators will include procedures for documentation and reporting to the PI the following events: (1) violation of any subject's confidentiality; (2) discomfort due to the assessment procedures; (3) discomfort among student Peer Leader associated with participation in training and/or schoolwide prevention campaigns; (4) indications of improper Adult Advisor facilitation of Peer leader activities or potentially unsafe Peer Leader messaging activities; (5) reports of negative events by 8th grade students, parents or school staff associated with participation in an *Above the influence of Vaping* activity.

In addition to the preceding indicators of SAE and AEs, the study team will also report to the DSMB any reports by schools, students or parents, or other indications of changes that could have implications for student safety, such as unanticipated dangerous vaping behavior in intervention schools.

Any serious adverse event will be reported to co-investigators and to the DSMB, IRB at the University of Rochester Medical Center (URMC) and to the NIDA project officer within 48 hours of determination.

DSMB Reports

The DSMB will meet, at minimum, once yearly to review interim data from the following school year, but may schedule additional meetings as needed. In advance of those meetings the

members will receive reports from the research teams (U. Rochester, Texas Tech). The reports will consist of the following information:
1. Enrollment rates by school and condition, including any problems associated with enrollment or study participation.
2. Summaries by the research team of any negative events reports by schools (or research team) associated with the Above the Influence of Vaping (ATI-V) intervention, such as any concerns about student Peer Leaders' participation in training and schoolwide campaigns, negative reactions of students to being Peer Leaders or reports of negative events by parents and staff.
3. Data (blinded) summarizing intervention and control group rates of new vaping behaviors– by school and condition. This data summary will be provided by U Texas and identifiers will be removed from schools. Interim data review will be done to minimize possibility that ATI-V could in some contexts increase vaping behaviors (e.g., inappropriate Peer Leaders were selected) without opportunity for the study team to address problems before the end of the trial.
4. Report of adverse events that occurred since last meeting, if any.
5. Any other regulatory issues (amendments, protocol deviations, IRB reports).
A report of all DSMB meetings will be made to the DSMB members, U Rochester RSRB, and to NIDA PO within a month of each meeting including meeting dates, meeting minutes or summary, current board membership, changes in membership if any (and info about new members), and specific board recommendations.

17. DATA ANALYSIS PLAN

Descriptive statistics. Descriptive data will be aggregated to describe the intervention and comparison schools and to guide subsequent multivariate analysis procedures. Measurement properties of all scales will be evaluated through item analysis (i.e., internal consistency) and confirmatory factor analysis (i.e., reliability, content validity, measurement invariance).
Inferential Statistics. We will adopt a multiple-group fixed effects modeling framework where each school is represented as a grouping variable. Little (2019) described numerous limitations to multilevel evaluation and instead recommend the multiple-group framework because of its many advantages including using latent variables to correct for measurement error and test for factorial invariance over time and across groups. Because schools are treated as a separate grouping variable, moderation by school can be examined and modeled in addition to commonalities across schools. With 20 schools and 192 students per school and 20% attrition, the estimated final sample size of 3,080 students provides more than sufficient power to detect changes in vaping prevalence over time and between schools as small as 1% (see E5a). We will employ a fully longitudinal (wide formatted data) missing data model to retain the generalizability of the original sample of 4,800 students over the course of the study (Enders, 2010; Lang & Little, 2018). The base model will be a longitudinal panel model with unconstrained mean-structures estimated as discrete levels at each time point in each group. Structured means will then be tested against the unconstrained means. Each pair of schools that are randomly assigned to immediate treatment vs wait-list control will be tested for baseline equivalence at time 1. Differences in vaping rates are expected to emerge at time 2 between each pair of selected schools. Because the trends over time in this school-based study are not expected to follow a simple linear or curvilinear pattern, growth modeling of the means will not be used. Instead, the mean trends will be estimated via contrast constraints across schools within treatment and within control across time with fluctuating but bifurcating mean-level differences expected across time between pairs of schools. Co-I Little used this approach in a large scale evaluation of a school-based

intervention study of teen dating violence (see Niolon et al., 2019). Additional modeling steps will be taken to facilitate interpretation of findings in terms of meaningful effect sizes. We will use proportion of maximum scoring (Little, 2013) and effects coded scale setting of the constructs (Little, Bovaird, & Widaman, 2006) to place each construct on metric with a true zero, allowing calculation of relative risk ratios at each time point between pairs of schools contrasted. Prior to modeling schools, we will compare treatment schools for homogeneity of their variance covariance structure to determine if combining schools is warranted. If not, each school will be treated as a unique group in the multiple-group longitudinal modeling framework. If warranted, schools will be combined and school will be included as a covariate. Other covariates will also be controlled, including age, sex and race.

Missing data. We will utilize modern missing data treatments for all analyses – MI for descriptive statistics and FIML for structural equation modeling (Enders, 2010). Information lost even by as large as 30% missingness can be readily recovered with 100 imputations. Thus, we will create a large number (200) of imputed datasets to ensure accurate recovery of missing data, and combine the analysis results from each imputed dataset to make valid statistical inferences. SEM parameters will be estimated via FIML for incomplete data, thereby achieving asymptotically optimal estimates (Schafer & Graham, 2002). All measured variables and design factors (e.g., cohorts, times) will be incorporated into the imputation or FIML process as auxiliary variables, thereby addressing the MAR assumption (what causes the data to be missing does not depend on the missing data itself but is related to observed characteristics of the sample) and achieving greater recovery of missing information (Schafer & Graham, 2002).

Given school-level randomization, the analytic plan directly addresses potential within-group dependencies (i.e., students from the same school are more likely to be similar than students from other schools) and removes problems that occur when efficacy studies fail to address the clustered nature of the data, including biased standard errors (Dorman, 2009; Hedges, 2007). However, two problems that can often occur with group randomized trials are model misspecification and decreased power. Our analysis plan prevents misspecification while maximizing power (Little, 2019; Niolon et al., 2019).

Baseline Differences – Randomization Check. Cohort 1 & 2 (N = 20 schools). In year 1, students at 10 schools will complete pre-test (Cohort 1a & 1b; baseline) surveys in fall 2020 to provide a baseline comparison of post-test means. In Fall 2021, another 10 schools will complete pre-test (Cohort 2a & 2b; baseline, Wave 1) surveys. These data will also be used to determine the success of the randomization of schools to condition. Using bivariate tests and multiple modeling techniques, we will examine baseline equivalence between intervention (*ATI-V*) schools and control (delayed intervention) schools in student demographics, primary outcome variables, and study mediators (e.g., school connectedness, help-seeking).

F6c. Evaluation of Research Questions

Aim 1. To test the impact of *ATI-V* in preventing vaping use (past 30 days) in the total population of 8th grade students followed into grade 10 (any vaping, nicotine vaping, and regular use). Examine differences in *ATI-V* impact by sex, race/ethnicity, and in different subgroups defined by emotional and behavioral risk factors.

After testing the main hypotheses of differences between the two *ATI-V* conditions (Immediate Intervention vs. Wait-List), we will conduct fine grained analyses of the individual differences in the responsiveness to the intervention (the 'for whom' question of the intervention). We will also examine the potential magnitude of the treatment effect by structured means modeling (as described above) to test moderation by age, sex, and race/ethnicity-(i.e., interactions with

treatment condition) and in high-risk subgroups defined by: prior tobacco use, elevated mood and behavior problems, home policies, and sensation seeking and reactance. Interaction terms will also be created with baseline school climate scales and treatment condition to assess the impact of climate as moderator of intervention effects. For discrete moderators such as sex, vulnerable vs. resolute use/intention, and race/ethnicity, the multiple group framework will be utilized. For continuous moderators such as age, mood, and behavioral problems, continuous variable interactions will be estimated using the orthogonalization approach (Little et al., 2006) or simply invoking the XWITH command in the mPlus software package. As outlined in Little (2013), all potential moderators will be explored and only significant moderators will be retained for inclusion in the steps toward a final model.

Aim 2. To test multiple hypothesized mediators of ATI-V impact from our intervention model, which identifies three domains of mediators - (a) peer norms that vaping is unacceptable; (b) connections to supportive adults; and (c) connections to non-using peers/nonusers' influence.

Mediation for Aims 2a-b will be tested using the longitudinal mediation steps outlined in Little (2013), which follows on Cole and Maxwell's work. Each of the two mediators will first be tested in isolation using the total indirect effect estimate. Then the two mediators will be examined in conjunction to determine if unique mediation remains when the other mediators are in the model. This latter test provides strong support for the mechanism(s) by which these three factors operate in the broader model.

Aim 2c evaluates how characteristics of students' friendship networks mediate the effect of *ATI-V* on vaping. We will account for the dependencies among students in each network using social network analytic tools (Snijders & Bosker, 2012; Valente, 2010). Specifically, we will use students' friendship nominations to test how the network structure changes (i.e., change in friendship patterns), whether these structural changes relate to earlier behavior (i.e., students *selecting* friends with specific behaviors or characteristics), and whether behavior is related to earlier structural characteristics (i.e., friends *influencing* each other's behavior).

We will first examine aim 2c using Stochastic Actor-Based Models (SABM). In SABMs, the behaviors (e.g., vaping) and friendships observed at each wave are assumed to be snapshots of a continuous latent process. The modeling task is to determine the weighted combinations of effects that are most likely to produce the observed changes in friendships and behavior (see Snijders, 2001; Steglich, Snijders, & Pearson, 2010 for more details). We will estimate these SABMs using the R package, RSiena (Ripley et al., 2019). Briefly, RSiena uses simulations to jointly estimate two models: One for network change (i.e., the probability of a friendship between actor i and actor j forming or dissolving) and one for behavior change (i.e., the probability of a behavior increasing or decreasing by 1 unit). We will test three potential mechanisms through which peer networks might mediate the effect of ATI-V on vaping: (1) whether *ATI-V* reduces deviant peer clustering (i.e., fewer friendships among vaping students), which has been linked to the escalation of youth substance use and other deviant behaviors (e.g., Dishion & Tipsord, 2011); (2) whether vaping students are less popular and whether students are less influenced by their vaping friends in intervention schools. These effects would be consistent with the conceptual model for *ATI-V*, which aims to reduce the popularity and influence of vaping peers; and (3) within the intervention schools, we will test whether students with more exposure to *ATI-V* (e.g., self-reported engagement in *ATI-V* activities) are less likely to select vaping peers as friends. Across models, we will test the statistical significance of each effect, controlling for several covariates (e.g., sex, age,), as well as endogenous network processes (e.g.,

reciprocity) that prior studies show are important to network evolution.
We will then examine aim 2c by testing the extent to which peer leaders (PLs) facilitate diffusion of intervention effects through friendship networks. We expect that vaping will be lower for students who have more PL friends. We will also test potential mediators of diffusion (e.g., exposure to *ATI-V* intervention activities; changes in norms), which could explain how friendships with PLs leads to more positive outcomes. We will conduct our diffusion analyses using a two-step process. First, we will use social network tools to create variables that capture characteristics of students' peer networks (e.g., proportion of PL friends). Then, we will use these variables as mediators using the modeling framework described above for assessing aims 2a and 2b.

18. REFERENCES

Agaku, I. T., Davis, K., Patel, D., Shafer, P., Cox, S., Ridgeway, W., & King, B. A. (2017). A Longitudinal Study of the Relationship between Receptivity to E-Cigarette Advertisements and E-Cigarette Use among Baseline Non-Users of Cigarettes and E-Cigarettes, United States. *Tobacco Induced Diseases, 15*(1), 42.

Aherrera, A., Olmedo, P., Grau-Perez, M., Tanda, S., Goessler, W., Jarmul, S., . . . Navas-Acien, A. (2017). The Association of E-Cigarette Use with Exposure to Nickel and Chromium: A Preliminary Study of Non-Invasive Biomarkers. *Environmental Research, 159*, 313-320.

Ajzen, I. (2001). Nature and Operation of Attitudes. *Annual Review of Psychology, 52*(1), 27-58.

Alexander, J. P., Williams, P., & Lee, Y. O. (2019). Youth Who Use E-Cigarettes Regularly: A Qualitative Study of Behavior, Attitudes, and Familial Norms. *Preventive Medicine Reports, 13*, 93-97.

Barrington-Trimis, J. L., Berhane, K., Unger, J. B., Cruz, T. B., Huh, J., Leventhal, A. M., . . . Gilreath, T. D. (2015). Psychosocial Factors Associated with Adolescent Electronic Cigarette and Cigarette Use. *Pediatrics, 136*(2), 308.

Barrington-Trimis, J. L., Urman, R., Berhane, K., Unger, J. B., Cruz, T. B., Pentz, M. A., . . . McConnell, R. (2016). E-Cigarettes and Future Cigarette Use. *Pediatrics, 138*(1).

Bold, K. W., Kong, G., Cavallo, D. A., Camenga, D. R., & Krishnan-Sarin, S. (2016). Reasons for Trying E-Cigarettes and Risk of Continued Use. *Pediatrics, 138*(3).

Brown, C. H., Wyman, P. A., Guo, J., & Peña, J. (2006). Dynamic Wait-Listed Designs for Randomized Trials: New Designs for Prevention of Youth Suicide. *Clinical Trials, 3*(3), 259-271.

Campbell, R., Starkey, F., Holliday, J., Audrey, S., Bloor, M., Parry-Langdon, N., . . . Moore, L. (2008). An Informal School-Based Peer-Led Intervention for Smoking Prevention in Adolescence (Assist): A Cluster Randomised Trial. *The Lancet, 371*(9624), 1595-1602.

Chamberlain, P., Brown, C. H., & Saldana, L. (2011). Observational Measure of Implementation Progress in Community Based Settings: The Stages of Implementation Completion (Sic). *Implementation Science, 6*(1), 116.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places. *Journal of Personality and Social Psychology, 58*(6), 1015.

Conway, K. P., Swendsen, J., Husky, M. M., He, J.-P., & Merikangas, K. R. (2016). Association of Lifetime Mental Disorders and Subsequent Alcohol and Illicit Drug Use: Results from the National Comorbidity Survey–Adolescent Supplement. *Journal of the American Academy of Child & Adolescent Psychiatry, 55*(4), 280-288.

Crano, W. D., Brewer, M. B., & Lac, A. (2014). *Principles and Methods of Social Research*: Routledge.
Crano, W. D., Siegel, J. T., Alvaro, E. M., Lac, A., & Hemovich, V. (2008). The at-Risk Adolescent Marijuana Nonuser: Expanding the Standard Distinction. *Prevention Science, 9*(2), 129.
Crano, W. D., Siegel, J. T., Alvaro, E. M., & Patel, N. M. (2007). Overcoming Adolescents' Resistance to Anti-Inhalant Appeals. *Psychology of Addictive Behaviors, 21*(4), 516.
Csuti, N. (2008). The Colorado Trust Bullying Prevention Initiative Staff Survey.
Cullen, K. A., Ambrose, B. K., Gentzke, A. S., Apelberg, B. J., Jamal, A., & King, B. A. (2018). Notes from the Field: Use of Electronic Cigarettes and Any Tobacco Product among Middle and High School Students—United States, 2011–2018. *Morbidity and Mortality Weekly Report, 67*(45), 1276.
DeJong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R., . . . Scribner, R. A. (2006). A Multisite Randomized Trial of Social Norms Marketing Campaigns to Reduce College Student Drinking. *Journal of Studies on Alcohol, 67*(6), 868-879.
DHHS, U. (2016). E-Cigarette Use among Youth and Young Adults. A Report of the Surgeon General. *Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health*, 1-275.
Dishion, T. J., & Tipsord, J. M. (2011). Peer Contagion in Child and Adolescent Social and Emotional Development. *Annual Review of Psychology, 62*, 189-214.
Dorman, J. P. (2009). Statistical Tests Conducted with School Environment Data: The Effect of Teachers Being Clustered in Schools. *Learning Environments Research, 12*(2), 85-99.
Enders, C. K. (2010). *Applied Missing Data Analysis*. New York: Guilford press.
Espelage, D. L., Polanin, J. R., & Low, S. K. (2014). Teacher and Staff Perceptions of School Environment as Predictors of Student Aggression, Victimization, and Willingness to Intervene in Bullying Situations. *School Psychology Quarterly, 29*(3), 287.
Fjeldsoe, B. S., Marshall, A. L. & Miller, Y. D. (2009). Behavior change interventions delivered by mobile telephone short-message service. American Journal of Preventive Medicine, 36, 165-173. https://doi.org/10.1016/j.amepre.2008.09.040
Gibbons, R., Kupfer, D., Frank, E., Lahey, B., George-Milford, B., Biernesser, C., . . . Brent, D. (2019). The Kiddie Cat (K-Cat): A New Statistical Paradigm for Quickly and Accurately Measuring Psychopathology Dimensions in Youth. (under Review).
Goriounova, N. A., & Mansvelder, H. D. (2012). Short-and Long-Term Consequences of Nicotine Exposure During Adolescence for Prefrontal Cortex Neuronal Network Function. *Cold Spring Harbor Perspectives in Medicine, 2*(12), a012120.
Grana, R., Benowitz, N., & Glantz, S. A. (2014). E-Cigarettes: A Scientific Review. *Circulation, 129*(19), 1972-1986.
Hall, M. G., Pepper, J. K., Morgan, J. C., & Brewer, N. T. (2016). Social Interactions as a Source of Information About E-Cigarettes: A Study of U.S. Adult Smokers. *International Journal of Environmental Research and Public Health, 13*(8), 788.
Head, K. J., Noar, S. M., Iannarino, N. T. & Harrington, N. G. (2013). Efficacy of text messaging-based interventions for health promotion: A meta-analysis. Social Science & Medicine, 97, 41-48. https://doi.org/10.1016/j.socscimed.2013.08.003
Hedges, L. V. (2007). Correcting a Significance Test for Clustering. *Journal of Educational and Behavioral Statistics, 32*(2), 151-179.

Hong, S.-M., & Faedda, S. (1996). Refinement of the Hong Psychological Reactance Scale. *Educational and Psychological Measurement, 56*(1), 173-182.
Hong, S.-M., & Page, S. (1989). A Psychological Reactance Scale: Development, Factor Structure and Reliability. *Psychological Reports, 64*(3_suppl), 1323-1326.
Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). Reliability and Validity of a Brief Measure of Sensation Seeking. *Personality and Individual Differences, 32*(3), 401-414.
Jessor, R. (1998). *New Perspectives on Adolescent Risk Behavior*: Cambridge University Press.
Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2019). Monitoring the Future National Survey Results on Drug Use, 1975-2018: Overview, Key Findings on Adolescent Drug Use. *Institute for Social Research*.
Kelly, J. A. (2004). Popular Opinion Leaders and Hiv Prevention Peer Education: Resolving Discrepant Findings, and Implications for the Development of Effective Community Programmes. *AIDS Care, 16*(2), 139-150.
Kerr, M., & Stattin, H. (2000). What Parents Know, How They Know It, and Several Forms of Adolescent Adjustment: Further Support for a Reinterpretation of Monitoring. *Developmental Psychology, 36*(3), 366.
Kessler, R. C., & Walters, E. E. (2002). The National Comorbidity Survey. *Textbook in Psychiatric Epidemiology, 2d ed. New York: John Wiley & Sons*, 343-362.
Lang, K. M., & Little, T. D. (2018). Principled Missing Data Treatments. *Prevention Science, 19*(3), 284-294.
Lapinski, M. K., & Rimal, R. N. (2005). An Explication of Social Norms. *Communication Theory, 15*(2), 127-147.
Leventhal, A. M., Strong, D. R., Kirkpatrick, M. G., Unger, J. B., Sussman, S., Riggs, N. R., . . . Audrain-McGovern, J. (2015). Association of Electronic Cigarette Use with Initiation of Combustible Tobacco Product Smoking in Early Adolescence. *JAMA, 314*(7), 700-707.
Li, D., Sundar, I. K., McIntosh, S., Ossip, D. J., Goniewicz, M. L., O'Connor, R. J., & Rahman, I. (2019). Association of Smoking and Electronic Cigarette Use with Wheezing and Related Respiratory Symptoms in Adults: Cross-Sectional Results from the Population Assessment of Tobacco and Health (Path) Study, Wave 2. *Tobacco Control*, tobaccocontrol-2018-054694.
Little, T. D. (2013). *Longitudinal Structural Equation Modeling*. New York: Guilford press.
Little, T. D., Bontempo, D., Rioux, C., & Tracy, A. (2019). *On the Merits of Longitudinal Multiple Group Modeling: A Valid and Often Preferred Approach to Intervention Evaluations. Manuscript under Review.*
Little, T. D., Bovaird, J. A., & Widaman, K. F. (2006). On the Merits of Orthogonalizing Powered and Product Terms: Implications for Modeling Interactions among Latent Variables. *Structural Equation Modeling, 13*(4), 497-519.
MacArthur, G. J., Harrison, S., Caldwell, D. M., Hickman, M., & Campbell, R. (2016). Peer-Led Interventions to Prevent Tobacco, Alcohol and/or Drug Use among Young People Aged 11–21 Years: A Systematic Review and Meta-Analysis. *Addiction, 111*(3), 391-407.
Mercken, L., Snijders, T. A., Steglich, C., Vartiainen, E., & De Vries, H. (2010). Dynamics of Adolescent Friendship Networks and Smoking Behavior. *Social Networks, 32*(1), 72-81.
Niolon, P. H., Vivolo-Kantor, A. M., Tracy, A. J., Latzman, N. E., Little, T. D., DeGue, S., . . . McIntosh, W. L. K. (2019). An Rct of Dating Matters: Effects on Teen Dating Violence and Relationship Behaviors. *American Journal of Preventive Medicine, 57*(1), 13-23.

Noland, M., Ickes, M. J., Rayens, M. K., Butler, K., Wiggins, A. T., & Hahn, E. J. (2016). Social Influences on Use of Cigarettes, E-Cigarettes, and Hookah by College Students. *Journal of American College Health, 64*(4), 319-328.
Ossip, D. J., Johnson, T., Assibey-Mensah, V., Wang, S., McLaren, D., Calabro, K., . . . McIntosh, S. (2018). Smoke-Free Home and Vehicle Policies among Community College Smokers. *Health Education & Behavior, 45*(4), 540-549.
Pepper, J. K., Lee, Y. O., Watson, K. A., Kim, A. E., Nonnemaker, J. M., & Farrelly, M. C. (2017). Risk Factors for Youth E-Cigarette "Vape Trick" Behavior. *Journal of Adolescent Health, 61*(5), 599-605.
Perkins, H. W., Haines, M. P., & Rice, R. (2005). Misperceiving the College Drinking Norm and Related Problems: A Nationwide Study of Exposure to Prevention Information, Perceived Norms and Student Alcohol Misuse. *Journal of Studies on Alcohol, 66*(4), 470-478.
Peterson, R. L., Larson, J., & Skiba, R. (2001). School Violence Prevention: Current Status and Policy Recommendations. *Law & Policy, 23*(3), 345-371.
Petrova, M., Wyman, P. A., Schmeelk-Cone, K., & Pisani, A. R. (2015). Positive-Themed Suicide Prevention Messages Delivered by Adolescent Peer Leaders: Proximal Impact on Classmates' Coping Attitudes and Perceptions of Adult Support. *Suicide and Life-Threatening Behavior, 45*(6), 651-663.
Pickering, T. (2018). Diffusion of a Peer-Led Suicide Preventive Intervention in Secondary Schools: Strategies to Increase Effectiveness of Peer-Led Interventions (Unpublished Dissertation).
Pickering, T. A., Wyman, P. A., Schmeelk-Cone, K., Hartley, C., Valente, T. W., Pisani, A. R., . . . LoMurray, M. (2018). Diffusion of a Peer-Led Suicide Preventive Intervention through School-Based Student Peer and Adult Networks. *Frontiers in Psychiatry, 9*.
Pisani, A. R., Wyman, P. A., Petrova, M., Judd, E., Schmeelk-Cone, K., Thiha, P., & Gurditta, K. (2019). Framework for Supporting Adolescent Peer Leaders: A Pilot Using Text Messaging in a School-Based Substance Use Prevention Program. *The Journal of Primary Prevention*, 1-12.
Primack, B. A., Soneji, S., Stoolmiller, M., Fine, M. J., & Sargent, J. D. (2015). Progression to Traditional Cigarette Smoking after Electronic Cigarette Use among Us Adolescents and Young Adults. *JAMA Pediatrics, 169*(11), 1018-1023.
Ramirez, J. R., Crano, W. D., Quist, R., Burgoon, M., Alvaro, E. M., & Grandpre, J. (2004). Acculturation, Familism, Parental Monitoring, and Knowledge as Predictors of Marijuana and Inhalant Use in Adolescents. *Psychology of Addictive Behaviors, 18*(1), 3.
Rimal, R. N., & Real, K. (2003). Understanding the Influence of Perceived Norms on Behaviors. *Communication Theory, 13*(2), 184-203.
Ripley, R. M., Snijders, T. A., Boda, Z., Vörös, A., & Preciado, P. (2019). Manual for Rsiena.
Rogers, E. (2003). Diffusion of Innovations. 15: New York: Free Press. .
Rogers, R. W. (1983). Cognitive and Psychological Processes in Fear Appeals and Attitude Change: A Revised Theory of Protection Motivation. *Social Psychophysiology: A Sourcebook*, 153-176.
Rothman, A. J., & Salovey, P. (1997). Shaping Perceptions to Motivate Healthy Behavior: The Role of Message Framing. *Psychological Bulletin, 121*(1), 3.
Rulison, K., Wyman, P., Mendenhall, B., & Pisani, A. (2019). Diffusion of Intervention Effects from Peer Leaders to Friends: Effects from above the Influence. *Society for Research in Child Development*.

Ryan, R. M., & Deci, E. L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist, 55*(1), 68.
Saldana, L., Chamberlain, P., Wang, W., & Brown, C. H. (2012). Predicting Program Start-up Using the Stages of Implementation Measure. *Administration and Policy in Mental Health and Mental Health Services Research, 39*(6), 419-425.
Schafer, J. L., & Graham, J. W. (2002). Missing Data: Our View of the State of the Art. *Psychological Methods, 7*(2), 147.
Siegel, J. T., Crano, W. D., Alvaro, E. M., Lac, A., Hackett, J. D., & Hohman, Z. P. (2014). Differentiating Common Predictors and Outcomes of Marijuana Initiation: A Retrospective Longitudinal Analysis. *Substance Use & Misuse, 49*(1-2), 30-40.
Snijders, T., & Bosker, R. (2012). Discrete Dependent Variables. *Multilevel analysis: an introduction to basic and advanced multilevel modeling*, 304-307.
Snijders, T. A. (2001). The Statistical Evaluation of Social Network Dynamics. *Sociological Methodology, 31*(1), 361-395.
Snow, E., Johnson, T., Ossip, D. J., Williams, G. C., Ververs, D., Rahman, I., & McIntosh, S. (2018). Does E-Cigarette Use at Baseline Influence Smoking Cessation Rates among 2-Year College Students? *Journal of Smoking Cessation, 13*(2), 110-120.
Stanwick, R., & Society, P. p. o. t. C. P. (2015). E-Cigarettes: Are We Renormalizing Public Smoking? Reversing Five Decades of Tobacco Control and Revitalizing Nicotine Dependency in Children and Youth in Canada. *Pediatrics & Child Health, 20*(2), 101-105.
Steglich, C., Snijders, T. A., & Pearson, M. (2010). 8. Dynamic Networks and Behavior: Separating Selection from Influence. *Sociological Methodology, 40*(1), 329-393.
Talhout, R., Schulz, T., Florek, E., Van Benthem, J., Wester, P., & Opperhuizen, A. (2011). Hazardous Compounds in Tobacco Smoke. *International Journal of Environmental Research and Public Health, 8*(2), 613-628.
Tsai, J., Walton, K., Coleman, B. N., Sharapova, S. R., Johnson, S. E., Kennedy, S. M., & Caraballo, R. S. (2018). Reasons for Electronic Cigarette Use among Middle and High School Students—National Youth Tobacco Survey, United States, 2016. *Morbidity and Mortality Weekly Report, 67*(6), 196.
Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. *Science, 211*(4481), 453-458.
Unger, J. B., Soto, D. W., & Leventhal, A. (2016). E-Cigarette Use and Subsequent Cigarette and Marijuana Use among Hispanic Young Adults. *Drug and Alcohol Dependence, 163*, 261-264.
Valente, T. W. (2010). *Social Networks and Health: Models, Methods, and Applications*: Oxford: University Press.
Valente, T. W. (2015). Social Networks and Health Behavior. *Health Behavior: Theory, Research and Practice, 5*, 205-222.
Volkow, N. (2018). Monitoring the Future Survey Results Show Alarming Rise in Teen Vaping *Nora's Blog*.
Wills, T. A., Knight, R., Sargent, J. D., Gibbons, F. X., Pagano, I., & Williams, R. J. (2017). Longitudinal Study of E-Cigarette Use and Onset of Cigarette Smoking among High School Students in Hawaii. *Tobacco Control, 26*(1), 34-39.
Wills, T. A., Knight, R., Williams, R. J., Pagano, I., & Sargent, J. D. (2015). Risk Factors for Exclusive E-Cigarette Use and Dual E-Cigarette Use and Tobacco Use in Adolescents. *Pediatrics, 135*(1), e43.

Wyman, P. A., Brown, C. H., LoMurray, M., Schmeelk-Cone, K., Petrova, M., Yu, Q., . . . Wang, W. (2010). An Outcome Evaluation of the Sources of Strength Suicide Prevention Program Delivered by Adolescent Peer Leaders in High Schools. *American Journal of Public Health, 100*(9), 1653-1661.
Wyman, P. A., Petrova, M., Schmeelk-Cone, K., Kerr, N., Pisani, A., Brown, C. H., . . . Valente, T. (2015). A Method for Assessing Implementation Success of a Peer-Led Suicide Prevention Program. *Implementation Science, 10*(S1), A42.
Wyman, P. A., Pickering, T.A., Pisani, A.R., Rulison, K., Schmeelk-Cone, K., Hartley, C., Gould, M., Caine, E.D., Brown, C.H. & Valente, T.W. (2019). Peer-Adult Network Structure and Suicide Attempts in 38 High Schools: Implications for Network Informed Suicide Prevention. *Journal of Child Psychology and Psychiatry, 60(10):*1065-1075.
Yule, J. A., & Tinson, J. S. (2017). Youth and the Sociability of "Vaping". *Journal of Consumer Behaviour, 16*(1), 3-14.