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Evaluation of the Substance Abuse Research and Education Training (SARET) program: Stimulating health professional students to pursue careers in substance use research

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Abstract

Background: We developed and implemented the Substance Abuse Research Education and Training (SARET) program for medical, dental, nursing, and social work students to address the dearth of health professionals pursuing research and careers in substance use disorders (SUD). SARET has two main components:

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Author contributions

K.H., S.B., E.T., F.M., M.N., and M.G. conceived of, implemented and designed this study and contributed significantly to the drafting and revision of the manuscript. K.G. and S.B. conducted the data analysis. K.H. and S.B. had full access to all of the data in the study and take responsibility for the integrity and accuracy of the data analysis. A.K. provided substantial feedback in study design and conceptualization and substantial editing of the manuscript.

*We recognize that the phrase “substance abuse” has fallen out of favor because of its stigmatizing connotations. The SARET program was started in 2007, when this language was still in widespread use. Because the program acronym, SARET, is now widely known and used, including in publications, we have opted to stay with its name for consistency and program recognition. However, “substance use” is the phrase we use with our trainees and in all updated program materials.

Previous presentations

Data presented here has not been published elsewhere but has been presented in abstract and workshop form as detailed below.

Hanley K, Bereket S, Tuchman E et al. SARET: Evaluation of Early Career Impact of Interprofessional Substance Use Research Training at 39th Annual Meeting of Society for General Internal Medicine, 2016 May 11–14; Hollywood, FL.

Hanley K, Bereket S, Tuchman E et al. Dissemination and 8-year Evaluation of the Interdisciplinary Substance Abuse Research Education and Training (SARET) Program at 39th Annual Association for Medical Education and Research in Substance Abuse (AMERSA) National Conference, 2015 Nov 5–7; Washington, DC.

Hanley K, Back S, Bereket S, et al. Building Interprofessional Research and Training in Substance Use: Pragmatic Approaches. Skills-Based Workshop at: 39th Annual Association for Medical Education and Research in Substance Abuse (AMERSA) National Conference, 2015 Nov 5–7; Washington, DC.

1. A novel online curriculum addressing core SUD research topics, to reach a large number of students.
2. A mentored summer research experience for in-depth exposure.

Methods: Modules were integrated into the curricula of the lead institution, and of five external schools. We assessed the number of web modules completed and their effect on students' interest in SUD research. We also assessed the impact of the mentorship experience on participants' attitudes and early career trajectories, including current involvement in SUD research.

Results: Since 2008, over 24,000 modules have been completed by approximately 9,700 individuals. In addition to integration of the modules into curricula at the lead institution, all five health-professional partner schools integrated at least one module and approximately 5,500 modules were completed by individuals outside the lead institution. We found an increase in interest in SUD research after completion of the modules for students in all four disciplines. From 2008–2015, 76 students completed summer mentorships; 8 students completed year-long mentorships; 13 published in SUD-related journals, 18 presented at national conferences, and 3 are actively engaged in SUD-related research. Mentorship participants reported a positive influence on their attitudes towards SUD-related clinical care, research, and inter-professional collaboration, leading in some cases to changes in career plans.

Conclusions: A modular curriculum that stimulates clinical and research interest in SUD can be successfully integrated, into medical, dental, nursing, and social work curricula. The SARET program of mentored research participation fostered early research successes and influenced career choice of some participants. Longer-term follow-up will enable us to assess more distal careers of the program.

Keywords

Web-based learning; substance abuse; substance use disorders; research training; interprofessional education

Introduction

The volume of high-value research on substance use disorders (SUD) does not match the need, given the prevalence of SUD and its increasing contribution to morbidity and mortality, both nationally and globally^{1–4}. The treatment of SUD frequently employs an interdisciplinary team approach, informed by the recognition that SUD represent a complex interplay of biological, social, and psychological factors⁵. The National Institute of Drug Abuse (NIDA) and the World Health Organization (WHO) have emphasized the importance of interdisciplinary training efforts and perspectives in order to further advance SUD research^{6–8}. Researchers need to adopt new strategies for working with those outside of their field and appreciating other scientific cultures, particularly as more funding opportunities are developed to support interdisciplinary science. Most programs to train physicians, dentists, nurses and social workers in clinical and translational research (e.g., K12 and T32 initiatives), target later stages of training (typically post-doctoral), once participants have already selected a field of study. Far less attention has been devoted to the less differentiated, “upstream” pool of pre-doctoral students who have not yet defined a specific career focus. In

addition, there have been calls for more effective and standardized evaluation of addiction training programs⁹.

The Substance Abuse Research Education and Training (SARET) program has been funded by the National Institute on Drug Abuse (NIDA) since 2006 to address the need to increase the pipeline of health professionals who engage in SUD research over the course of their careers. It began as an interprofessional collaboration between the schools of Medicine, Dentistry, and Nursing. In 2011, social work was successfully incorporated as a fourth discipline, reflecting conclusions from several national studies that there is insufficient curriculum on SUD in social work training despite the often integral role social workers play in treatment^{10,11}. In addition, the NIH Roadmap emphasizes the need for training of an interdisciplinary workforce that includes investigators drawn from the fields engaged in providing care to persons affected by the conditions they are studying. Despite social workers' deep involvement in many facets of substance use-related care, research conducted by and for social workers has been limited in quantity and impact.

SARET uses novel approaches to activate doctoral and masters level students' interest in SUD-related research careers, with the long-term goal of increasing the supply of researchers in this field. The first component is a flexible, scalable, modular, web-based curriculum to reach a large number of potentially interested students. The second is stipend-supported summer and year-long mentored research experiences with NIDA-funded researchers that offer more intensive exposure to a smaller group of highly motivated students. Through the modules and the mentored research experiences, students are exposed both to a fundamental understanding of SUD and to cutting-edge research challenges at the interface of addiction-related neuroscience, behavior, and healthcare delivery.

As the SARET program entered its 9th year, we undertook a broad assessment of both the web-based curriculum and research mentorship components to assess the program's effectiveness in relation to its goals of: (1) expanding local integration and widely disseminating the modular curriculum (2) increasing students' sensitivity to SUD in the clinical and research arenas, 3) influencing positively students' knowledge, skills and attitudes regarding inter-professional collaboration, and 4) motivating students to engage in research on SUD.

This paper describes our web-based curriculum modules and their local integration and dissemination nationally; the impact of the modules on student interest in SUD research, across all four disciplines; and the influence of SARET on our mentorship program participants, including their attitudes towards SUD and inter-professional collaboration, as well as their early career trajectories and scholarly work.

Methods:

Instructional methods

We use multiple instructional strategies to maximize the impact of the SARET program on a range of audiences and to take into account the realities of academic training in health-related fields. To facilitate integration with existing curricular content and compete more

successfully for the limited time and attention of learners and faculty, we deliver the core curricular content of the SARET program in a modular, web-based format. In addition, since a positive experience of research mentorship is the most consistent predictor of future success in a research career, mentored SUD research is a core feature of SARET^{12–15}. We offer participation in SARET's mentored research program to a small number of learners seeking deeper exposure, often after their interest has been stimulated by the web-based modules. Finally, we designed the modules to be easily disseminated to institutions with limited training and research resources.

The web-based curriculum

The digital curriculum was phased in from 2008–2010¹⁶. We used module-embedded student surveys to assess the curriculum's effects on attitudes towards research and treatment of SUD among medical, dental, nursing and social work students^{16,17}. Since 2010, we have continually expanded deployment of the modules throughout the curriculum at the lead institution. In addition, we have refined and enhanced the modules' content based on successive cycles of feedback¹⁷, including detailed yearly review of each module by nationally recognized content experts from schools of medicine, nursing, dentistry or social work as well as focus group feedback from students and faculty from our school of social work during the initial implementation at that school. Enhancements have ranged from incorporation of new terminology (e.g., substance use disorder) to inclusion of a more diverse roster of researchers, clinicians, and patient actors.

Each of the six interactive, multimedia, web-based SARET modules integrates exploration of a core topic in the field of SUD with instruction on fundamental concepts in research methodology, such as principles of study design or criteria for evaluating a screening test, using case-based examples often in the form of video vignettes (Table 1). The initial module, Exploring Substance Use Disorders Research, introduces students to inter-professional aspects of the field through interviews with successful SUD researchers from medicine, nursing, dentistry, and social work. Subsequent modules address epidemiology, neurobiology, screening, personal impact, and treatment modalities for SUD.

Modules are accessed through an open-source, interactive web platform called Compass, (<https://compass.iime.cloud/category/saret/>), and each takes approximately 40 minutes to complete. Students can visit a module as many times as needed and are not forced to complete it in a single session. Classroom instructors are encouraged to use the modules to fill content gaps and to elaborate upon concepts addressed in existing courses.

Evaluation of web-based curriculum

Since the launch of the SARET program in 2009, we have employed a 4-item survey at the end of every module to assess changes in students' level of interest in i) research generally and ii) SUD research specifically, as well as iii) students' attitudes towards SUD treatment and iv) impression of the importance of SUD to health. Data collected also included training discipline and institution at which the student completed the survey¹⁸.

Because many students completed more than one module and we could not control for the sequence in which they were completed, we selected the first module completed for our

assessment of module impact on students' interest and attitudes. We compared the proportion of students in each of four categories of interest (on a 4-point Likert scale anchored by "Not at all interested" and "Very interested,") pre- and post-module to illustrate change in interest by discipline and module. We also used logistic regression to estimate both the module- and discipline-specific proportions of students with increased interest, excluding those who rated their interest at a level of 4 (Very Interested) in the first module since they could not increase. Based on the estimated probabilities and standard errors from these two models (one for module and one for discipline), we calculated the confidence intervals around the proportion with increased interest (R Version 3.3.1).

Local integration

The modules have been integrated into a number of courses at each of the four local schools, as detailed in Table 2, with total module completions thus far nearing 15,500. The heterogeneity in uptake across schools reflects the modules' versatility and schools' diverse curricular needs. In addition to the large audiences afforded by offering the modules to all participants in a given course, the full series of 6 web-based modules is completed by all student participants in SARET's in-depth mentored research component.

National Dissemination

We embarked on a dissemination initiative with the goal of extending the reach of the SARET curriculum to health professional schools outside of the lead institution. We piloted this by identifying five "early partner" schools in several disciplines that agreed to integrate one or more modules into their curriculum during the 2013–2014 academic year (Georgetown University School of Medicine, Albert Einstein College of Medicine, Indiana University School of Dentistry, University of Michigan School of Dentistry, University at Buffalo School of Social Work). These early partner schools adapted their approaches to integrating the modules according to their curricular needs. Most used two modules and reached a large number of learners, while one assigned all six modules to a small group of motivated learners taking an addiction medicine elective. After the first year of use by other schools, we elicited feedback from participating faculty regarding the modules' content and technical implementation to guide the next phase of dissemination. Most of the early partner schools continue to use the modules.

After demonstrating the feasibility and acceptability of integrating the web-based modules into other schools' curricula, we initiated more widespread dissemination. We employed a variety of approaches to raise educators' awareness of the modules, including email listservs, oral and poster presentations and workshops at national meetings, and targeted outreach through national professional organizations in medicine, dentistry, nursing and social work. We sent emails to educational leaders responsible for curricula at a wide array of health professional schools, with links to a video previewing the modules and to a brief video trailer describing the curriculum (<http://tinyurl.com/saret-video>), and offered phone consultations with SARET faculty to discuss options for curricular integration.

To initiate a second platform for dissemination, we developed and piloted an iBook version of one of our most popular modules, *Neurobiology of Substance Abuse* (2015, <https://>

itunes.apple.com/us/book/neurobiology-of-substance-abuse/id990700558?mt=11). While the iBook format allows access to all of the module's interactive features without an internet connection, it does not allow for embedded pre- and post-completion user surveys. Like the web-based version of the modules, the iBook is available free of charge on the iTunes store. We recently updated the title to *Neurobiology of Substance Use Disorders* to reflect preferred terminology.

As of December 2017, 24,352 SARET modules had been completed by 9,741 module participants (Figure 1). In addition to the local institution, the five early partner schools and four additional health professional schools had integrated one or more SARET modules into their curricula. Locally, the Personal Impact and Exploring SUD Research modules have been the most widely integrated, largely reflecting their adoption as required curricular elements at the College of Nursing and College of Dentistry. The Neurobiology module has been the most widely used by the early partner and other professional schools. The Neurobiology iBook has also proved popular, with over 700 downloads to date despite only minimal promotion.

The Research Mentorship Program

Each year, 12 students are selected through a competitive application process at each of the lead institution's 4 health professional schools to participate in a summer of intensive mentored research. Students commit to participating full-time (35 hours/week) for eight weeks and are integrated into the research group of an experienced (typically NIDA-funded) SUD investigator. In addition to promoting students' engagement and interaction with other members of their research team, mentors dedicate 1–2 hours/week to one-on-one mentoring. We strive to pair students with a mentor from a discipline other than their own to increase inter-professional exposure. Students work on a particular facet of their mentor's research program or develop a related sub-project of their own. Specific opportunities vary widely, from bench to health services to population-oriented research.

Every week, the student mentees come together for a half day of structured didactic sessions. Through weekly seminars and the web-based curriculum, students study core dimensions of SUD: 1) epidemiology, 2) neurobiology and genetics, 3) screening, assessment and diagnosis, 4) fostering behavior change, 5) treatment modalities, 6) health policy and harm reduction approaches to substance use, and 7) approaches to difficult clinical cases. Speakers present ongoing research and share their expertise and experience in conducting SUD research. Site visits are arranged to: 1) a hospital-based methadone clinic and a comprehensive chemical dependency outpatient program, 2) a community-based harm reduction center with a syringe exchange, 3) a primary care-based buprenorphine treatment service, 4) a human subjects research lab studying crack cocaine use, and 5) open meetings of 12-step groups such as Alcoholics Anonymous and Narcotics Anonymous.

The weekly sessions seek also to foster skill-building in research, structuring student discussions of their research projects with an interdisciplinary group of peers and faculty, and setting and refining the goals that become part of their individual learning plans. Students are guided step-by-step through the process of developing and presenting formal research posters on their individual projects, incorporating faculty and peer feedback. All

students present their completed poster to their peers, mentors, and other faculty and investigators at our annual research day during the last week of the summer program. To promote interdisciplinary collaboration and understanding, we assign students to small groups across disciplines to lead a portion of a weekly seminar. This is an opportunity for students to take a deep dive into an addiction topic of their choice, and in the process of presenting and facilitating a discussion with the entire group, to highlight different approaches and analyses based their discipline's perspective.

The summer program also emphasizes research ethics and the responsible conduct of research. Faculty-led, case-based discussions of principles of human subjects' research address: 1) common challenges in research ethics, including informed consent in SUD research and the ethical aspects of industry-sponsored research; 2) responsible conduct regarding data acquisition, security, and sharing; 3) addressing the roles and responsibilities of mentor/mentee relationships; and 4) ethical considerations in research with vulnerable populations and persons receiving SUD treatment.

After the mentored summer research experience, summer program participants can opt to continue their research experience informally (e.g., complete a manuscript based on work conducted over the summer) or through an extended, year-long stipend-supported mentored research experience. Sixty-eight (24 medical, 15 nursing, 21 dental and 8 social work) students participated in the summer mentorship from 2008–2014.

Survey of mentorship participants

In the fall of 2015, we emailed a survey to all 65 SARET participants from the 2008–2014 cohorts for whom we had valid email addresses. A \$100 incentive was offered for completion. The survey included 13 items collected as a 4-point strength-of-agreement Likert scale (dichotomized in the descriptive analysis), as well as several open-text response questions about participants' current careers and the perceived influence of SARET participation on their career choices, inter-professional attitudes, and research and/or treatment of SUD. We assessed participants' scholarly output through self-report of publications and presentations, supplemented by automated monthly PubMed searches.

Results:

Impact of modules and student interest in SUD research

Based on an analysis of modules completed between July 2013 (when the discipline of SW was added) and July 2016, student interest in SUD research increased following completion of each module (Figure 2). However, we observed differences in the magnitude of the increase in interest by module and student discipline (Figures 2 and 3). Specifically, the proportion of students with increased interest in SAR ranged from 36% to 57% across different modules, and from 40% to 61% across the different disciplines (Table 3 and 4). Less than 4% of students showed a decline in interest and the remainder had no change. Since the module could not be completed without answering the survey, the response rate is 100%.

Summer Mentorship Program: Survey of Attitudes and Career Intentions

Of the 65 participants who received the long-term follow-up survey (cohorts 2008–2014), 54 (83%) responded, with no differences in response rate by discipline. Sixty-six percent of the mentorship participants were female, 8% were Hispanic/Latinx, 24% Asian, 11% Black/African-American, 11% Multi-racial and 55% White. Over half of the respondents were still in training: e.g., completing residency, medical school, dental school, social work school, or PhD programs.

In response to the closed questions, the overwhelming majority of respondents reported that the mentored research experience had increased their interest in SUD-related research (96%; 50/52) and their knowledge of SUD (100%; 52/52). With regard to inter-professional attitudes, respondents indicated that the program increased their appreciation of other disciplines (96%; 50/52) and their comfort communicating with health professional colleagues in other disciplines (90%; 47/52). Forty-six percent (24/52) of respondents reported being somewhat or very involved in research currently, and 29% (15/51) reported current involvement in SUD-related research specifically. (Note that denominators vary according to number completing responses to given items).

Fifty-one individuals responded to open-ended questions regarding the impact of SARET on their careers. Many suggested that increased knowledge and awareness of SUD was the primary consequence of their SARET participation, as evidenced by comments such as: “As a provider, I have been more conscious of my role in treating patients’ substance abuse by asking about their habits and offering referral to treatment at our detox center” (medical student); and “definitely increased my sensitivity about substance abuse, my awareness of how pervasive substance abuse is, and how it impacts general healthcare” (dentistry student); and “main impact has been increased sensitivity to substance abuse issues of the patient, family and how it can affect the patient’s healthcare” (nursing student). Respondents expressed that SARET opened their eyes to opportunities for research and impressed upon them how new knowledge can inform their interactions with patients/clients in their respective fields: “The SARET program has increased my interest in continuing to research the impact of substance abuse on individuals, families and communities” (social work student); and the “SARET Program inspired me to conduct substance abuse research” (medical student). Increased self-efficacy at the research-clinical interface was evident as well, as expressed in this comment: “Certainly this enhanced my skill set and it helped me to apply for a job as a new grad NP in a position where I see both clinic patients as well as research participants. Without SARET, I would not have had these additional skill sets” (nursing student).

The impact of SARET’s inter-professional emphasis was evident in responses such as: “I think the most wonderful thing about SARET is learning to work with students from different backgrounds who are all studying a common subject” (dentistry student); and “increased my comfort level with seeking out multi-disciplinary projects” (nursing student). Some respondents saw the SARET experience as influencing their future engagement in research: “inspired me to conduct substance abuse research” (nursing student). Responses also indicated that SARET affected participants’ clinical work: “respect for the experience

of addiction, decreased stigma towards substance dependence and treatment, more able to empathize with those battling addiction” (medical student).

Scholarly work

Participants in SARET’s mentored research program have published substantially in the field of SUD research, including (to date) 23 peer-reviewed articles, and 28 oral and poster presentations at national meetings. A significant body of other (non-SUD-related) publications has been generated by SARET graduates as well. Six SARET participants have received subsequent research funding or travel awards to national SUD meetings on the strength of their accepted presentations. A medical student won the award for best abstract at the 2015 Association for Medical Education and Research in Substance Abuse (AMERSA) national meeting.

Conclusion

SARET, a multi-faceted, comprehensive, and readily adopted modular digital curriculum, stimulates SUD clinical and research interest among students of medicine, dentistry, nursing, and social work. It has successfully been implemented in a tailored and flexible manner across an array of institutions and curriculum structures. An iBook format adds flexibility and will likely further expand its reach.

The scholarly engagement and productivity of the health professional students who participated in the intensive mentored research component of the program has been substantive. The research experience has not only improved students’ knowledge and attitudes about SUD research but meaningfully influences career paths of students from all disciplines. While participating students are a select group in having chosen this experience, many attribute their ongoing engagement in research in general and in SUD research in particular to their experience with SARET.

Our study has several limitations. All of the mentored research summer program students are drawn from a single university in New York City, limiting the generalizability of this component of the program. Since we do not have a control group of students who did not take or complete the modules, we cannot definitively attribute students increased interest in SUD to engagement with the SARET curriculum. Nonetheless, the post-survey was completed immediately after completion of the module, and it is unlikely that other factors influenced students’ responses so consistently. While we were able to track mentorship participants over time, they are a self-selected group of students with high interest in SUD and are for the most part still relatively early in their careers.

Longer-term follow-up will allow us to assess the ultimate impact of SARET participation on career path, but the accumulating evidence already suggests that more widespread adoption and implementation will continue to increase future health professionals’ awareness of and readiness to address substance use disorders and related research.

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REFERENCES

1. Medicine Io, Sciences NAO, Engineering NAO. Facilitating Interdisciplinary Research. Washington, DC: The National Academies Press; 2005.
2. Medicine Io. Improving the Quality of Health Care for Mental and Substance-Use Conditions: Quality Chasm Series. Washington, DC: The National Academies Press; 2006.
3. Case A, Deaton A. Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. *Proc Natl Acad Sci U S A*. 2015;112(49):15078–15083. [PubMed: 26575631]
4. Weisner C, McLellan T, Barthwell A, et al. Report of the Blue Ribbon Task Force on Health Services Research at the National Institute on Drug Abuse. Rockville, MD: National Institute on Drug Abuse 2004.
5. McLellan AT, Starrels JL, Tai B, et al. Can substance use disorders be managed using the chronic care model? Review and recommendations from a NIDA Consensus Group. *Public health reviews*. 2013;35(2):8.
6. NIDA. Mentoring: A Guide for Drug Abuse Researchers National Institute on Drug Abuse website <https://www.drugabuse.gov/publications/mentoring-guide-drug-abuse-researchers> 2009.
7. Lindqvist S Framework for Action on Interprofessional Education & Collaborative Practice. WHO Report. 2015.
8. Panel IECE. Core competencies for interprofessional collaborative practice: 2016 Update. 2016.
9. Campbell AN, Back SE, Ostroff JS, et al. Addiction Research Training Programs: Four Case Studies and Recommendations for Evaluation. *Journal of addiction medicine*. 2017;11(5):333–338. [PubMed: 28590393]
10. Wilkey C, Lundgren L, Amodeo M. Addiction training in social work schools: A nationwide analysis. *Journal of Social Work Practice in the Addictions*. 2013;13(2):192–210.
11. Russett JL, Williams A. An exploration of substance abuse course offerings for students in counseling and social work programs. *Substance abuse*. 2015;36(1):51–58. [PubMed: 25010520]
12. Wood E, Samet JH, Volkow ND. Physician education in addiction medicine. *JAMA*. 2013;310(16):1673–1674. [PubMed: 24150462]
13. Kalfoglou AL, Sung NS. What inspires clinical research trainees and keeps them on the path? *J Investig Med*. 2002;50(6):408–411.
14. Fang D, Meyer RE. Effect of two Howard Hughes Medical Institute research training programs for medical students on the likelihood of pursuing research careers. *Acad Med*. 2003;78(12):1271–1280. [PubMed: 14660432]
15. Solomon SS, Tom SC, Pichert J, Wasserman D, Powers AC. Impact of medical student research in the development of physician-scientists. *J Investig Med*. 2003;51(3):149–156.
16. Truncali A, Kalet AL, Gillespie C, et al. Engaging Health Professional Students in Substance Abuse (SA) Research: Development and Early Evaluation of the SARET Program. *Journal of addiction medicine*. 2012;6(3):196–204. [PubMed: 22864401]
17. Tuchman E, Hanley K, Naegle M, More F, Bereket S, Gourevitch MN. Integration and Evaluation of Substance Abuse Research Education Training (SARET) into a Master of Social Work program. *Substance Abuse*. 2017:1–7.

18. Levinson W, Gordon G, Skeff K. Retrospective Versus Actual Pre-Course Self-Assessments. *Evaluation & the health professions*. 1990;13(4):445–452.

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Figure 1:
Module Completions by year illustrate the dissemination and uptake of SARET's web-based curriculum

Figure 2:
Students' change in interest in SUD research by module

Figure 3:
Students' change in interest in SUD research by discipline

Table 1:

SARET Web-based Modules

Module	Description
Exploring SUD Research	Features NIDA-funded investigators discussing how they tackle challenging problems in substance use disorders through research, and introduces learners to framing research questions. Goal is to activate interest in the field and in the other modules.
Personal Impact	Details the development of alcohol dependence in a man with a family history of alcohol use disorder. Introduces concepts of diagnostic criteria and risk factors for SUD, and teaches the concept of formulating a research question in the population/intervention/comparison/outcome (PICO) format.
Epidemiology	Focuses on population data, introduces basic epidemiology concepts, and explores causality vs. association using the controversy about marijuana as a gateway drug.
Neurobiology	Relates behavior of a cocaine-dependent man to the drug's neurophysiology. Describes reward circuitry, cue development and executive dysfunction. Investigators discuss the impact of bench research on treatment of SUD.
Screening	Reviews criteria for evaluating the effectiveness of screening for a condition and considers the case for routine screening for illicit drugs and alcohol. In-depth teaching of clinical epidemiologic concepts of sensitivity, specificity, and predictive value.
Treatment Modalities	Reviews treatment modalities, including pharmacotherapy and talk therapy. Presents case of patient with prescription opioid dependence, reviews opioid agonist treatment effectiveness, and addresses use of RCTs and observational trials to test and compare treatments.

Table 2:

Curricular integration of SARET modules

Module	Course(s) into which module was integrated, by participating NYU School
Exploring SUD Research	Dentistry: Professionalism & Ethics in Healthcare (PEH) Nursing: Professional Nursing (PN); Substance Abusing Client (SAC); Pop-Focused Nursing Social Work: Clinical Practice w SUD (CPSA); Evidence-Based Mental Health Practice (EBMHP); Substance Abuse & Co-occurring Disorders (SACOD); SW Research I (SWR I)
Personal Impact	Medicine: Practice of Medicine (PoM); Ambulatory Care Clerkship; Summer Undergraduate Research Program Dentistry: PEH Nursing: SAC; Contemporary Clinical Practice: Advanced Practice Roles Social Work: CPSA; EBMHP; SACOD; SWR I
Epidemiology	Medicine: Addiction “Inter-Clerkship Intensive” (AICI) Nursing: Population Focused Care Social Work: CPSA; SACOD; SWR I
Screening	Medicine: PoM; AICI Dentistry: Multidisciplinary Practice Nursing: PN; Mental Health Across the Lifespan (MHAL), Psychiatric Nursing (PsyN) Social Work: CPSA; EBMHP; SACOD; SWR I; SW Practice I (SWP I); Behavioral Health
Neurobiology	Medicine: Neuroscience (NS) Nursing: MHAL, SAC, Advanced Pathophysiology I and II Social Work: CPSA; SACOD; SWR I
Treatment Modalities	Medicine: AICI Nursing: PsyN; SAC Social Work: CPSA; EBMHP; SACOD; SWR I; Social Work Practice II

Table 3

% Percentage of students with increased interest – by module

% of students with increased in interest – by module			
Module	N=4049	Est. (%)	Conf. Interval
Treatment	263	36	33–39
Epidemiology	404	44	42–47
Personal Impact	849	48	46–49
Screening	120	48	44–53
Neurobiology	1294	50	48–51
Exploring	1119	57	56–59

Table 4

% Percentage of students with increased interest – by discipline

% of students with increased interest – by discipline			
Discipline	N=4049	Est. (%)	Conf. Interval
Dentistry	1402	61	59–62
Medicine	1332	44	43–46
Nursing	828	40	38–41
Social Work	398	53	50–55
Other	53	53	46–60