NIAAA's College Alcohol Intervention Matrix

CollegeAIM

Jessica M. Cronce, Traci L. Toomey, Kathleen Lenk, Toben F. Nelson, Jason R. Kilmer, and Mary E. Larimer

The College Alcohol Intervention Matrix (CollegeAIM) is a user-friendly, interactive decision tool based on a synthesis of the substantial and growing literature on campus alcohol use prevention. It includes strategies targeted at both the individual and environmental levels. Commissioned by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), CollegeAIM reflects the collective knowledge of 16 separate experts in the field, which makes it unique relative to other summaries of the science. CollegeAIM is designed to help college stakeholders compare and contrast different evidence-based prevention strategies to select a mix of individual and environmental strategies that will work best on and around their campuses. CollegeAIM is a living document, which will be updated to keep pace with the science. Colleges are therefore encouraged to ensure that evaluations of individual- or environmental-focused strategies on their campuses or in their communities make it into the published literature.

Key words: CollegeAIM; college drinking; literature review; prevention; research; underage drinking

Most students (81.4%) have consumed alcohol on at least one occasion by the time they reach college or at some point during their college career.[1] Many college students (63.2%) report alcohol consumption within the past 30 days, with 38.4% reporting "being drunk" at least once during that same time frame.[1] Rates of heavy episodic drinking (i.e., binge drinking), defined in this sample as consuming five or more drinks in a row on at least one occasion in the past 2 weeks for both men and women, roughly mirror the reported rates of being drunk (31.9%).[1]

Of course, students who engage in binge drinking may do so more than once during a 2-week period. In fact, Wechsler and colleagues found that, of the 43% of students who said they engaged in binge drinking (defined in this study as four or more drinks in a row for women or five or more drinks in a row for men during the past 2 weeks), nearly half reported three or more such occasions (44%, or 19% of the total sample).[2] In this study, frequent binge drinking was associated with a host of negative health and social consequences and other risk behaviors, including missing class (53.8%), driving after drinking (40.6%), or engaging in unplanned (49.7%) or unprotected (52.3%) sex (percentages represent the proportion of individuals engaging in frequent binge drinking that endorsed experiencing each consequence). These behaviors have long-term consequences that students can readily identify, including academic failure, injury, legal complications, sexually transmitted disease, and death. Binge drinking also has lasting effects on the brain that produce less recognizable consequences, such as impaired working memory and other changes in mental processes that may be less apparent to the individual engaging in binge drinking or others as long as the person is generally functional, but which nonetheless may derail or impair optimal development.[3] The prevalence of binge drinking, paired with the significant potential for both short-term and lasting harm, is why prevention is paramount in this population.

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) is at the forefront of efforts to prevent underage and harmful alcohol use among college students. NIAAA funds research to develop and evaluate prevention strategies

Jessica M. Cronce, Ph.D., is an assistant professor in the Department of Counseling Psychology and Human Services, College of Education, University of Oregon, Eugene, Oregon.

Traci L. Toomey, Ph.D., is a professor in the Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota.

Kathleen Lenk, M.P.H., is a senior research fellow in the Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota.

Toben F. Nelson, Sc.D., is an associate professor in the Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota.

Jason R. Kilmer, Ph.D., is an assistant director of Health and Wellness for Alcohol and Other Drug Education and an associate professor in the Department of Psychiatry and Behavioral Sciences, School of Medicine, University of Washington, Seattle, Washington.

Mary E. Larimer, Ph.D., is a professor in the Department of Psychiatry and Behavioral Sciences, School of Medicine, University of Washington, Seattle, Washington.

and creates dissemination tools to put evidence-based prevention approaches into the hands of college stakeholders.

In 2002, NIAAA's Task Force on College Drinking released a report, *A Call to Action: Changing the Culture of Drinking at U.S. Colleges*, outlining the state of alcohol misuse and prevention science in this area.[4] The report included specific recommendations to help colleges and universities determine which strategies were most likely to produce meaningful changes in alcohol use and consequences on their campuses. The Task Force categorized strategies into one of four tiers, based on evidence of their effectiveness and the nature of the evidence available. The strategies that met criteria for inclusion in Tier 1 had evidence of effectiveness among college students and were individual-focused strategies shown to reduce high-risk drinking behavior and/or negative drinking-related consequences. The strategies that met criteria for inclusion in Tier 2 had evidence of success with general populations and could be applied to college environments, but had not been specifically tested with college students. The multiple strategies assigned to Tier 2 were all environmental in nature, targeting the student body as a whole. Tier 3 strategies were defined as, and comprised, strategies that had logical and theoretical promise but had not been fully evaluated. Tier 4 comprised strategies where there was evidence of ineffectiveness.

In 2004, NIAAA mailed the 2002 report to the president of every college and university in the United States and made it available at no cost to anyone who requested a print copy. The report also was made available online on a dedicated website, www.collegedrinkingprevention.gov, along with a host of resources and supporting documentation.

In 2008, Nelson and colleagues assessed the influence of these dissemination efforts and found that 23% of colleges were not employing any recommended Tier 1 or Tier 2 strategies, and 45% were only employing a single recommended strategy.[5] Two-thirds of institutions surveyed offered a Tier 1 strategy (67%), but most did not report implementing any recommended Tier 2 strategies. This suggests a trade-off between individual and environmental approaches. One possible reason for this is that environmental approaches often are not self-contained within the campus and rely on building partnerships with local law enforcement, businesses within the community, community members, and lawmakers. It also is possible that the tier system created a false hierarchy, making individual strategies assigned to Tier 1 appear more effective than environmental strategies assigned to Tier 2, simply because the latter had not been tested specifically within college populations. This, of course, was not the intent of the tier system, as stated in a report on college drinking research: "Central to the Task Force findings was the recognition that successful interventions occur at three distinct levels . . . [that] must operate simultaneously to reach individual students, the student body as a whole, and the greater college community."[6] Thus, dissemination efforts need to adopt organizational structures that make readily apparent the importance of employing both individual and environmental strategies as part of an overall prevention approach.

CollegeAIM

In the 10 years following the 2002 publication of *A Call to Action*, there was an explosion of research on college alcohol use prevention. There were more than 151 studies published just on individual-focused approaches between 2002 and 2012, compared with only 45 in all the years before 2002.[7-10] This exponential increase in the available science prompted a re-evaluation of the Task Force recommendations: What did the science say about the effectiveness of the recommended strategies now? What new strategies had been shown to be effective and should be added to the list? Was the information provided as part of the original recommendations sufficient for colleges to effectively weigh their options, thus adequately supporting adoption and implementation of evidence-based approaches?

NIAAA had these questions in mind when it commissioned and oversaw creation of CollegeAIM, tapping the expertise of two teams of three researchers: a team at the University of Washington examining individual-focused strategies, and a team at the University of Minnesota examining environmental-focused strategies. Both teams worked together to create a comprehensive list of the practical factors that colleges would likely want to consider when choosing an evidence-based approach, including amount of research support, cost, and potential barriers to adoption and implementation. Each team then reviewed the extant research in their area through 2012, rating each strategy that met their inclusion criteria. For the individual-focused strategies, inclusion criteria required that a strategy had been the subject of at least two peer-reviewed, randomized, controlled clinical trials. In addition, a strategy could only be rated on effectiveness if there were at least three trials. For the environmental-focused strategies, ratings were based on review articles, when available, and all identified studies in other areas.

After the teams completed the ratings, they sent them to 10 leading experts within the alcohol prevention field for multiple rounds of peer review. The teams made edits (e.g., adding specific studies from 2013 that would inform ratings and clarifying how ratings were applied) until they achieved consensus across the teams and reviewers. Thus, CollegeAIM reflects the collective knowledge of 16 separate experts in the field (see Table 1), which makes it unique relative to other summaries of the science.

CollegeAIM is organized into two matrices, one summarizing individual-focused strategies and one summarizing environmental-focused strategies, divided into levels of effectiveness and cost. Each matrix also has a companion table that offers more in-depth information on the specific strategies. CollegeAIM also helps colleges consider both individual and environmental strategies by including a planning worksheet that facilitates a direct comparison of

Table 1 CollegeAIM Contributors

Individual-Focused Strategies Team

- Jessica M. Cronce, Ph.D., assistant professor of psychiatry and behavioral sciences, School of Medicine, University of Washington
- Jason R. Kilmer, Ph.D., associate professor of psychiatry and behavioral sciences, School of Medicine; assistant director of health and wellness for alcohol and other drug education, University of Washington
- Mary E. Larimer, Ph.D., professor of psychiatry and behavioral sciences, School of Medicine; director, Center for the Study of Health and Risk Behaviors; and professor, Department of Psychology, University of Washington

Environmental-Focused Strategies Team

- Kathleen Lenk, M.P.H., senior research fellow, Division of Epidemiology and Community Health, School of Public Health, University of Minnesota
- Toben F. Nelson, Sc.D., associate professor of epidemiology and community health, School of Public Health, University of Minnesota
- Traci L. Toomey, Ph.D., professor of epidemiology and community health, School of Public Health, University of Minnesota

Independent Reviewers

- David S. Anderson, Ph.D., professor of education and human development; director, Center for the Advancement of Public Health, George Mason University
- Kate B. Carey, Ph.D., professor of behavioral and social sciences, Center for Alcohol and Addiction Studies, School of Public Health, Brown University
- John D. Clapp, Ph.D., associate dean for research, College of Social Work; director, Higher Education Center for Alcohol and Other Drug Misuse Prevention and Recovery, The Ohio State University
- William DeJong, Ph.D., professor, School of Public Health, Boston University
- Mark S. Goldman, Ph.D., distinguished university professor of psychology, University of South Florida
- Ralph Hingson, Sc.D., M.P.H., director, Division of Epidemiology and Prevention Research, NIAAA
- Donald Kenkel, Ph.D., Joan K. and Irwin M. Jacobs professor of policy analysis and management, College of Human Ecology, Cornell University
- Robert F. Saltz, Ph.D., senior scientist, Prevention Research Center, Pacific Institute for Research and Evaluation
- Helene R. White, Ph.D., distinguished professor of sociology, Rutgers, The State University of New Jersey
- Mark Wolfson, Ph.D., professor of social sciences and health policy, School of Medicine, Wake Forest University

Note: Contributors are listed in alphabetical order by surname. Affiliations are current as of the launch of CollegeAIM in September 2015. Jessica M. Cronce, Ph.D., is now assistant professor of counseling psychology and human services, College of Education, University of Oregon.

strategies along the various rated factors, both across and within these two broad categories. Although CollegeAIM is largely a selection tool, institutions can use the planning worksheet to organize assessment of currently employed prevention strategies. CollegeAIM urges stakeholders to "see if any new, effective approaches might replace . . . existing strategies."[11] Information in the online version of CollegeAIM directs users to outside resources that can assist with planning and taking action to adopt, implement, and evaluate a given strategy. Each of these steps is necessary for effective campus prevention. Evaluation is of particular importance, since local realities (e.g., differences in campus and community culture, available staff) may influence how effective a strategy actually is on a given campus. A college or university's experience may diverge (for better or worse) from the effectiveness rating in CollegeAIM, which is based on the observed aggregate effect across the campuses and communities where they were tested.

Individual-Focused Strategies

CollegeAIM identified 14 strategies as having some effectiveness in the individual-focused strategy matrices. Of these, the researchers deemed 8 to have higher effectiveness, based on the requirement that 75% or more of the studies evaluating a given strategy reported a reduction in alcohol use and/or alcohol-related consequences. Consistent with *A Call to Action*, the science supported multicomponent alcohol skills training that includes information on what constitutes a standard drink, how to calculate and moderate blood alcohol concentration through protective behavioral strategies such as monitoring and setting limits on consumption, how alcohol outcome expectancies shape behavior following alcohol use, and how perceptions of other people's drinking influences personal drinking. This approach is typified by the Alcohol Skills Training Program (ASTP),[12] which is generally delivered to small groups of students. The ASTP was the precursor to the Brief Alcohol Screening and Intervention for College Students (BASICS),[13] which is the basis for the majority of current brief motivational interventions (BMIs). BMIs are generally one-on-one sessions facilitated by a professional in training (i.e., a graduate student in psychology) or professional (e.g., a master's- or doctoral-level counselor) using personalized feedback summarizing the student's alcohol-related behaviors, beliefs, and experiences to guide the conversation. Although limited research has examined whether undergraduate students (e.g., peer health educators) can deliver BMIs effectively, results are generally favorable; however, there is not enough evidence to conclusively determine the conditions under which peers are as effective as professionals. One factor that is thought to be central to the efficacy of BMIs is fidelity to a motivational interviewing (MI) style,[14] which requires regular supervision and review of taped or audio-recorded sessions that have been rated for adherence to the therapeutic spirit and skills of MI. That said, four of the eight highly effective programs are delivered entirely remotely, in the absence of an MI-trained facilitator.

Relative to BMIs, these nonfacilitated programs have been found to be comparable on most outcomes,[7] although in-person BMIs may hold an advantage over feedback-only

programs in terms of reducing alcohol quantity and negative consequences.[15] Two of these four programs are considered personalized feedback interventions (PFIs), which offer the feedback from a BASICS session delivered online, by email or text, or by mail. It is worth noting that some individual-focused strategies that would be considered PFIs are included as having "too few studies to rate effectiveness," since only two studies had been published when CollegeAIM was launched. Given the success of generic PFIs, as well as eCHECKUP TO GO (the only named and commercially available PFI with higher effectiveness), more research on these approaches is warranted. Another commercially named program rated as having higher effectiveness—AlcoholEdu for College—contains personalized feedback but is not considered a PFI, because it incorporates a number of other interactive elements that go beyond merely providing feedback.

The fourth remotely delivered program constitutes a single component of a PFI: correcting normative misperceptions of peer alcohol use in relation to the individual's own alcohol use, that is, personalized normative feedback (PNF). PNF in the form of birthday cards have been used to target 21st-birthday drinking, a known high-risk drinking event for many students; however, this use of PNF has had overall lower effectiveness.

The final two strategies rated as having demonstrated higher effectiveness include goal/intention setting alone and self-monitoring/self-assessment of drinking alone. Both of these strategies often are a part of the other strategies listed above; however, like PNF, these are considered single-component interventions that, in the absence of other elements, decrease student drinking. As their names imply, the former involves helping students set goals or intentions that are contrary to high-risk drinking, while the latter requires students to complete a one-time assessment or longitudinal daily monitoring of their drinking behavior. Assessment is necessary to create the feedback used for BMIs, PFIs, and PNFs, and creates an opportunity for self-reflection that is thought to be amplified by the associated feedback.

Environmental-Focused Strategies

CollegeAIM identified 19 strategies as having some degree of effectiveness in the environmental-focused strategy matrices. Of these, 5 were deemed to have high effectiveness: retaining the minimum legal drinking age (MLDA) of 21, enforcing the MLDA, increasing taxes on alcohol, retaining a ban on Sunday alcohol sales, and enacting bans on happy hours and other price promotions. Retaining the MLDA of 21 remains one of the most highly effective environmental interventions at the population level in terms of reducing alcohol consumption and alcohol-related fatalities.[16] Retaining the MLDA is beyond the control of any given college, but colleges can describe and promote the existing evidence on the effectiveness of the MLDA and work with community coalitions to ensure the drinking age is not lowered. Furthermore, retaining MLDA laws alone is not sufficient; the MLDA must be enforced through mechanisms such as underage compliance checks. Colleges can directly encourage local law enforcement agencies to regularly conduct compliance checks at alcohol establishments most likely to be frequented by their underage students. Increasing taxes on alcohol sales, retaining a ban on Sunday alcohol sales (if applicable), and bans on happy hours or other price promotions are all policies enacted at the state or local levels. Colleges can partner with other organizations or coalitions that influence policymakers to implement or retain these policies. In addition, college representatives can talk individually with local bars and other venues near campus that serve alcohol and ask them to restrict happy hours and other price promotions. Bars surrounding a campus may attempt to attract students to their establishments by underbidding nearby competitors, which can create a dangerous situation that promotes heavy consumption (e.g., buying one drink and getting one for a discounted price, or promoting discounted shots).

Conclusions

NIAAA developed CollegeAIM to offer colleges and universities an array of evidence-based options to address alcohol use on their campuses. Because the evidence changes with more scientific study, CollegeAIM is necessarily a living document, and NIAAA has committed to updating it every few years for the foreseeable future. The next update is planned for the fall of 2018, reviewing literature published through December 2017. Campus stakeholders are encouraged to facilitate future iterations of CollegeAIM by ensuring that evaluations of individual- or environmental-focused strategies on their campuses or in their communities make it into the published literature. Campus alcohol and drug prevention staff members could partner with graduate students and faculty at their own or nearby institutions to conduct the evaluations and collaborate on the publications. Graduate students, in particular, may be a valuable resource, since they need data for theses and dissertations, and they may therefore be willing and able to contribute time to evaluate the strategies in exchange for use of the data. It is, of course, just as important to publish what doesn't work as what does. CollegeAIM also is meant to help colleges learn what strategies are not effective, to avoid wasting resources.

In sum, CollegeAIM is a user-friendly, interactive decision tool based on a synthesis of the substantial and growing literature on campus alcohol use prevention, including strategies targeted at the individual and environmental levels. It is designed to be a strategy selection tool; however, it also offers resources to aid in strategy planning, implementation, and evaluation. The goal of CollegeAIM is to help colleges and communities use their limited resources in the most cost-effective way possible. The hope is that by using a combination of effective individual- and environmental-focused

strategies, colleges can create sustained reductions in risky alcohol use and related problems among their students.

Acknowledgments

This work was supported by NIAAA.

Financial Disclosure

The authors declare that they have no competing financial interests.

References

1. Johnston LD, O'Malley PM, Bachman JG, et al. *Monitoring the Future National Survey Results on Drug Use, 1975–2015.* Vol 2. College students and adults ages 19–55. Ann Arbor, MI: Institute for Social Research, University of Michigan 2016. http://monitoringthefuture.org/pubs/monographs/mtf-vol2_2015.pdf. Accessed July 31, 2017.
2. Wechsler H, Molnar B, Davenport A, et al. College alcohol use: A full or empty glass? *J Am Coll Health.* 1999;47(6):247-252. PMID: 10368558.
3. Courtney KE, Polich J. Binge drinking in young adults: Data, definitions, and determinants. *Psychol Bull.* 2009;135(1):142-156. PMID: 19210057.
4. Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institutes of Health. *A Call to Action: Changing the Culture of Drinking at U.S. Colleges.* Bethesda, MD: U.S. Department of Health and Human Services; April 2002. https://www.collegedrinkingprevention.gov/NIAAACollegeMaterials/publications/calltoaction.aspx. Accessed July 31, 2017.
5. Nelson TF, Toomey TL, Lenk KM, et al. Implementation of NIAAA College Drinking Task Force recommendations: How are colleges doing 6 years later? *Alcohol Clin Exp Res.* 2010;34(10):1687-1693. PMID: 20626728.
6. NIAAA, National Institutes of Health. *What Colleges Need to Know Now: An Update on College Drinking Research.* Bethesda, MD: U.S. Department of Health and Human Services; November 2007. https://www.collegedrinkingprevention.gov/media/1College_Bulletin-508_361C4E.pdf. Accessed July 31, 2017.
7. Cronce JM, Larimer ME. Individual-focused approaches to the prevention of college student drinking. *Alcohol Res Health.* 2011;34(2):210-221. PMID: 22330220.
8. Larimer ME, Cronce JM. Identification, prevention and treatment: A review of individual-focused strategies to reduce problematic alcohol consumption by college students. *J Stud Alcohol.* 2002;(suppl 14):148-163. PMID: 12022721.
9. Larimer ME, Cronce JM. Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addict Behav.* 2007;32(11):2439-2468. PMID: 17604915.
10. NIAAA, National Institutes of Health. *CollegeAIM Alcohol Intervention Matrix: Individual-Level Strategies.* Bethesda, MD: U.S. Department of Health and Human Services; 2015. https://www.collegedrinkingprevention.gov/CollegeAIM/IndividualStrategies/default.aspx. Accessed July 31, 2017.
11. NIAAA, National Institutes of Health. *Planning Alcohol Interventions Using NIAAA's CollegeAIM Alcohol Intervention Matrix.* Bethesda, MD: U.S. Department of Health and Human Services; 2015. https://www.collegedrinkingprevention.gov/CollegeAIM/Resources/NIAAA_College_Matrix_Booklet.pdf. Accessed July 31, 2017.
12. Baer JS, Marlatt GA, Kivlahan DR, et al. An experimental test of three methods of alcohol risk reduction with young adults. *J Consult Clin Psychol.* 1992;60(6):974-979. PMID: 1460160.
13. Dimeff LA, Baer JS, Kivlahan DR, et al. *Brief Alcohol Screening and Intervention for College Students (BASICS): A Harm Reduction Approach.* New York, NY: Guilford Press; 1999.
14. Miller WR, Rollnick S. *Motivational Interviewing: Helping People Change.* New York, NY: Guilford Press; 1992.
15. Carey KB, Scott-Sheldon LA, Elliott JC, et al. Face-to-face versus computer-delivered alcohol interventions for college drinkers: A meta-analytic review, 1998 to 2010. *Clin Psychol Rev.* 2012;32(8):690-703. PMID: 23022767.
16. Wagenaar AC, Toomey TL. Effects of minimum drinking age laws: Review and analyses of the literature from 1960 to 2000. *J Stud Alcohol.* 2002;(suppl 14):206-225. PMID: 12022726.