Effective Substance Use Harm Reduction Interventions on College Campuses: A Scoping Review

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Abstract

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Objective: Harm reduction is an evidence-based approach to mitigate the risks associated with certain behaviors. A feasible solution for meeting college students where they are, harm reduction equips students with knowledge and resources in the event they choose to engage in alcohol or illicit drug use. This review summarizes what is known from the existing literature about the effectiveness of harm reduction interventions on college campuses related to substance use.

Methods: A scoping review was conducted on effective harm reduction interventions on college campuses. The literature search utilized three databases: PubMed, Embase, and Grey Literature Report. Effectiveness was assessed using the Center for Disease Control's Continuum of Evidence of Effectiveness (well-supported, supported, promising).

Results: 52 primary articles were included in this review after being screened. Interventions were grouped and analyzed by type. As much of the available literature discussed alcohol and marijuana use, there is a scarcity of interventions related to other substances.

Conclusions: This review summarizes the evidence of effective harm reduction interventions for college students. Current research establishes a variety of program initiatives for colleges to successfully address and treat alcohol and illicit drug use on campus. There is a need for evaluating the long-term effects of these interventions and substances other than alcohol and marijuana.

Introduction

Entering college is a significant life event for many young adults. While this time can encourage self-exploration and independence, many habits can develop or intensify during this transition into adulthood without direct parental oversight (Welsh et al., 2019). Affiliation with Greek life, academic pressure, and peer pressure are just a few contributing factors to this population's high rates of alcohol and illicit drug use (Welsh et al., 2019). In 2020, the percentage of illicit drug use in the past year was highest (37.0 percent or 12.4 million people) and alcohol consumption in the past month was second highest (51.5 percent or 17.3 million people), among those 18 to 25 years old compared to other age groups (Center for Behavioral Health Statistics, 2021).

During the 1980s, zero-tolerance policies were introduced as a one-sided approach to drug enforcement in response to the War on Drugs (Windham & Grittner, 2018). In the 1990s, these policies became widely adopted in schools as a policy or mandate of the application of predetermined consequences, most often severe and punitive in nature, that were intended to be applied regardless of the seriousness of behavior, mitigating circumstances, or situational context (Skiba et al., 2006). Although zero-tolerance policies have no set definition, their universal goal in school settings assumes that by removing students who engage in disruptive behavior will deter others from disruption, and create an improved climate for those students who remain (Skiba et al., 2006). However, research has shown that the opposite happens when individuals are forced to abide by such rules - the behavior that is strictly regulated increases rather than decreases (American Psychological Association, 2006). In particular, institutions of higher education that embrace the notion of a "Drug-Free Campus" enhance formal disciplinary measures and surveillance by colleges, thus, potentially causing more harm to students than good (Garius, 2021).

Social norms associated with the college environment primarily include alcohol and illicit drug use (e.g., marijuana which has now been legalized in several US states) (Kollath-Cattano et al., 2020; Lewis & Neighbors, 2006). The "normalization" of such behaviors has resulted in schools taking on a harm reduction approach to developing and implementing interventions along with other related programs that teach students about the harms associated with various alcohol- and illicit drug- use and attempt to encourage behavior and attitude changes surrounding these activities.

Harm reduction is an umbrella term for reasonable strategies and interventions aimed to reduce the problematic effects of behaviors (Logan & Marlatt, 2010). Examples of these strategies include safer use, managed use, meeting people who use drugs "where they are at," and addressing conditions of use as well as the use itself (National Harm Reduction Coalition, n.d.) without having to commit to complete abstinence until the individual is ready.

In 2004, The Office of National Drug Control Policy released a policy memo on methods to reduce alcohol and drug use on college campuses. This memo incorporated targeted information and recommendations for college administrators and included a selection of approaches colleges had effectively implemented (The Office of National Drug Control Policy, 2004). Most recently in 2016, the U.S. Surgeon General released a report on alcohol, drugs, and health. This report incorporated both public health and harm reduction approaches to highlight the importance of prevention interventions and treatment for policymakers, health care professionals, and the general public, including parents and academic institutions (Substance Abuse and Mental Health Services Administration (US) & Office of the

Surgeon General (US), 2016). Today, many of these strategies and recommendations are still utilized, evidenced by the results of this scoping review. Now more than ever, the call for harm reduction practices is being acknowledged and justified. This review intends to build on current knowledge by identifying effective harm reduction interventions for substance use on college campuses and gaps in the existing literature, which may lead to opportunities for future research and analysis.

Methods

This scoping review followed Arskey and O'Malley's (2005) 5-step process: (1) identify the research question, (2) identify relevant studies, (3), study selection, (4) chart the data, (5) collate, summarize, and report the results (Arksey & O'Malley, 2005).

Eligibility Criteria

The inclusion and exclusion criteria were developed once the research question and key search terms were established. Harm reduction is a term that appeared in the 1980s to address the HIV/AIDS epidemic amongst intravenous drug users (Roe, 2005). Presently, harm reduction has become a widely recognized mechanism to address the health consequences of historically stigmatized behaviors such as sex, alcohol, and drug use; therefore, the results ranged across numerous intervention types and goals. Additionally, the Center for Disease Control's Continuum of Evidence of Effectiveness was heavily consulted during the screening and inclusion process. This tool enables researchers, practitioners, and policymakers to determine whether a prevention program, practice, or policy is achieving the outcomes it aims to by assessing the strength of evidence and effectiveness (Puddy & Wilkins, 2011). This scoping review only considered studies with high strength of evidence and high effectiveness (e.g., promising direction, supported, or well-supported). Studies were reviewed for eligibility following specific inclusion and exclusion criteria, which were revised in iterative steps before the final criterion was determined.

Table 1. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Language	Published in English	Studies published in other languages
Time Period	1971-2021	
Type of Article	Original research, published in a peer-reviewed journal or primary sources of grey literature	Articles that did not meet these criteria
Study Focus	Substance use by undergraduate students in higher education	
Literature Focus	Well-supported, supported, or promising harm reduction intervention targeting alcohol and/ or drug use	Ineffective harm reduction intervention targeting alcohol and drug use
Population and Sample	Traditional (4-year) or community college with at least 80% of participants between the ages of 18-25	All other students
Types of Substances	Alcohol and other drugs (e.g., marijuana, cocaine, phencyclidine (PCP), amphetamine, hallucinogens/psychedelics)	Tobacco

Information Sources
A total of three electronic databases were searched: PubMed, Embase, and Grey Literature Report, to identify peer-reviewed articles and primary sources of grey literature. The search and review of the literature were completed over the span of 4 months, from July 2021-October 2021. A small number of authors were contacted directly via email or ResearchGate to request additional information related to the effectiveness of their research or to request full-text versions of their research if the abstract was the only available record in the database. The majority of authors did not respond.

Search Strategy
Arskey and O'Malley (2005) suggest utilizing a comprehensive range of search terms to generate a broad coverage of available literature and to reduce the occurrence of relevant articles not appearing in the results (Arksey & O'Malley, 2005). Key search terms were initially developed by the author and refined in steps according to article results and in consultation with a University of Washington Public Health Librarian. Similar search strategies were utilized in the two scholarly databases, PubMed and Embase, but were adapted to the advantages of each database. In PubMed, MeSH (Medical Subject Headings) terms were used in combination with Title/Abstract [TIAB] terms to expand the search while keeping results relevant to the topic. Embase is a biomedical research database often considered an important supplement to PubMed in the health sciences (Frandsen et al., 2021). Emtree uses "Emtree terms" rather than MeSH terms. Grey Literature Report did not possess as thorough of an indexing tool as the other databases; thus, adjusting the search terms was necessary. Additionally, the search terms used in PubMed and Embase were not transferrable to the Grey Literature Report due to the database pulling zero results. To refine the search, a combination of one or two keywords was utilized per search, and the duplicative or irrelevant articles that did not meet the established inclusion criteria were removed.

To implement the guidance from Arskey and O'Malley (2005), relevant keywords and terms were grouped into four concepts: (1) harm reduction, (2) alcohol and other drugs, (3) population, and (4) setting. Grouping the key concepts while incorporating suitable terms allowed for an intentional and exhaustive search.

Table 2. Sample key search terms

Database	Concept	Search Terms
PubMed	Harm Reduction	("harm reduction"[MeSH] OR "harm reduction"[TIAB] OR "risk reduction behavior"[TIAB] OR "health knowledge, attitudes, practice"[TIAB] OR "health promotion"[TIAB] OR "preventive health services"[TIAB] OR "primary prevention"[TIAB] OR "health services research"[TIAB])
	Alcohol and other drugs	("substance-related disorders"[MeSH] OR "substance-related disorders"[TIAB] OR "alcoholic intoxication"[TIAB] OR "alcohol drinking"[TIAB] OR "marijuana smoking"[TIAB] OR "cannabis"[TIAB] OR "cocaine"[TIAB] OR "crack cocaine"[TIAB] OR "phencyclidine abuse"[TIAB] OR "amphetamine-related disorders"[TIAB] OR "addictive behavior"[TIAB] OR "recreational drug use"[TIAB] OR "Substance-Related Disorders/prevention and control"[MeSH] OR "Prescription Drug Misuse"[MeSH] OR

		"risk factors"[TIAB] OR "hallucinogens"[TIAB] OR "college drinking"[TIAB])
	Population	("young adult"[MeSH] OR "young adult"[TIAB] OR "young adult behavior"[TIAB] OR "students"[TIAB] OR "academic success"[TIAB] OR "adolescent"[MeSH] or "adolescent"[TIAB] OR "adolescent behavior"[TIAB] OR "young adult health"[TIAB] OR "adolescent health"[TIAB])
	Setting	("universities"[MeSH] OR "universities"[TIAB] OR "university"[TIAB] OR "postsecondary"[TIAB] OR "college"[TIAB])

Selection of Sources of Evidence
Reviewing the abstract only, 2,011 studies were identified across the three databases. Article duplicates were first removed, and next, the inclusion and exclusion criteria were applied to the remaining results. Fifty-two articles were identified as relevant to the research question and meeting the inclusion criteria. This vetting process was an opportunity to review and remove any sources that did not meet the inclusion criteria and to identify other potentially relevant literature listed in the source's reference list, including primary sources of grey literature. Due to the high volume of results amongst the databases, abstracts were solely reviewed for inclusion unless additional information was deemed necessary.

Data Collection Process
Data charting of selected articles was captured by Google Forms primarily for the system's ability to convert the form's responses into a Google Sheet (spreadsheet). Data extracted from each article included: title, author(s), year of publication, origin/country where research was conducted, aims/purpose, population and sample size, study design, intervention type and duration (if applicable), outcomes, limitations, and key findings that relate to the research question. Details of included studies are provided in the Appendix.
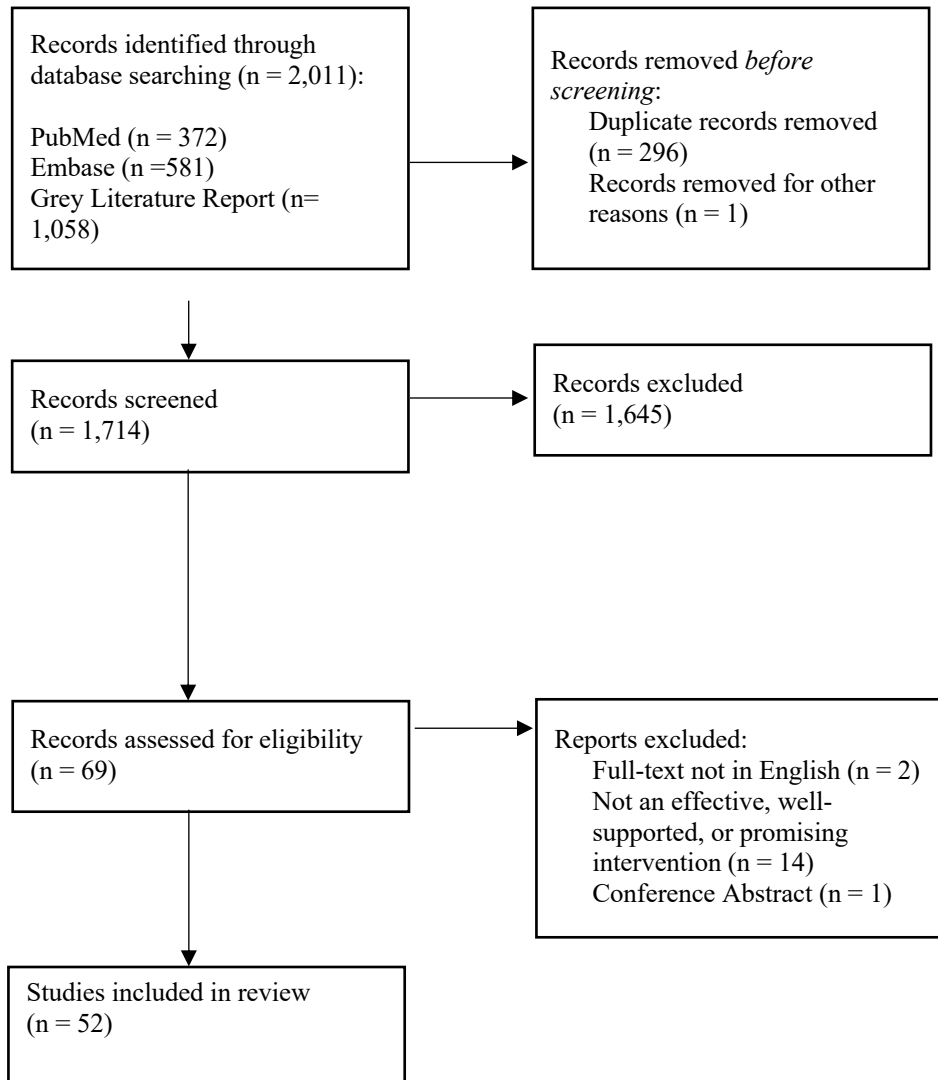
Synthesis of Results
For the purposes of the paper, it was decided that limitations would not be included in the data charting table since the focus of the research question is related to effective interventions.

Results
This scoping review yielded 52 articles from 7 countries; one conducted in Canada, one in The Netherlands, one in Thailand; one in New Zealand, one in Spain; one in the United Kingdom; and forty-six in the United States. The types of interventions varied and are presented in this section. The primary unit of analysis is intervention type and is organized into 19 categories.

Figure 1. PRISMA flow diagram of article selection process

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┌─────────────────────────────┐        ┌─────────────────────────────┐
│ Records identified through  │        │ Records removed before      │
│ database searching (n =     │───────▶│ screening:                  │
│ 2,011):                     │        │     Duplicate records       │
│                             │        │     removed (n = 296)       │
│ PubMed (n = 372)            │        │     Records removed for     │
│ Embase (n =581)             │        │     other reasons (n = 1)   │
│ Grey Literature Report (n=  │        │                             │
│ 1,058)                      │        │                             │
└─────────────────────────────┘        └─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐        ┌─────────────────────────────┐
│ Records screened            │───────▶│ Records excluded            │
│ (n = 1,714)                 │        │ (n = 1,645)                 │
└─────────────────────────────┘        └─────────────────────────────┘
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│ Records assessed for        │───────▶│ Reports excluded:           │
│ eligibility                 │        │     Full-text not in        │
│ (n = 69)                    │        │     English (n = 2)         │
│                             │        │     Not an effective, well- │
│                             │        │     supported, or promising │
│                             │        │     intervention (n = 14)   │
│                             │        │     Conference Abstract     │
│                             │        │     (n = 1)                 │
└─────────────────────────────┘        └─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Studies included in review  │
│ (n = 52)                    │
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1. Peer-Based

Two articles focused on peer-based involvement. The first article utilized a peer-led training program, and the second article assessed a peer drinking group motivational intervention (PD-GMI). The peer-led training program incorporated a harm-reduction approach to assess the ability of reducing risky alcohol behaviors among fraternity and sorority members. This approach showed promise in addressing alcohol-related outcomes (e.g., alcohol knowledge, decreases in drinking and driving, talking to friends about alcohol protective behavioral strategies (PBS), future use of PBS) among Greek chapters (Abadi et al., 2020).

A peer-drinking group motivational intervention (PD-GMI) sought to reduce hazardous alcohol consumption among a group of Thai male undergraduate students. In group sessions, students were

invited to discuss their drinking behaviors, engaged in facilitated discussions regarding alcohol's psychological and neurobehavioral effects, and encouraged to record personal and group commitments, goals, and activities to curb their own alcohol consumption. This intervention successfully increased students' awareness of risks associated with hazardous/harmful alcohol consumption, enhanced students' motivation to change their drinking behaviors, and encouraged harm reduction strategies during episodes of alcohol consumption (Pensuksan et al., 2010).

2. Campus Programming
The results yielded seven college programming interventions, including college-sponsored programming (residential programs and alcohol-free programming), mandated programs (disciplinary sanctions, such as education or counseling, for students who violate campus alcohol or drug policies (Carey et al., 2016)), and Curriculum Infusion (integration of preventative content into courses).

     a. College-Sponsored Programming
Two articles included residential programs on campus (typically targeted environments promoting behavior changes in students). The University of Vermont Wellness Environment (UVM WE) program was developed to improve academic performance and nurture life-long healthy habits by promoting a multidisciplinary, incentive-based behavioral change system to increase health-promoting behaviors and decrease substance misuse and abuse, among other issues faced by college students. By offering and incentivizing wellness, this program provided promising results in assisting students in having better academic and behavioral outcomes and fewer negative alcohol behaviors (Bai et al., 2019).

Rutgers University offers on-campus housing for students recovering from alcohol or drug dependence. Established in 1988, Rutgers Recovery House was the first of its kind on a campus college and continues to run as a 12-month on-campus housing option that affords students the same experiences as other students living in traditional residence halls. Residents in this community receive support from the Alcohol and Other Drug Assistance Program (ADAP) counselors and are provided with academic and career support. This program has shown effectiveness both inside and outside of the classroom, demonstrated by a community recovery rate of 95% and a 3.2 average GPA (Rutgers University Student Health, n.d.).

Regarded as a promising prevention program, LateNight Penn State (LNPS) assessed the association between program attendance and alcohol use among college students. LNPS provided students with a range of alcohol-free entertainment options during prime social times. For the specific local context, this was Thursday night (9:00 PM to Midnight), Friday night (9:00 PM to 2:00 AM), and Saturday night (9:00 PM to 2:00 AM). One of the program's primary goals was to provide students with alcohol-free alternatives to alcohol-related activities. Results of this study suggest that alcohol-free social programs may be an effective strategy for decreasing alcohol use on the days students attend these specific programs compared to other social events (Patrick et al., 2010).

     b. Mandated Programs
Student mandated alcohol programs presented two key findings: (1) some students have already made significant changes in their drinking at the onset of the violation (Morgan et al., 2008) and (2) when offered a choice of intervention, at-risk students mandated for campus alcohol violations are likely to

choose a more intensive and effective intervention if offered (Carey et al., 2013). Research suggests that mandated interventions may be more effective among this unique group when they incorporate and reinforce proven harm reduction strategies with a range of intensity (Morgan et al., 2008; Carey et al., 2013).

c. *Curriculum Infusion*

Two studies examined Curriculum Infusion (CI) as a method for affecting students' attitudes and behaviors about alcohol in a positive manner. A CI intervention blends alcohol and drug-related issues into the curriculum content of academic courses and is a common and effective approach for students. Findings show that CI can influence students' personal life choices and has the potential to reduce the harm associated with college students' alcohol use. Using the classroom as a vehicle by incorporating alcohol prevention into the curriculum further supports colleges and universities' missions since academics and student health are at the core of most, if not all, institutions (Cordero et al., 2010; Riley et al., 2005).

3. *Brief Motivational Intervention*

Five articles discussed Brief Motivational Interventions (BMI) as the primary or combined intervention method. Motivational interviewing (MI) effectively reduces high-risk drinking in college populations (Carey, Merrill, et al., 2018). Two of these studies focused on the Brief Alcohol and Screening Intervention for College Students (BASICS) program, the prototypical BMI for college drinking (Huh et al., 2015). The BASICS program addresses lifestyle changes over time using BMI versus promoting abstinence or a reduction in drinking by adopting a peer-based, person-centered approach that targets a range of high-risk behaviors (Dimeff LA et al., 1999). Findings show that poorly motivated college students with high-risk drinking behaviors respond well to BASICS because of this personal approach (Kazemi et al., 2011). Additionally, results demonstrate BASICS as a generally effective intervention for reducing drinking among college students, especially for male students and moderate- to high-risk drinkers (DiFulvio et al., 2012), and for students turning 21 years old, a time when alcohol consumption is at its peak (Neighbors et al., 2012).

The BMI programs have also shown effectiveness when applied in conjunction with other intervention methods, such as educational commitment (EC) activities (Bogg et al., 2019) and theories of behavior change (e.g., Readiness to Change (RTC), transtheoretical model (TTM) of intentional behavior change) (Kazemi et al., 2011).

4. *Protective Behavioral Strategies*

Protective behavioral strategies (PBS) are specific behaviors individuals can utilize to minimize the harmful consequences of alcohol consumption (Pearson, 2013) and drug use. One article examined whether the use of marijuana PBS can buffer or amplify the effects of several risks and protective factors that have been shown to relate to marijuana-related outcomes (e.g., use frequency and consequences) in college students. Evidence supports marijuana-PBS use for its association with less marijuana use and marijuana-related consequences among college students. Marijuana-PBS use can also buffer risk factors and enhance protective factors among marijuana-using college students (Bravo et al., 2017).

Research has shown that PBS interventions benefit college students exhibiting poor mental health due to their increased risk for problematic alcohol use (LaBrie et al., 2015). One study evaluated the effects of an individual facilitator-led PBS skills training and personalized feedback (PBS-STPF) intervention among students with poor mental health and who consume alcohol heavily. Results indicated increased PBS use was correlated with less drinking and fewer consequences for intervention participants than the control group (LaBrie et al., 2015).

5. Mental Simulation Intervention
One article assessed the impact of a mental simulation intervention designed to reduce student alcohol consumption. Students were assigned to one of four exercises involving either imagining positive outcomes of non-drinking during a social occasion (outcome condition); imagining strategies required for non-drinking during a social occasion (process condition); imagining both positive outcomes and required strategies (combined condition); or completing a drinks diary task (control condition). Preliminary evidence indicates that this type of intervention can successfully promote behavior change by reducing alcohol consumption and heavy episodic drinking over a 4-week period (Conroy et al., 2015).

6. Deviance Regulation Theory
A 6-week web-based Deviance Regulation Theory (DRT) intervention on students' intention to use alcohol PBS and associations between these intentions and actual behavior demonstrated effectiveness of increasing students' PBS intentions and the actions taken to utilize them (Dvorak et al., 2016).

7. Harm Reduction Education
Two education and skills-based harm reduction programs have demonstrated effectiveness and positive outcomes. One article assessed the Alcohol-related Harm Prevention (AHP) program, which strives to correct misperceived norms regarding levels of alcohol use, provide training to students to intervene on behalf of their peers, and make harm-avoidance plans with their friends before consuming alcohol. This intervention offered a non-judgmental, bottom-up approach that was well-received by participants and established evidence as a viable method of dealing with college drinking (Graham et al., 2004).

Like the AHP, Cannabis Café is a harm reduction and education initiative that incorporates effective components to reduce risky substance consumption on campuses and substance-related stigma by facilitating meaningful and evidence-informed conversations on the topic of cannabis (Mader et al., 2020). Overall, both AHP and Cannabis Café were positively accepted and resulted in behavior change, positive reinforcement, and reduced internal and external stigma associated with substance use, particularly marijuana.

8. Sociodrama
Sociodramatic plays are often referred to as "role-plays" or "simulations" (Hunter & Lakey, 2003; Jemal et al., 2021). Sociodramatists bring community issues to life using role-plays as an educational tool that provides participants with actionable insights, new perspectives, and role training (Giacomucci, 2021). One intervention evaluated a sociodrama addressing college drinking as a method of helping students make healthy choices to decrease the harmful consequences of drinking. The sociodrama was positively received by students and assisted with fostering discussion about drinking. Additionally, it encouraged

students to consider and commit to using harm reduction techniques and how to access the appropriate campus resources (Haleem & Winters, 2011).

9. Environment Management
The college environment is one of high-risk drinking and specific events or periods appear to be associated with heavier drinking than others. Environmental management (EM) features several key strategies, including limiting alcohol availability, restricting alcohol marketing and promotion, and developing and enforcing new policies to combat alcohol-impaired driving and to restrict the times, places, and circumstances in which alcohol can be purchased and consumed (Marchell et al., 2013). Two universities in the United States, Cornell University and The University of Rhode Island, embraced EM approaches to address campus drinking culture.

An EM intervention was assessed as a way of reducing student drinking at a university's year-end celebration, Slope Day, after major restructuring. Short-term effects included decreased drinking at the campus celebration while drinking before the event increased. Long-term, the intervention significantly reduced high-risk drinking on the day of the event, especially among those under 21 years old (Marchell et al., 2013). Similarly, a media campaign-supported prevention program called "Common Ground" successfully altered college students' perceptions of alcohol enforcement, alcohol access, and the local alcohol environment (Wood et al., 2009).

10. Web-Based Interventions
Web-based interventions are easily accessible, frequently utilized, and perceived as less stigmatizing and highly acceptable by students (Tahaney & Palfai, 2017). Additionally, they have demonstrated promising effects in reducing drinking quantity and frequency, and preventive measures to curb the initiation of drinking (Tahaney & Palfai, 2017). Seven various web-based interventions have proven efficacy: M-PASS (Barretto et al., 2011), AlcoholEdu (Lovecchio et al., 2010; Paschall et al., 2011), Alcohol-wise (Croom et al., 2015; Gilbertson et al., 2018), Marijuana eCHECKUP TO GO (Palfai et al., 2016; Riggs et al., 2018), College Alc (Bersamin et al., 2007), and Project Fitness (Moore et al., 2012). Regardless of the specific intervention, web-based interventions meant to target specific behaviors, reduce harm, educate, and correct student misperceptions about alcohol and drug use have shown effectiveness among college students as a supplemental or mandatory intervention (e.g., incoming first-year students) (Bersamin et al., 2007) to students no matter their user-level (heavy-user versus non-user) in consuming drugs or alcohol.

11. Intervention Boosters
Boosters (additional exposure to key intervention content) are a promising approach to maintaining the impact of a brief intervention. Booster sessions have been shown to enhance alcohol treatment outcomes for heavy drinkers in the community (Carey, Walsh, et al., 2018). Results from the database searches include three types of intervention boosters: personalized boosters, e-mail boosters (E-boosters), and text message boosters. These different intervention boosters effectively enhanced the intervention's purpose and effect. Personalized boosters led to reduced perceptions of how much peers drink, which led to reductions in alcohol consumption (Braitman & Lau-Barraco, 2020). E-boosters providing personalized feedback were shown to reduce drinking (Braitman & Henson, 2016), and text-message boosters have demonstrated promising results of helping to reduce binge drinking on the weekends for students

sanctioned for violating campus alcohol policies (Suffoletto et al., 2016). Research suggests that boosters can be simple, brief, and efficient in maintaining and enhancing intervention results.

12. *Text Messaging*

The use of text messages is an effective method to reduce student drinking. When combined with a web-based intervention (e.g., eCHECKUP TO GO), alcohol-specific text messages received when students were likely to drink and consume higher amounts of alcohol (i.e., in the evening) assisted students experience reduced drinking and face fewer consequences (Tahaney & Palfai, 2017). Similarly, students in community college responded positively to a PBS-text message-based intervention sent throughout the week on typical drinking days. Students found the messages easy to understand and felt the frequency and number of messages were appropriate, suggesting that these prompts could be useful in reducing drinking or alcohol-related negative consequences (Lewis et al., 2018).

13. *Event-Specific Prevention*

Special occasions corresponding with heavy drinking include 21st birthdays, Homecoming, Spring Break, and end-of-semester celebrations. Unlike general prevention efforts, Event-Specific Prevention (ESP) takes advantage of this knowledge regarding the severity and timing of specific events in which drinking is particularly high (Neighbors et al., 2007). Recent research suggests that 21st birthdays are a strong candidate for initial efforts in evaluating event-specific prevention efforts (Neighbors et al., 2012).

ESP is a strategy being used to address and further improve alcohol prevention in college populations (Neighbors et al., 2007). Three articles utilized ESP interventions to reduce the harmful effects of alcohol use during specific events, including 21st birthday celebrations and Spring Break. Two of these articles implemented a harm reduction birthday card to reduce risky drinking. Students who were soon turning 21 years old were mailed a personalized birthday card that would be received a few days before their birthday. The first study signed the birthday cards from the parents of Brad McCue (a student at Michigan State University (MSU) who died by alcohol poisoning on his 21st birthday) and encouraged the recipient to celebrate their birthday responsibly so they may celebrate their 22nd birthday as well (Atkin C & Martell D, 2002). The second birthday card intervention included a personalized note from each student's Resident Assistant (RA) (LaBrie et al., 2009). Students who received the first card (compared to those who did not) drank less, were less likely to get drunk, were less likely to drink shots, were less likely to report blacking out, and were more likely to stop drinking when they had had enough (Atkin C & Martell D, 2002). The second birthday card intervention may have increased student's receptivity to the message due to the sender being someone they personally know (LaBrie et al., 2009).

Spring Break is another high-risk period most notably known for excessive alcohol consumption. A brief intervention was designed and conducted to reduce the harmful effects of alcohol use among college students during Spring Break. This intervention utilized the Use and Consequences Diary (UCD), a self-report measure of alcohol use and negative consequences the week before and during the week immediately following Spring Break measuring intended behavior versus actual behavior. This brief intervention proved successful in reducing the frequency of alcohol use-related problems experienced by students (Cronin, 1996).

14. College-Community Intervention

Two articles focused on the relationship between college and the surrounding communities, as they also play a role in addressing student alcohol and drug use. The first was a community liaison and security program in New Zealand developed to improve students' quality of life by monitoring their behavior in the form of around-the-clock foot patrols of the campus and surrounding neighborhoods by Campus Watch staff (Cousins et al., 2014; University of Otago, n.d.). This program organized teams to provide general welfare and emotional support to students and residents to reduce harm and social disorder, within the parameters of the University's Code of Student Conduct (Cousins et al., 2014). Although the intervention was not developed to specifically target alcohol consumption, it reduced alcohol consumption and certain alcohol-related harms, such as assaults on women and vandalism by men (Cousins et al., 2014).

Off-campus settings (e.g., off-campus housing, Fraternity/Sorority housing, bars/restaurants, etc.) are also locations where heavy drinking occurs. One article evaluated whether a large-scale (14 public universities) multicomponent environmental prevention intervention targeting off-campus settings would reduce the likelihood and incidence of student intoxication in said settings (Saltz et al., 2010). The environmental interventions included nuisance party enforcement, minor decoy operations, driving under the influence (DUI) checkpoints, social host ordinances, and the use of campus and local media to increase the visibility of environmental strategies. This intervention's results included a reduction in the likelihood of intoxication at social gatherings in private homes off-campus. Additionally, results support the efficacy of environmental prevention strategies to reduce harmful alcohol use on and in communities near college campuses.

15. Mailed Feedback Intervention

Mailed feedback interventions designed to address college student drinking have been shown to decrease drinking rates. Among a large population of students (n = 737), students benefited from generic (e.g., information regarding alcohol's effects, costs of drinking, and specific protective strategies they could use to avoid drinking-related negative consequences) and personalized feedback. Personalized feedback included a comparison of each participant's perceived descriptive norms with actual campus drinking rates, their alcohol outcome expectancies with embedded text indicating that placebo effects influence many social effects of alcohol, feedback regarding negative consequences of drinking the participant had reported in several domains (i.e., alcohol and sex, alcohol and weight), and specific protective behaviors the participant was already engaging in as well as those they could initiate. Compared to the control group, participants who received the mailed feedback intervention consumed less alcohol and were more likely to use PBS, such as setting limits and alternating alcohol with nonalcoholic beverages; abstainers were twice as likely to remain abstinent (Larimer et al., 2007).

16. Binge Drinking Prevention

College students are more likely to binge drink when they have a positive attitude toward it and believe it to be the social norm on campus (Kessler & Kurtz, 2019). Two articles address this growing problem on college campuses. A change-in-perception-of-the-norm intervention strategy was implemented over the course of five years, comparing a traditional intervention to a media campaign. This intervention shows that a significant difference exists between students' perceptions of typical drinking behavior among college students and the self-reported drinking behavior in this population. Additionally, the proportion of

students who reported heavy or binge drinking as the norm decreased significantly, as did the ratio of students who reported engaging in binge drinking after the intervention (Haines & Spear, 1996).

The second article evaluated the feasibility of a binge drinking prevention intervention for college students delivered via the Internet versus a print-based intervention delivered via postal mail (Moore et al., 2005). For binge-drinkers, the efficacy of both paper and web-based interventions were both supported by decreases in the quantity of alcohol consumed. However, the authors concluded that the Internet could serve as more of a practical option for future implementations compared to traditional health intervention delivery methods (Moore et al., 2005).

17. Health Promotion
The leading causes of mortality and morbidity in young adults relate mainly to six categories of health behaviors: (a) behaviors that contribute to unintentional injuries and violence, (b) tobacco use, (c) the abuse of alcohol or other drugs, (d) unwanted pregnancies and sexually transmitted infections, unhealthy dietary behaviors, and (f) physical inactivity (Faílde Garrido et al., 2019).

The concept of health-promoting universities (HPU) or healthy universities emerged to incorporate health promotion (HP) into the university setting. HPUs are institutions of higher education that incorporates HP into its educational and employment project to facilitate human development and improve the quality of life of the people who study or work there, while enabling them to act as models and promoters of healthy behaviors in their family, work, or social settings (Faílde Garrido et al., 2019).

A university in Spain adopted the HPU model, assessing alcohol dependence among many other measures. Students were exposed to different HP messages through iconography and texts, located in various places around campus (e.g., dining halls, elevators, and sports facilities). This intervention produced significant decreases in alcohol dependence as well as promise for changes in other health behaviors among college students (Faílde Garrido et al., 2019).

18. Self as the Intervention
Three articles evaluated the individual self as the intervention. There is a need for peer-to-peer interventions to prevent potentially harmful situations in social gatherings, such as dying from alcohol poisoning. In a harm reduction and social context, peer-to-peer intervention could prevent over-intoxication and reduce suffering after said over-intoxication. Harm reduction interventions for students, by students related to social drinking includes displaying behaviors such as encouraging drinkers to limit their alcohol intake, giving a drinker food or drink, helping a drinker to get home safely, keeping a drinker from passing out, or getting a drinker medical assistance when warranted rather than relying on total abstinence to reduce risk. First-year students are particularly vulnerable to high-risk drinking. By providing first-year students with the necessary education to enhance not only their intention to intervene, but their confidence as well, they might be more inclined to act when spotting a peer in a potentially dangerous alcohol-related situation (Boekeloo & Griffin, 2009).

Self-sustaining interventions can also serve as a valuable method for students to engage in voluntarily. Two articles looked at the feasibility of students conducting their own self-intervention without outside assistance. The first study sought to evaluate a fully gamified self-sustaining web-based alcohol

intervention (CampusGANDR (Gamified Alcohol Norm Discovery & Readjustment)) for college students to enjoy playing willingly without being incentivized to do so. Students were able to submit questions and receive personalized normative feedback. Students who received the supplemented feedback, and especially those who were heavy drinkers before participating in the intervention, reduced their drinking significantly during the two months post-intervention, relative to the control participants. Results show that a gamified approach is promising as a self-sustaining intervention, and high-risk drinkers may benefit from this type of intervention, mainly since students participated voluntarily (Earle et al., 2018).

Drinking refusal self-efficacy (DRSE) is one's belief in the ability to refuse alcohol. Three of its states are relevant to young adults: (1) drinking related to emotional relief (e.g., 'when I am angry'), (2) drinking related to opportunity (e.g., 'when I am watching TV'), and (3) drinking related to social pressure (e.g., 'when my friends are drinking'). The second study evaluated if a web-based brief alcohol intervention, "What Do You Drink" (WDYD), resulted in DRSE changes post-intervention in heavy drinkers. This intervention resulted in two findings, one about binge drinkers' behavior and the promise of WDYD to influence DRSE states, thereby, reducing weekly alcohol consumption. Additionally, results show that the WDYD intervention increased the level of social pressure DSRE for up to six months, supporting the hypothesis that this intervention can, in fact, be self-sufficient (Voogt et al., 2014).

19. Targeted Messaging
Targeted messaging can assist in meeting college students where they are. Two articles focused on this approach. The first article assessed how targeted messaging related to marijuana user status influenced students' perceptions of health communication messages by comparing primary and secondary marijuana prevention messages (Wotring et al., 2019). Non-marijuana users rated primary prevention messages higher than secondary prevention messages, whereas marijuana users ranked secondary prevention messages more favorably than primary prevention messages. Results indicate that primary prevention messages should be designed independently for abstainers and secondary prevention messages incorporating harm reduction strategies (safe or healthier methods) should be used with current marijuana users for most effectiveness.

The second article examined self-efficacy statements in humorous anti-alcohol abuse television advertisements on college students for their effectiveness to reduce participants' feeling of threat from the messages, if any. Results suggest that by adding self-efficacy statements (i.e., "you are in control of the situation") in humorous anti-alcohol abuse ads increased high risk individuals' personal intentions to change their behaviors and their perceived risks of drinking, which then decreased their feelings of fear or threat in the messages (Lee, 2010). Non-threatening messages appear to be more effective with individuals who are already engaged in substance use.

Discussion
In this scoping review, 52 primary articles were identified as effective interventions that reduced substance use-related harm on college campuses. These interventions spanned a range of facilitators (e.g., students, faculty, administrators, student- and residence life), techniques (e.g., web-based, face-to-face, sociodrama, curriculum infusion), target audiences (e.g., first-year students, mandated students, students in community college, high-risk students), and outcomes (promising, well-supported, and supported).

This scoping review presents a broad coverage of harm-reducing, knowledge-based, behavior-changing examples that can be applied to a variety of students and settings (e.g., in-class, residence halls, and the local community). Many of the interventions emphasized the importance of tailoring programs to the student and collective college community since contextualizing is related to effectiveness and varies from campus to campus. Common themes included: personalized feedback, which can be an effective mechanism to frame interventions due to its tailored approach; and considering and developing interventions to align with students' user status, for example, non-user, habitual, novice, social, etc. The findings of this scoping review indicate the relevance and importance of meaningfully addressing alcohol and drug use on college campuses around the world as consumption rates increase due to a variety of reasons (e.g., newfound independence, curiosity, social and academic pressure). Exhibiting the breakdown of intervention by type will hopefully demonstrate the vast options and opportunities for implementing or re-creating a functional harm reduction intervention with known results.

Harm reduction interventions for substance use can positively impact college students' consumption patterns, attitudes towards alcohol and drugs, self-confidence to intervene with peers if needed, and knowledge of available resources on and around campus. As evidenced by the findings, harm reduction interventions have demonstrated proven effectiveness for alcohol and marijuana-use, specifically. While this scoping review found no articles that evaluated interventions targeted at opioids or psychedelics, similar models can be adapted to drugs commonly used by college students. Like alcohol and marijuana-use on campus, students have continuous access to illegal or illicit substances, made readily available through online drug markets via the Internet and social media. It is unlikely that substance use will ever truly be eradicated; therefore, it is imperative for institutions of higher education to work with the current trends, rather than against them, to keep students safe. For example, colleges and universities can test and evaluate the implementation of harm reduction practices, such as making the narcotic overdose reversal medication, Naloxone (Narcan), and fentanyl test strips available in student health centers and pharmacies, as well as offering training to students on how to utilize these life-saving tools, including de-escalation techniques which are common with the use of psychedelics and other "comedown" (akin to a drug hangover) tips and strategies. Future directions of research should focus on interventions that are specific to the panoply of drugs, beyond marijuana, consumed by college students to effectively offer programs and other means of support that will minimize the harms encountered in, and the motivations for, substance use.

Limitations

This scoping review has some limitations. First, a few of the articles that were screened turned out to be protocol studies which had not been tested for effectiveness. For these specific articles, the first authors were contacted directly via email but to no avail, consequently eliminating them from the sample. Second, this scoping review was conducted in July 2021 and the search was rerun in October 2021; therefore, the results are only as up to date as of October 2021. Third, many of the articles showed short-term effectiveness (1 to 6 months on average). Future scoping reviews should explore harm reduction interventions' long-term efficacy. Fourth, the Grey Literature Report was officially discontinued in January 2017, but continues to host resources. Since this database has not been and will not be updated for the foreseeable future, many of the promising search results were broken links and inaccessible even on the Internet (i.e., Google). While incorporating grey literature would have potentially broadened the

scope of intervention types, the lack of relevant and available results did not affect the overall findings of this review.

Conclusions

The results of this scoping review signal encouraging efforts being made to meet students where they are. Alcohol and illicit drugs have long been a part of college culture and will most likely continue on the same trajectory. Colleges have the perfect opportunity and framework to intervene in students' behavior, before and after they have decided to consume drugs or alcohol.

While the interventions in this scoping review have shown various levels of effectiveness, the majority of the articles focused solely on alcohol and marijuana, leaving little to no evidence of the efficacy of harm reduction interventions on other drugs utilized by this specific population (e.g., cocaine, psychedelics, phencyclidine (PCP), amphetamine, fentanyl, etc.). There is a demonstrated knowledge gap in the short-term and long-term effects of interventions on these additional drug types. Plausibly, these harm reduction approaches may also work and should be evaluated, accurately capturing all drug types consumed by college students.

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Appendix: Characteristics and Findings of Included Studies

[Study number] Author details	Year	Location	Intervention	Participant Sample Study Design	Key Findings
[1] Abadi, Shamblen, Thompson, Richard, Parrino, and Hall	2020	USA	"Voice of Reason" (VOR), a harm-reduction, peer-led training on alcohol knowledge and behaviors among students in Greek chapters to examine its applicability to reduce risky alcohol behaviors among fraternities and sororities.	College students trained in VOR (Study 1: N = 118; Study 2: N = 53) and college students in affiliated Greek chapters (Study 1: N = 1363; Study 2: N = 1446). The VOR program includes five 1-hour sessions held on campus weekly in Greek chapter houses. Sessions are interactive, focusing on alcohol behavior modification, effective communication skills, and promotion of alcohol awareness and PBS through practice conversations with peers.	Decreases in drinking and driving and riding with drinking drivers. Increases in alcohol knowledge and medical amnesty law awareness. Increases in talking with friends about alcohol protective strategies increases in having friends talk to them about alcohol protective strategies (and increases in the use of PBS to reduce high-risk drinking as well as future intentions to use PBS
[2] Bai, Copeland, Adams, Lerner, King, Szopinski, Devadanam, Rettew, and Hudziak	2019	USA	Vermont Wellness Environment (UVM WE) hypothesized to improve health and academic outcomes by incentivizing behaviors that promote positive brain health and decrease normative risk for alcohol and drug use in college students.	N = 1,860 The UVM WE program is rooted in the developmental neuroscience literature and rests on 4 pillars: physical fitness, nutrition, mindfulness, and interpersonal relationships.	Students demonstrated better academic and behavioral outcomes and far less negative alcohol and conducts behaviors.
[3] Barretto, Bingham, Goh, and Shope	2011	USA	Web-based brief motivational alcohol intervention program, Michigan Prevention & Alcohol Safety for Students (M-PASS)	N = 8 Students took the baseline survey and each of the four Web sessions, completing a paper-and-pencil survey evaluation after each session. Focus group discussions were held separately with male and female participants to identify changes to improve the Web program and/or intervention content.	Participants were on average somewhat engaged in the program, found the program to be somewhat relevant, and considered the program to be somewhat useful, interesting, and valuable. On a scale from 1 (low) to 10 (high), participants on average gave the M-PASS program an overall rating of 6.3.
[4] Bogg, Marshbanks, Doherty, and Vo	2019	USA	Novel educational commitment (EC) module as a complement to the Brief Alcohol Screening and Intervention for College Students (BASICS)	N = 180 Randomized trial design. Students were assigned to one of three conditions: Information, BASICS, or BASICS+EC (educational commitment). Participants completed an alcohol consumption interview and measures of alcohol-related problems, partying decision-making, subjective student role investment, and self- control-related traits at baseline and at two- and nine-month follow-ups.	BASICS +EC module produced modestly stronger patterns of short-term decreases in drink quantity compared to BASICS. A brief MI module for the academic/vocational aspects of the student role is not associated with greater long-term drink and harm reduction.
[5] Braitman and Lau-Barraco	2020	USA	Descriptive perceived drinking norms and use of protective behavioral strategies (PBS) as potential booster effects.	N = 537 Participants were randomly assigned to one of 3 conditions: general health education, alcohol intervention only, or alcohol intervention plus booster email. Participants completed assessments at baseline and follow-ups through 9 months.	Boosters led to reductions in perceptions of how much peers drink and alcohol consumption.

[6] Conroy, Sparks, and de Visser	2015	UK	Mental simulation intervention designed to reduce student alcohol consumption by asking participants to imagine potential positive outcomes of and/or strategic processes involved in not drinking during social occasions.	N = 211 Students were randomly allocated to one of four intervention conditions involving either imagining positive outcomes of non-drinking during a social occasion (outcome condition); imagining strategies required for non-drinking during a social occasion (process condition); imagining both positive outcomes and required strategies (combined condition); or completing a drinks diary task (control condition).	Mental simulation interventions focused on non-drinking can successfully promote behavior change.
[7] Dvorak, Pearson, Neighbors, Martens, Stevenson, and Kuvaas	2016	USA	Examination of the effects of a web-based Deviance Regulation Theory (DRT) intervention on (1) intentions to use alcohol protective behavior strategies (PBS) and (2) associations between intentions and actual behavior.	N = 76 Participants completed a six-week, web-based, study examining drinking behaviors. Participants were randomly assigned to receive a positive frame about individuals who use PBS or a negative frame about individuals who do not.	DRT-based intervention increased intentions to use three distinct types of PBS and produced an increased likelihood of following through with intentions for at least two PBS.
[8] Graham, Tatterson, Roberts, and Johnston	2004	USA	Assessed the effects of the Alcohol-related Harm Prevention (AHP) program, a normative education and skill-acquisition program designed to reduce serious, long-term alcohol-related harm in college students.	N = 681 The AHP program was implemented in two successive 50-min class periods in 30 small sections of a large, required, general education course. The objective of Session 1 was to establish credibility with the students. The objective of Session 2 was to present students with attention-getting facts regarding the negative consequences of alcohol use.	AHP program was well received by the students. 94% of participants thought it was better than other treatments they had seen on this topic; average rating of `session quality' corresponded to `very' good.
[9] Haleem and Winters	2011	USA	Sociodrama addressing college drinking, entitled "Prism: Reflections on Unspoken Words"	N = 79 Students attended one of the two productions. Pre- and post-surveys were administered to test commitment to use harm reduction techniques, assess the perception of a student's own drinking pattern to the perception of their fellow student colleague drinking, assess the student use of resources, and assess the effectiveness of the sociodrama as a means of learning.	62% reported the production will influence their drinking behavior. Production was successful in fostering discussions about drinking.
[10] Labrie, Migliuri, and Cail	2009	USA	21st birthday card program to test the efficacy of a harm-reduction 21st birthday card campaign to reduce risky drinking.	N = 81 Students in 2 residence halls were randomly chosen to receive the birthday card, while students in 2 other residence halls did not receive the card. Students completed a survey that assessed drinking behaviors during their 21st birthday celebration, such as the decision to drink or not, the quantity of alcohol consumed, and the amount of time spent drinking.	The card's overall efficacy was most likely strengthened by the interrelationship among Heads UP, Resident Life, and the student population. Students who received the card consumed fewer drinks and reached lower blood alcohol content (BAC) levels on their birthday. Female students who received the card consumed 40% fewer drinks and reached nearly 50% lower BAC levels than women who did not receive it.
[11] Patrick, Maggs, and Osgood	2010	USA	Participation in the Late-Night Penn State (LNPS) alcohol-free programming and rates of alcohol consumption on days on attendance.	N = 689 Students were randomly selected to participate completed a web-based baseline survey and 14 consecutive daily web surveys.	Students drank less on days they attended LNPS and on days they stayed in, especially among women.

[12] Mader, Smith, Smith, and Christensen	2020	Canada	Evaluation of a harm reduction and education initiative, The Cannabis Café.	N = 442 Non-experimental, observational cohort design. Seven Cannabis Café's were delivered as part of an undergraduate curriculum course. Participants were asked to complete four surveys (baseline, immediate follow-up, 1 month, and 3 months).	Intervention was associated with positive outcomes. Majority of participants reported being more knowledgeable on cannabis (80.5%), more aware of appropriate medical use (67.5%), and more aware of less risky cannabis practices (73%)
[13] Morgan, White, and Mun	2008	USA	Reduced drinking between the time of an alcohol-related violation and the sanctioned intervention.	N = 175 At intake, students reported their alcohol consumption for the 30 days before the violation and 30 days before the intake assessment.	University policies regarding alcohol-related violations may contribute to reductions in drinking. Mandated students significantly reduced peak blood alcohol concentration (BAC) levels, total weekly drinks, and frequency of alcohol use after the violation before any intervention. Students who had received a legal or medical referral reduced their alcohol consumption (BAC and total drinks) significantly more than those referred by residence hall advisors.
[14] Palfai, Tahaney, Winter, and Saitz	2016	USA	Examined whether readiness-to-change (RTC) moderated the influence of a web-based intervention on frequency of use at 3-month outcomes.	N = 123 Students who smoked marijuana at least monthly were identified by screening in a student health center. Participants were randomly assigned to either eCHECKUP TO GO-marijuana or a control condition.	Electronic screening and brief intervention (eSBI) may bolster change efforts among students who have begun taking steps toward changing their marijuana use. eCHECKUP TO GO does not appear to be more effective for those who are more aware that their use may be problematic.
[15] Paschall, Antin, Ringwalt, and Saltz	2011	USA	Effects of AlcoholEdu for alcohol-related problems among college freshmen.	N = 200 (approximately) Students from 30 universities (15 were randomly assigned to receive AlcoholEdu and 15 were assigned to the control condition).	AlcoholEdu for College shows promise to prevent or reduce alcohol-related problems among freshmen during the fall semester that immediately follows course implementation.
[16] Pensuksan, Taneepanichskul, and Williams	2010	Thailand	Alcohol harm reduction strategies administered as a peer-drinking group motivational intervention (PD-GMI) among Thai male undergraduates.	N = 215 Participants were enrolled in two public universities and reported alcohol consumption during the current academic year. Students at one university were assigned to an assessment-only study group (n = 110); and students at the other university were assigned to a 2-hour PD-GMI (n = 115).	PD-GMI intervention demonstrated effectiveness in reducing alcohol consumption and adverse consequences among Thai male students. Resulted in reductions in alcohol consumption and adverse consequences of alcohol use.
[17] Riggs, Conner, Parnes, Prince, Shillington, and George	2018	USA	Adapted PF (personalized feedback) + PBS version of Marijuana eCHECKUP TO GO to reduce heavy marijuana use among college students.	N = 298 Heavy-using college students were randomly assigned to receive Marijuana eCHECKUP TO GO or strategies for healthy stress management (HSM).	Participants enrolled in Marijuana eCHECKUP TO GO reported decreases in estimated use prevalence, self-reported hours high per week, days high per week, periods high per week, and weeks high per month. Women also reported using PBS more than men.
[18] Riley, Durbin, D'Ariano	2005	USA	Curriculum Infusion (CI)	N = 34 Participants enrolled in a Health Promotion and Disease Prevention course and was a requirement for all health studies major undergraduate students in their sophomore year.	CI had a positive impact on knowledge. Participants became aware of the health education resources available to students and evaluated their own alcohol use, with significant modifications of alcohol consumption behaviors.

[19] Tahaney and Palfai	2017	USA	Text messaging as an adjunct to a web-based intervention (eCHECKUP TO GO) for heavy episodic drinking college students.	N = 113 Risky drinkers were recruited and randomly assigned to one of three conditions: assessment only (AO), web intervention (WI), and web intervention plus text messaging (WI + TXT).	Participants in the WI + TXT condition showed significantly less weekend drinking than those in the AO and WI conditions. Among students who drink in a manner that puts them at risk for harm, WI + TXT may be more beneficial over WI alone for impacting weekend alcohol consumption.
[20] Neighbors, Lee, Atkins, Lewis, Kaysen, Mittmann, Fossos, Geisner, Zheng, and Larimer	2012	USA	Event-specific prevention (ESP) efforts delivered in-person or via the Web and the potential role of including friends in the ESP.	N = 599 Men who intended to consume at least 5 drinks and women who intended to consume at least 4 drinks on their 21st birthday. ~1 week before turning 21, participants were randomly assigned to 1 of 6 conditions: 21st birthday in-person BASICS, 21st birthday web BASICS, 21st birthday in-person BASICS plus friend intervention, 21st birthday web BASICS plus friend intervention, BASICS, or an attention control. Follow-up assessment was completed ~1 week after students' birthdays.	Supports general intervention and ESP approaches for reducing extreme drinking and negative consequences associated with turning 21. BASICS was related to lower BACs and fewer negative consequences.
[21] Cousins, Connor, and Kypri	2014	New Zealand	Evaluation of the Campus Watch intervention on alcohol consumption and related harms experienced by college students.	N = 4,641 Quasi-experimental design. Participants were randomly selected from the enrollment lists of six New Zealand universities. Changes in drinking patterns and alcohol-related harms over time at the university where Campus Watch was introduced (intervention site) were compared with those of five university campuses in other parts of New Zealand (control sites).	Campus Watch was not focused on alcohol, but it reduced alcohol consumption and some related harms.
[22] Earle, LaBrie, Boyle, and Smith	2018	USA	Gamified intervention reducing normative beliefs and alcohol use.	N = 222 First-year students were invited to play the smartphone-based version of CampusGANDR weekly for six rounds. Participants submitted and voted on their own questions each week and received feedback.	Promise as a self-sustaining intervention. Participants who received the supplemented feedback, especially those who were heavy drinkers before participating in the intervention, reduced their drinking significantly during the two months post-intervention
[23] Bersamin, Fearnow-Kenney, Paschall, and Wyrick	2007	USA	Online alcohol-misuse prevention course (College Alc) to reduce alcohol use and related consequences among drinkers and nondrinkers.	N = 622 Participants were incoming college freshmen who reported any past 30-day alcohol use before the beginning of the semester and those who did not. Participants were randomly assigned to the College Alc intervention or a control group.	College Alc may be more effective for students who regularly engage in alcohol use before college than for those who rarely or never engage in alcohol use.
[24] Braitman and Henson	2016	USA	E- mail booster sessions to increase the efficacy of an online intervention (Alcohol 101 Plus) on the outcomes of alcohol use and alcohol-related problems.	N = 213 Students were randomly assigned to receive the intervention-only or intervention plus booster. Alcohol consumption and related problems were assessed at baseline, 2 weeks post, and 4 weeks post intervention.	E-mail boosters providing personalized feedback were associated with significant reductions in drinking frequency, heavy drinking days, peak drinks, and associated blood alcohol concentration (BAC).

[25] Cordero, Israel, White, and Park	2010	USA	Curriculum Infusion (CI)	N = 309 Undergraduates enrolled in 14 CI classes between Winter 2003 and Spring 2004. Participants were surveyed about their substance use, behavioral consequences of substance use, knowledge, and attitudes about alcohol, and their perceptions of the credibility and immediacy of their CI course instructors. Faculty in the first year of the evaluation received no training on AOD issues. Faculty in the second year of the evaluation received training that included information about the philosophy of CI, campus statistics regarding student AOD use, and information about campus and community resources.	CI improved undergraduates' AOD knowledge about alcohol and attitude about substance use. Class size and perceptions of CI instructors' credibility predicted the effectiveness of the CI.
[26] Croom, Staiano-Coico, Lesser, Lewis, Reyna, Marchell, Frank, and Ives	2015	USA	Short-term effectiveness of Alcohol-Wise, an online alcohol prevention program at two universities.	Number of participants not stated. Randomized control study. Incoming first-year students at two different universities (Temple University and Cornell University). Students were randomly assigned to the intervention group (Alcohol Wise) or the control group. After data collection ended, the control group was invited to complete the Alcohol-Wise program.	At both universities, students in the Alcohol-Wise group's knowledge scores significantly improved after taking the course. Whereas the intervention increased the alcohol-related knowledge at both institutions, it significantly affected alcohol consumption measures and high-risk drinking behaviors among first-year students only at the urban, public campus, University A (Temple).
[27] Difulvio, Linowski, Mazziotti, and Puleo	2012	USA	Brief Alcohol Screening and Intervention for College Students (BASICS) among mandated students.	N = 1,896 Majority of participants where mandated to the program due to campus alcohol/drug policy violations. Random sample of undergraduate students were selected for the comparison group. BASICS included 2 1-hour face to face sessions with a prevention specialist. During the second session, participants received an 8-page personalized feedback report.	BASICS is an effective intervention for moderate- and high-risk drinkers. Male students in the intervention group decreased their drinking at follow-up; comparison group increased their drinking. Women in the intervention and comparison groups decreased their drinking at 6 months.
[28] Gilbertson, Norton, Beery, Lee	2018	USA	Personalized web-based alcohol intervention, Alcohol-Wise (version 4.0, 3rd Millennium Classrooms), on multiple measures of alcohol consumption, alcohol consequences, alcohol expectancies, academic achievement, and adaptation to college in first-year students.	N = 126 Participants received Alcohol-Wise either prior to first semester or were waitlisted and received the intervention second semester. Follow-up surveys were conducted 10 weeks (n = 76) and 24 weeks (n=64) following the intervention.	Demonstrated short-term effectiveness in increasing academic achievement when used as a population-level prevention tool in incoming first-year students.
[29] Kaysen, Lee, Labrie, and Tollison	2009	USA	Readiness-to-change (RTC) variability and drinking behavior and whether motivational interviewing (MI) that incorporated a discussion of female-specific reasons for drinking, increases RTC in an intervention group compared with controls.	N = 182 First-year female college students. Intervention groups were held near the end of the first month of the academic year and consisted of 8-12 students. Both facilitators were women with extensive training in MI. Control sessions were also led by two facilitators, but there was no group discussion.	The intervention group had significantly higher RTC than controls. Higher RTC was associated with lower intentions to drink and future drinking behavior. Changes in RTC affect drinking intentions and future drinking behavior independent of receiving an MI-based intervention.

[30] La Brie, Kenney, Grimaldi, Lac, and Napper	2015	USA	Evaluated the efficacy of a standalone PBS skills training and personalized feedback (PBS-STPF) intervention among students accessing mental health services.	N = 251 Heavy-drinking students were randomly assigned to either an individual facilitator-led PBS-STPF intervention or a health-related control condition. Follow-up surveys were conducted 1-and 6-months post-intervention which included measures of alcohol use, negative consequences, and a composite measure of PBS use.	Showed promising results. Changes in PBS use were maintained for up to 6 months post-intervention, but the effects of the intervention on drinking and consequences were limited. Students in the PBS-STPF condition reported greater PBS use, but no differences in alcohol use or consequences. Participants in both conditions reported decreases in drinking outcomes over time.
[31] Larimer, Lee, Kilmer, Fabiano, Stark, Geisner, Mallett, Lostutter, Cronce, Feeney, and Neighbors	2007	USA	Mailed feedback and tips as a universal prevention strategy for college drinking.	N = 1,488 Participants were randomly assigned to feedback or assessment-only control conditions. Feedback included each participant's current drinking behavior, his or her percentile rank in comparison with the campus average (and the percentage of students who didn't drink in a typical month), estimated peak and typical blood alcohol levels, and the effects of alcohol at different blood alcohol levels. Feedback also included a comparison of each participant's perceived descriptive norms with actual campus drinking rates, his or her alcohol outcome expectancies, feedback regarding negative consequences of drinking), and specific protective behaviors the participant was already engaging in as well as those he or she could initiate.	Mailed feedback intervention had a preventive effect on drinking rates overall. Abstainers in the feedback condition were twice as likely to remain abstinent from alcohol at follow-up. Feedback participants were significantly more likely to refrain from heavy episodic drinking. Protective behaviors mediated intervention efficacy.
[32] Lewis, Cadigan, Cronce, Kilmer, Suffoletto, Walter, Lee	2018	USA	Alcohol protective behavioral strategy text messages (TM-PBS).	N = 47 Community college students with past hazardous single occasion or weekly drinking (N = 48; 60% female) were randomized to receive 2 TM-PBS on 3 typical drinking days per week for 2 weeks selected by: (1) research investigators (i.e., based on clinical and theoretical application); (2) participants (i.e., messages highly rated at baseline by the participants); or (3) a random process. Prior to 2 typical drinking days per week and immediately after receiving TMs, participants were asked about predictive usability.	TM-PBS chosen by students were perceived as more useful, supporting this form of tailoring in alcohol interventions to optimize usefulness. Investigator-selected messages were rated as less useful (though still useful) than messages that were self-selected by participants or messages that were selected at random.
[33] Lovecchio, Wyatt, and DeJong	2010	USA	Short-term impact of AlcoholEdu for College 8.0, an online alcohol course for first-year students.	N = 1,620 Randomized control trial. Participants were randomly assigned to either a treatment group (n=810) or an assessment-only control group (n=810). Both groups of students completed a baseline survey and knowledge test. Treatment group students finished the course, took a second knowledge test, and 30 days later completed a post-intervention survey. Control group students completed the post-intervention	AlcoholEdu for College had a positive impact on first-year students' alcohol-related attitudes, behaviors, and consequences. AlcoholEdu students reported a significantly greater reduction in alcohol use than students in the assessment-only control condition. AlcoholEdu should be viewed as a comprehensive prevention effort on campus, not as a substitute.

				survey and knowledge test during the same period.	
[34] Marchell, Lewis, Croom, Lesser, Murphy, Reyna, Frank, and Staiano-Coico	2013	USA	Evaluation of the environmental management plan enacted in 2003 at Slope Day (Cornell University).	N = 322 to 1,973 Cornell University undergraduates were surveyed each May from 2001 through 2009. Sample sizes ranged. Randomly sampled surveys were conducted after a large, annual spring campus celebration. Surveys arrived the day after Slope Day (mailed surveys) or the evening of Slope Day (web-based surveys).	In the short-term, drinking at the campus celebration decreased while drinking before the event increased. Over time, the intervention significantly reduced high-risk drinking on the day of the event, especially among those under the age of 21.
[35] Atkin, Martell, Hembroff, Greenamyer, and McCue	2002	USA	B.R.A.D. Card intervention.	N = 1,731 Students whose birthdates in the enrolled student information database of the university indicated they would turn 21 during the academic year were randomly divided into a group that would receive the B.R.A.D. Card and a group that would not receive the card (control).	Students who received the card and wallet card (vs those who did not) drank less, were less likely to get drunk, were less likely to drink shots, were less likely to report blacking out, and were more likely to stop drinking when they had enough.
[36] Moore, Werch, and Bian	2012	USA	Project Fitness.	N = 200 Participants were randomly assigned to the intervention or control program, both delivered via computer. Immediate feedback was collected with the computer program. At the conclusion of the consultation, a fitness recommendation is provided. The recommendation reiterates key points of the consultation and asks students to select at least 1 behavior from each of 4 behavior groups to improve in the next week, including physical activity/exercise, alcohol misuse, substance use (cigarette and marijuana use), and an "other health behavior" category.	Supports the potential efficacy of Project Fitness to positively impact substance use intentions and several risk factors for health behaviors among college students.
[37] Moore, Soderquist, and Werch	2005	USA	Binge drinking prevention intervention for college students delivered via the Internet versus an identical print-based intervention delivered via postal mail.	N = 116 Participants completed the baseline survey and were randomized into the Web or print group and then sent the intervention materials. The intervention consisted of a series of 4 weekly "newsletters" in electronic or print format. Each newsletter included 5 main components starting with a question challenging an alcohol-expectancy belief. Data was collected using a standardized online 42-item survey.	Results support the Internet as a viable alternative compared to more traditional health intervention delivery methods.
[38] Suffoletto, Merrill, Chung, Kristan, Vanek, and Clark	2016	USA	Evaluated a text message (SMS) program (PantherTRAC) as a booster to an in-person alcohol intervention with mandated college students.	N = 224 Participants were those who violated an on-campus alcohol policy over a 2-semester period in 2014. PantherTRAC sent drinking-related queries to participants each Thursday and Sunday and provided tailored feedback for 6 weeks.	PantherTRAC provided evidence that an SMS program could be useful as a booster for helping mandated students reduce weekend binge drinking. Weekend binge drinking decreased over the 6-week SMS program, and drinking-limit goal commitment was associated with less alcohol consumption. Men had greater reductions in alcohol consumption when they committed

					to a drinking-limit goal compared with women.
(39) Wood, Dejong, Fairlie, Lawson, Lavigne, and Cohen	2009	USA	Common Ground, a media campaign-supported prevention program	Random-sample telephone surveys were conducted each fall at the University of Rhode Island (2004-2007) and at a large, New England public state university that served as a comparison campus (2005-2007). Random samples from the schools' lists of full-time undergraduate students, ages 18-25 years of each year.	Common Ground successfully altered perceptions of alcohol enforcement, alcohol access, and the local alcohol environment.
[40] Haines and Spear	1996	USA	Evaluation of a 5-year study following implementation of "change in perception of the norm" strategy.	N = 3,745 Undergraduate students in general education classes over a 5-year course: Baseline (Year 1), Traditional strategy (Year 2), Media campaign (Year 3), Perceived drinking norms intervention (Years 4-5).	Highlighted the difference between students' perceptions of typical drinking behavior among college students and the self- reported drinking behavior within this population. The number of students who reported heavy or binge drinking as the norm decreased significantly after the implementation of the change-in-perception-of-the-norm strategy. Changes in both the perception of others' behavior and self-reported binge drinking also occurred.
[41] Voogt, Kuntsche, Kleinjan, and Engels	2014	Netherlands	What Do You Drink' (WDYD) intervention	N = 907 Participants were heavy drinkers. Those in the experimental condition were exposed to the single session WDYD intervention (completion time: circa 20 min), whereas participants in the control condition received no intervention.	WDYD increased the level of social pressure DRSE directly after the intervention that sustained at six-months follow-up.
[42] Saltz, Paschall, McGaffigan, and Nygaard	2010	USA	Environmental prevention strategies targeting off-campus settings.	N = ~500-1,000 at 14 large public universities in California. Environmental interventions took place in 2005 and 2006 after 1 year of planning with 7 Safer intervention universities. Random cross-sectional samples of undergraduates completed online surveys in four consecutive fall semesters (2003–2006). Campuses and communities surrounding 8 campuses of the University of California and 6 in the California State University system were utilized. The study used random samples of undergraduates. Safer environmental interventions included nuisance party enforcement operations, minor decoy operations, DUI checkpoints, social host ordinances, and use of campus and local media to increase the visibility of environmental strategies.	Safter intervention universities resulted in reductions in the incidence and likelihood of intoxication at off-campus parties and bars/restaurants were observed compared to controls.
[43] Bravo, Anthenien, Prince, Pearson, and Marijuana Outcomes Study Team	2017	USA	Marijuana protective behavioral strategies (PBS)	N = 2,093 Participants were past-month marijuana users across 11 universities. Marijuana-PBS use as a moderator was examined on the effects of impulsivity-like traits,	Marijuana-PBS use is associated with less marijuana use frequency and marijuana related consequences among college students. Additionally, marijuana-PBS use can buffer risk factors and enhance

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				marijuana use motives, gender, and marijuana use frequency on marijuana-related outcomes in a large sample of college students.	protective factors among marijuana using college students.
[44] Cronin	1996	USA	Use and Consequences Diary (UCD) during Spring Break.	N = 128 Participants were selected at a small liberal arts college. One week prior to Spring Break, students in two randomly chosen lectures (intervention group) were asked to complete the UCD during class time. Utilizing the UCD, students indicated how much they intended to drink during Spring Break and what negative consequences they thought they might experience as a result of drinking. The week immediately following Spring Break, students in the same two lectures were asked to complete the UCD indicating their actual consumption rates and experiences.	The UCD was successful in reducing the frequency of alcohol use-related problems in a group of college students during a high-risk period.
[45] Garrido, Soriano, Fernández, Fernández L, and Castro	2019	Spain	Health Promotion (HP) program "Campus da Auga conVida."	N = 2,438 Quality of life and certain health-related behaviors were evaluated at the beginning of their academic studies (testing phase). Four years later (retest phase), they were reevaluated. A health promotion (HP) program was applied between the two evaluation periods.	The HP program resulted in significant decreases in relation to alcohol dependence.
[46] Boekeloo and Griffin	2009	USA	Examined students' intentions and confidence in their ability to intervene into others' social drinking.	N = 509 Incoming freshmen. A web-based follow-up survey was conducted with student participants 2 months after the beginning of the school year (Fall 2006) and 2 weeks after the final workshop.	Incoming freshmen living in dorms are often compelled to intervene into others' social drinking but are more likely to provide caretaking than restrictive intervention that could limit drinking. With education to enhance their intention and confidence to intervene, first-year college students might be encouraged to intervene into others' social drinking.
[47] Wotring, Paprzycki, Wagner-Green, Wygonik, Blavos, Kruger, Castor, Diehr, and Glassman	2019	USA	College students' perceptions of health communication messages comparing primary and secondary prevention messages concerning marijuana.	N = 487 Participants assessed messages based on likeability, creativity, believability, persuasiveness, relevance, and usefulness using an online questionnaire that also included open-end comments.	Interventions designed to address marijuana use among college students may be more effective if tailored toward user status. Specifically, primary prevention materials should be designed for abstainers, while secondary prevention messages that focus on harm reduction strategies should be used with marijuana users.
[48] Kazemi, Sun, Nies, Dmochowski, Walford	2011	USA	Brief Alcohol Screening and Intervention for College Students (BASICS)	N = 102 Three surveys were administered to volunteer freshmen at baseline and 3 months post-intervention. The BASICS intervention was delivered in two 50-minute therapy sessions, with one following the baseline assessment and one at the 2-week visit. A booster session was held 3 months after the 2-week visit.	Number of drinks, hours of drinking, and negative consequences decreased, indicating a significant decrease in alcohol consumption and negative consequences. Supports developing alcohol prevention and intervention programs that consider the individual needs of college students.

[49] Carey, Merrill, Walsh, Lust, Kalichman, and Carey M.	2018	USA	Predictors of change after a brief motivational intervention (BMI) for students mandated to an alcohol intervention.	N = 568 Participants were mandated to participate in an alcohol education program following an alcohol-related violation. Eligible students viewed a brief presentation outlining their options for satisfying the sanction: (a) pay a fee and participate in the standard sanction (a brief individualized alcohol intervention modeled after BASICS) or (b) participate in this study (i.e., baseline, BMI, and 1-month assessment). Completion of study activities through the 1-month follow-up was considered equivalent to the standard sanction, and therefore served to satisfy the sanction requirement.	Participation reduced alcohol use and problems among mandated college students at 1-month follow-up. However, being male, valuing fun seeking, and perceiving fewer benefits and more costs to drinking less were associated with less change after the BMI. Similarly, associating college life with drinking and seeing fewer benefits and more costs to drinking less predicted smaller reductions in alcohol-related consequences. BMIs should be better tailored to reduce heavy drinking by male students.
[50] Carey, DeMartini, Prince, Luteran, and Carey M.	2013	USA	Determined if choice of intervention affects drinking outcomes for students mandated to participate in an alcohol intervention. The two interventions used for this study were (a) a counselor-administered brief motivational intervention (BMI), and (b) Alcohol101+, an interactive computer-delivered program.	N = 288 Participants were required to participate in an intervention due to a violation of campus alcohol policy. Participants were randomized either to a self-chosen or researcher-assigned intervention. Within the choice condition, they also selected either a brief motivational intervention (BMI) or a computer-delivered educational program. Participants then received 1 of the 2 interventions, assigned randomly.	Follow-up assessments at 1 and 2 months revealed that choice was associated with higher intervention satisfaction. Students who chose their BMI reduced drinks per drinking day more than did the assigned students. Given the choice of intervention, heavier-drinking students self-selected into the face-to-face BMI. Offering a choice of intervention to students mandated for campus alcohol violations increased the chance that at-risk students will select a more intensive and effective intervention.
[51] Lee	2010	USA	Self-efficacy statements in humorous anti-alcohol abuse television advertisements.	N = 124 90% of the participants were individuals between 18 and 27 years old. Half of the participants viewed anti-alcohol abuse ads that had a textual self-efficacy statement (e.g., "You Are in Charge") inserted into each ad (the self-efficacy condition). After completing the survey, the participants were asked to watch either the tape with the self-efficacy statements (n = 65), the self-efficacy condition, or the tape that had not been altered (n = 59), the non-self-efficacy condition. After watching the ads, participants were asked to answer Likert-scale questions (on a scale of 0 to 9) regarding their fear of drinking, liking of the ads, intention to change their drinking behavior, alcohol expectancies, perceived risks of alcohol, and drinking refusal self-efficacy.	Humorous messages with self-efficacy statements could offer ways to communicate with rebellious college students regarding their drinking problems. Health promotional messages should be tailored to rebellious college students, particularly those who are at risk, in a manner that not only gains their attention but also minimizes possible defensive reactions to the given messages.
[52] Official National Drug Control Policy (Grey Literature) Rutgers University (Primary Source)	n/a	USA	The Recovery House is an on-campus residence hall home to a voluntary community of students who wish to live with others committed to recovery and provide support to each other so that all can excel	n/a	The Rutgers Recovery House was the first residence hall on a college campus for students in recovery in the country when it opened in 1988. The community's high recovery rate, averaging 95%, and a high average GPA of 3.2, demonstrates

academically, sustain recovery, and build lifelong friendships. Students are expected to have a sponsor and attend 12-Step meetings at least twice a week while they are living in the Recovery House.

the success of this nationally recognized collegiate recovery model.