Campus tobacco control policies and cessation interventions in college students: a commentary calling for research and action to address tobacco-related health disparities

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Abstract

Tobacco-related health disparities (TRHDs) have a significant impact on population health in the USA. Effectively preventing and controlling TRHDs among young adult populations require multiple prevention and cessation points, including within college/university contexts. This commentary addresses current campus tobacco control policies and cessation interventions for U.S. college students, with an emphasis on TRHDs and opportunities for research and research translation to reduce these disparities. This commentary is informed by literature published between 2010 and 2020 regarding (a) prevalence and impact of campus tobacco control policies; and/or (b) behavioral outcomes from cessation interventions for young adults attending colleges. Despite a doubling of college campuses adopting tobacco-free policies from 2012 to 2017, roughly two-thirds continue to operate without such policies. Few policies address alternative tobacco products (e.g., e-cigarettes, cigars/cigarillos, and hookah), and communication about and enforcement of existing policies is extremely limited. A broad range of cessation intervention strategies have targeted individuals in this age group, but with little focus on TRHDs and limited intervention dissemination. Importantly, college students representing populations at risk for TRHDs (e.g., racial/ethnic/sexual/gender minorities, low socioeconomic status) are less likely to be exposed to strong tobacco control policies or supports for cessation. There are untapped opportunities for behavioral medicine approaches to reduce TRHDs in college settings. Research findings regarding multilevel (policy, community-level, and individual-level) interventions must be translated to policy/practice in order to address tobacco use, particularly among vulnerable college student populations.

Keywords

Tobacco use, Young adults, College students, Health disparities, Risk factors

Implications

Practice: College campuses must play a critical role in intervening early in the tobacco use continuum and addressing tobacco-related health disparities; student health centers must be active in assessing tobacco use and facilitating cessation, particularly among populations disproportionately affected by tobacco use.

Policy: Comprehensive campus-based tobacco control polices must be implemented on all college/university campuses, particularly among those campuses (e.g., tribal or historically Black) that have lagged in adopting such policies; these policies must include alternative tobacco products and measures to facilitate enforcement.

Research: Research must address cultural and racial/ethnic diversity on campuses, both to inform broader policy decisions and campus-based cessation resources; dissemination and implementation research is particularly crucial in ensuring translation of existing evidence-based programs.

INTRODUCTION

Tobacco-related health disparities (TRHDs) have a significant impact on population health in the USA [1]. Efforts to address TRHDs early in the lifespan, such as those focused on adolescents and young adults, are critical, especially given the increasing prevalence of their use of alternative tobacco products, such as e-cigarettes, little cigars/cigarillos, hookah, and smokeless tobacco [2].

Effectively preventing and controlling TRHDs among young adults require multiple points of interception, including focusing on college students. College students experience TRHDs paralleling adult subpopulations, such as racial/ethnic minorities, sexual and gender minorities (SGM), and those from lower socioeconomic backgrounds or rural areas. For example, blacks compared with whites are more likely to initiate tobacco use during young adulthood than adolescence [3]. Additionally, one study found no rural/urban differences in tobacco during the transition to college, although rural racial/ethnic minorities were more likely to use tobacco [4]. In addition, young adult SGM show higher levels of tobacco use [5], driven by multilevel influences [6]. Moreover, cessation intervention research has documented difficulties recruiting and enrolling minority populations [7]. Commercial tobacco use prevalence

is also higher at community/technical colleges [8–10] and tribal colleges/universities (TCUs) compared with traditional 4 year colleges/universities [11]. Thus, college students and college-age young adults are a critical target population to mitigate TRHDs.

The field of behavioral medicine emphasizes individual, community, and environmental influences on behavior, including tobacco use [12]. Indeed, TRHDs are attributable to various multilevel influences, including the presence and/or strength of campus tobacco control programs and policies. Within this context, tobacco cessation programs focusing on college students are also a critical aspect of addressing TRHDs among college students. Tobacco control programs that address policy, education, and cessation are successful in decreasing tobacco use prevalence [13]. Translation of this evidence base has informed frameworks for tobacco control policies and strategies developed by the American Nonsmokers' Rights Foundation (ANRF) [14] and the American College Health Association (ACHA) [15], specifically recommending that physical, social, and retail environments reduce tobacco exposure and use and providing student cessation support.

This commentary is informed by current literature pertaining to campus tobacco control policies and tobacco cessation interventions for U.S. college students with an emphasis on TRHDs. In doing so, we aim to identify opportunities to reduce TRHDs through multilevel behavioral interventions and policy-relevant research translation. We searched academic literature platforms (PUBMED, Web of Science, GoogleScholar) for research published between 2010 and 2020 to provide context for our recommendations. Our search included the following key terms: "(tobacco OR cigarette* OR smoking) AND (college* OR university* OR campus OR young adult* OR college student*) AND (polic* OR ban* OR restriction* OR smoke-free OR smokefree OR tobacco-free OR cessation OR prevention OR program OR intervention)." Relevant articles were those that: (a) focused on U.S. colleges/universities and students or young adults where a substantial proportion were college students; and (b) provided results regarding (i) prevalence of campus tobacco control policies and related changes in tobacco use, and/or (ii) behavioral outcomes from cessation interventions. We also included meta-analyses and systematic reviews summarizing historical data.

CAMPUS TOBACCO CONTROL POLICIES

Prevalence and characteristics of campus policies
The number of U.S. colleges/universities implementing comprehensive tobacco control policies doubled between 2012 and 2017 [16]. Of the more than 6,000 U.S. colleges/universities, as of October 2018, ANRF documented that at least

2,278 schools had 100% smoke-free campuses, 1,909 were 100% tobacco-free, 1,885 prohibited e-cigarette use, 959 prohibited hookah use, and 386 prohibited smoking/vaping marijuana on school grounds [17]. Another recent study of 605 colleges/universities found that while 35.2% adopted tobacco-free policies, 53.7% did not have tobacco- or smoke-free policies, and 10.1% had only smoke-free policies [18]. A 2020 analysis found that 39.2% of the sample adopted e-cigarette-free policies, 26.0% hookah-free policies, and 20.0% ACHA-recommended tobacco-free policies [19]. A 2019 study indicated that an estimated 14.9 million college students (26.9%) and 8.9 million faculty and staff (25.4%) were protected by campus policies and state laws, as of data from 2015 to 2017 [20]. While the adoption of tobacco-free campus policies is increasing, there is substantial progress to be made.

Regarding prevalence of tobacco-related policies across settings, per 2015−2017 data, only three states and two territories had 100% smoke-free or 100% tobacco-free protections in over half of their institutions; four states and six territories had no known 100% smoke-free or 100% tobacco-free campus protections [20]. Private (vs. public) colleges/universities and those in the South and Midwest (vs. West) were more likely to have ACHA-recommended tobacco-free policies [19]; student populations on these campuses also represented groups with TRHDs [19].

Differences in tobacco control policy implementation exist in relation to campus types/settings. Given that community/technical colleges, TCUs, and historically Black colleges/universities (HBCUs) are critical settings for addressing TRHDs, the Tobacco-Free College Campus Initiative (TFCCI) was launched in 2012. The TFCCI had a specific initiative to support the adoption of smoke-free and tobacco-free policies in technical/community colleges and HBCUs, recognizing lagging tobacco-related policy implementation within these contexts [9,21]. Additionally, of the 32 fully accredited TCUs [22], 5 had tobacco-free campuses as of 2020 [23]. One 2018 study found that 60% of TCU students reported past-week secondhand smoke exposure, and two-thirds of nonsmokers and a third of smokers supported having a smoke-free campus [24].

Impact of campus policies
Results of systematic reviews and meta-analyses supported the positive impact of campus tobacco control policies on tobacco use among college students. A systematic review of 11 studies from 1990 to 2016 examined the extent to which campus-based policies affected student tobacco use behavior [25]. Whereas results of cross-sectional studies were mixed, longitudinal studies indicated that policies significantly reduced smoking behavior and pro-smoking attitudes. An earlier systematic review also indicated a post-ban reduction in smoking prevalence [26]. A review of

tobacco prevention and control programs between the years 2001 and 2009 found that multicomponent programs resulted in increased initial quit rates, decreased odds of smoking on campus, and fewer relapses after stopping tobacco use [27].

More recent studies have similarly documented the impact of campus tobacco control policies [28–30]. For example, a 2020 study found that, on campuses without a comprehensive policy versus with campuses a comprehensive policy, students were more likely to personally smoke on campus (65 vs. 36%), see others smoking (98 vs. 69%), and see others using tobacco products on campus (88 vs. 67%) [31]. In addition, one study showed that implementing such policies also coincided with improvements in academic performance [30].

The impact of campus tobacco control policies on student use of other tobacco products also warrants investigation. A 2019 study found that, after a university-wide smoking ban was implemented, the prevalence of self-reported combustible cigarette smoking decreased (12 vs. 7%) but e-cigarette use did not (26.3 vs. 27.5%) [32]. Another study documented that e-cigarette use increased in the years following the ban while combustible cigarette use decreased from 2013 to 2016 and that men were more likely than women to use both products [33].

Campus tobacco control policies may also affect tobacco retail availability, with recent literature examining alternative tobacco retail. A national study found that 554 U.S. colleges/universities (38.1%) were located within three miles of a hookah establishment [34]; however, these establishments were less likely to be close to colleges/universities with smoke-free campus policies—as well as public colleges/universities. One California-based study documented that half of campuses had 10 or more vaping product retailers nearby [35], but that exterior advertising for vaping products was less prevalent near campuses with established tobacco-free policies than near campuses with recent or no tobacco-free policies.

Campus tobacco control policy gaps

Despite progress in establishing campus tobacco control policies and the promise of their effects on tobacco use, there are notable gaps in research and practice. For example, enforcement is a well-documented challenge [36–38], particularly among tobacco users [36,37]. A 2015 study found that few campuses had enforceable penalties related to noncompliance [39]. Such gaps underscore the importance of continued efforts to monitor, promote, implement, and enforce smoke-free and tobacco-free policies across US campuses [40].

Communication about tobacco control policies and whether such policies and/or communication encompass alternative tobacco products may contribute to the aforementioned findings that such policies may not affect e-cigarette use. One study analyzing websites of 581 universities prohibiting e-cigarette use on campus documented that health and other risks of e-cigarette use were rarely or never mentioned and that one-fifth did not specify that e-cigarettes were prohibited [41]. Some campus characteristics (e.g., the U.S. census region of campus, campus housing, and funding type) were associated with the presence of e-cigarette information on websites [41]. Thus, TRHDs in college students result from whether policies are adopted, how policies are implemented and enforced, and whether these policies are updated to address new tobacco products like e-cigarettes.

College-based cessation interventions and resources

A major issue inherent in addressing college student tobacco use is which types of intervention strategies are appropriate and effective. A 2012 meta-analysis of interventions among young adults including 14 studies found that any type of intervention was more effective in producing successful smoking cessation than the control and that interventions effective for the larger adult sample were also effective for young adults [42]. Moreover, one study of college student tobacco users found interest in a broad range of cessation interventions and supports, irrespective of sex, sexual orientation, race/ethnicity, and other sociodemographics [43]. Thus, there are ample opportunities and strategies to support cessation among college students. Studies have examined college student tobacco use cessation interventions, both using campus-based assets (e.g., student health centers) and independent of such campus resources.

Campus-based cessation resources

With regard to campus resources to support cessation, some research has indicated that roughly a third of college students who visited their student health center were not screened for tobacco use [44] and that less than half of student health center directors indicate that their clinics screen for tobacco at every visit [45]. Barriers include limited time and access to pharmacotherapy, as well as student failure to report tobacco use or lack of interest in quitting [45]. This research also indicates that state-level cash receipts (e.g., tax revenues) for tobacco were positively associated with clinic-level supports [45], underscoring how these contextual factors contribute to TRHDs.

Other cessation intervention strategies

Outside of student health centers, other opportunities for individualized cessation intervention exist. A 2016 review of prevention and treatment intervention research for college student addictive behaviors found that in-person skills-based interventions and motivational interventions that incorporate personalized feedback are effective for cessation in the short-term (and more effective than web-based interventions);

however, little support was found for long-term effects [46]. Despite these findings, other literature has documented a broad range of approaches to cessation.

Technology-based interventions are particularly relevant to college student populations. A comprehensive literature search for studies on Internet interventions with young adults published from 1999 to 2011, including eight studies using various intervention strategies (e.g., computer-generated advice letters, web-based cessation guides, computer-generated text messages, and peer e-mail support), documented significant increases in quit rates across studies [47]. A 2015 systematic review and meta-analysis of 20 randomized controlled trials of technology-based cessation interventions in university/college settings [48] included ten stand-alone computer interventions, five internet-based interventions, three phone-based interventions, and two mobile SMS interventions. Meta-analysis on the six tobacco cessation intervention studies using an abstinence outcome measure demonstrated that the interventions increased the rate of abstinence by 1.5 times compared with usual care controls [48]. One randomized controlled trial of a 6 week intervention involving general lifestyle content and personally tailored health information plus online peer coaching found higher 30 day smoking abstinence rates [49]. Another smaller trial evaluating the feasibility and acceptability of an avatar-led, digital intervention grounded in Acceptance and Commitment Therapy for smoking cessation also showed promise [50]. Higher smoking cessation rates were also documented in a study testing a dissonance-enhancing, web-based experiential smoking cessation intervention for college students [51].

Text-messaging cessation interventions also hold promise. A 2015 review and meta-analysis of 14 text-messaging interventions for tobacco and alcohol cessation within adolescent and young adult populations documented effect sizes ranging from −0.25 to 0.54, with a summary effect size of 0.25 [52]. This might indicate that, in general, text message interventions have a positive effect on reducing substance use behaviors. More recent research documented the feasibility and acceptability of integrating text-messaging−based cessation interventions into usual student health center screening and cessation services [53]. Another mobile feedback intervention targeting heavy episodic drinking and smoking was found to be effective in reducing the number of cigarettes smoked in nontreatment-seeking college students [54].

Social media may extend the reach and impact for cessation interventions among college students. One study assessed the effect of an innovative multicomponent web-based and social media approach and documented significantly higher 7 and 30 day quit rates [55]. As another example, the Tobacco Status Project Facebook smoking cessation intervention involved young adult smokers assigned to private Facebook groups tailored to stage of change to quit smoking, receiving daily contacts, weekly live counseling sessions, cognitive behavioral therapy counseling sessions, and random assignment to receive monetary incentive for engagement [56]. Compared with the control, the Tobacco Status Project intervention had an effect on abstinence at 3 months but not at 12 months; however, intervention participants engaged more and rated the intervention more favorably than those in the control condition [56]. SGM in this trial indicated cessation outcomes similar to heterosexuals [57].

The literature also suggests some promise of incentives-based cessation interventions among college students. One strategy potentially well-suited for college student smokers is Quit & Win contests, in which smokers pledge to quit smoking for a defined period in exchange for the chance to win a prize. A study of Quit & Win contests on 7 Minnesota college campuses in 2007 found a 30 day abstinence rate of 52.5% during the Quit & Win contest month and 20.5% at 6 month follow-up [58]. Another randomized controlled trial among 19 colleges in Minnesota, Texas, Ohio, and Wisconsin found that being enrolled in multiple Quit & Win contests back-to-back increased abstinence at 4 months and continuous abstinence at 6 months [59]; moreover, using multiple Quit & Win contests among college student smokers was shown to be cost-effective [60]. Another study documented promise of a novel incentives-based smoking cessation intervention for college students; students received discounted or free goods and services from businesses proximal to their campus for completing intervention modules (e.g., health behavior monitoring, targeted messaging) [61]. Compared with an attention control, intervention participants smoked fewer cigarettes/day and showed greater adherence and satisfaction [61]. This literature collectively underscores the promise of incentives-based strategies for college students.

Few interventions target alternative tobacco products. However, two web-based intervention studies focused on waterpipe/hookah use among college students who received information about the harms of waterpipe smoking. These studies reported greater perceived risk and worry about harm and addiction and expressed a stronger desire to quit, as well as increases in cessation (62%) compared with the control group (33%) [62]. This provides early evidence that interventions to reduce alternative tobacco use among college students can be effective.

Cessation intervention research gaps

Despite the existing literature, the science is limited in terms of identifying the most critical and effective components of tobacco cessation intervention for U.S. college students. This is due to small sample sizes, lack of control groups, inconsistency

in outcome measures, and interventions integrating various components and approaches but insufficiently accounting for them in analyses of outcomes. Additionally, insufficient research has been conducted to develop and test campus-based or campus-level cessation interventions to address alternative tobacco product use among U.S. college students. Moreover, there is a dearth of research examining the implementation and dissemination of existing, promising interventions among college students and within the campus context.

Central to this commentary, there is insufficient research focused on college students disproportionately affected by tobacco use. Despite some research focusing on SGM or racial/ethnic minority adult subgroups [63,64], there is limited tobacco cessation intervention research focused on SGM, as well as racial/ethnic minority students and/or those at TCUs or HBCUs. For example, a search for published literature from 2000 to 2016 to assess the current state of smoking prevention and cessation intervention research for SGM youth and young adults found limited research [65]. Additionally, there has been no tobacco cessation intervention research that has targeted college students with mental health issues or that has explicitly addressed mental health in the context of tobacco cessation among college student populations. While the previously mentioned literature has not excluded college students representing these populations, few had sufficient representation of such subgroups to explore differential intervention effects.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

There are important opportunities to advance practice, policy, and research to address TRHDs on college/university campuses in the USA (Table 1).

With regard to campus-based tobacco control policies, first, research must further examine policies and policy implementation across different campus types, including public and private institutions, 2 and 4 year colleges, TCUs, and HBCUs. Second, interventions and strategies to support implementation and promote compliance must be developed, tested, and disseminated, as such strategies have been understudied to date. The existing research pertaining to this indicates that such strategies (e.g., collaborations between departments of health and colleges/universities, tools to assess and improve compliance, and communication strategies) can be effective [66–69]. Third, additional longitudinal research is needed to better understand the role of college anti-tobacco policies on student tobacco use behavior, particularly with regard to the use of alternative tobacco products such as e-cigarettes. Fourth, additional policies, such as restrictions on using campus debit cards for tobacco purchases [70], require further consideration and evaluation.

With regard to college student tobacco cessation interventions, this commentary indicated a broad range of promising strategies, including in-person strategies and technology-based strategies, such as text-messaging, mobile applications, and social media. Novel incentive-based approaches also show promise. However, there are important gaps in the research. Central to this commentary, effective tobacco cessation interventions must be developed and disseminated to sufficiently include and/or target racial/ethnic minority or SGM young adults, 2 versus 4 year colleges, and students with mental health concerns. It is crucial to tailor recruitment approaches and interventions to subpopulations at high risk for tobacco use [71], particularly among populations

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Table 1 | Opportunities for Behavioral Medicine to Address College/University Tobacco-Related Health Disparities

Tobacco control policy

- Examine policies and policy implementations across different campus types, including public and private institutions, two- and four-year colleges, TCUs, and HBCUs
- Develop/test/disseminate interventions to promote compliance (e.g., collaborations between departments of health and colleges/universities, tools to assess and improve compliance, communication strategies)
- Conduct longitudinal research to better understand the role of college anti-tobacco policies on student tobacco use behavior, particularly with regard to the use of alternative tobacco products such as e-cigarettes
- Examine additional policies, such as restrictions on using campus debit cards for tobacco purchases

Cessation interventions

- Conduct tobacco cessation intervention research sufficiently including and/or targeting racial/ethnic minority or SGM young adults, two- versus four-year colleges, and students with mental health concerns
- Tailor recruitment approaches and interventions to subpopulations at high risk for tobacco use, particularly among populations with a history of mistrust of the research community
- Develop/test interventions to address the broad range of tobacco products being used by college students
- Increase dissemination and implementation research leveraging student health centers as a hub for delivering interventions in order to increase adoption and reach of such interventions, particularly to populations disproportionately impacted by tobacco use

Synergies

- There are important opportunities to advance practice, policy, and research to address TRHDs on college/university campuses in the USA
- Examine the interplay between larger macro-level factors such as state policy, college campus tobacco-related policy and resources, and individual tobacco use behavior is needed

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with a history of mistrust of the research community [72]. Moreover, in today's rapidly evolving tobacco market, interventions are needed to address the broad range of tobacco products being used by college students.

A major concern is how empirically supported or evidence-based interventions will reach college student populations, particularly those experiencing TRHDs. There are gaps in student health center assessment and intervention on tobacco use and little actual sustainable implementation of promising interventions. This underscores a critical need to increase dissemination and implementation research leveraging student health centers as a hub for delivering interventions in order to increase adoption and reach of such interventions, particularly to populations disproportionately affected by tobacco use.

Finally, research regarding the interplay between larger macro-level factors such as state policy, college campus tobacco-related policy and resources, and individual tobacco use behavior is needed. One study found evidence that higher state expenditures on tobacco control programs was associated with subsequent reductions in tobacco use among college students [73]. These macro-level factors may be critical but overlooked contributors to tobacco use and TRHDs among college students that result in larger population-level health disparities; such implications are critical in informing state and local policy, as well as campus-based policy.

Compliance with ethical standards

Conflicts of Interest: Lorien Abroms receives royalties from the sale of Text2Quit and has stock in Welltock, Inc. No other authors declare any conflicts of interests.

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Ethical Approval: This article does not contain any studies with human participants performed by any of the authors. This article does not contain any studies with animals performed by any of the authors.

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