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Implementation and Evaluation of a Multi-level, Place-Based Tobacco Prevention and Control Program at a Minority-Serving Institution in Texas

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Abstract

Multi-level, place-based interventions have proven effective at promoting a range of health behaviors, including tobacco control and discouraging the uptake of tobacco products. This paper describes the implementation and impact of a 3-year, multi-level tobacco prevention and control program at a community-college minority-serving institution (MSI) on the Texas Gulf Coast within the context of a broader multi-sector, cross-functional health coalition. The intervention studied included a tobacco-free policy, a large-scale communication campaign highlighting parts of the intervention and prevention and cessation resources. The intervention was bolstered by the support of a community-led Steering Committee and tobacco control experts. Results from the first 3 years of implementation show that tobacco-free policies were largely supported by community members, awareness of the policy increased over time, and tobacco prevention and cessation resources were successfully embedded into campus norms. This multi-component approach shows how a community college was able to effectively reach students and staff on their campus to increase awareness of both the campus tobacco-free policy and the availability of tobacco prevention and cessation resources. Additionally, it also offers lessons for future tobacco prevention and control work in higher education.

Keywords Cancer prevention · Tobacco cessation · Place-based intervention · Community intervention · Health communication

Introduction

Tobacco is a leading cause of preventable death in the United States (Dattani, 2023). Cancer due to tobacco-related causes is preventable, but tobacco use rates remain high among young adults and college-age students, influenced by the socio-cultural factors of peer pressure (Procter-Scherdtel & Collins, 2013), the perceptions of normative behavior (Do et al., 2020), and the entry of new tobacco-related products into the market such as e-cigarettes (Bandi et al., 2021).

Most adult smokers begin smoking before the of age 26 (Wang et al., 2018). Thus, tobacco use among young adult populations has implications for the life-long health of individuals and has population health consequences across generations. There have been uneven prevention efforts to reduce smoking and other forms of tobacco use in recent decades. People from racial and ethnic minority groups have experienced persistent disparities in smoking behavior and health outcomes driven partially by increased advertising

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placements in their communities (Herrera et al., 2020) and targeted ads on social media (Tan & Bigman, 2020). In addition, existing research on multi-component interventions demonstrates how communication components, in particular, can play a key role in improving tobacco-use patterns more equitably (Namkoong et al., 2017), ultimately helping bolster smoke-free and tobacco-free policies (Wray et al., 2021), protecting individuals from secondhand smoke exposure, reducing the acceptability of smoking, preventing uptake among never-users, and increasing rates of quitting (Wang et al., 2018). This research is particularly important considering how the tobacco industry has intentionally falsified research to downplay the association between cigarettes and lung cancer (Harford, 2022; Pearl & Mackenzie, 2018). At present, new tactics of promotion through social media and new nicotine delivery devices threaten to encourage never-smokers that vaping has no health risks (Tan & Bigman, 2020).

Multi-level, place-based interventions have proven effective at promoting a range of health behaviors, including tobacco control and discouraging the uptake of tobacco products (Shershneva et al., 2014; Smith et al., 2021). Community colleges, particularly those that are also minority-serving institutions (MSI), are well placed to implement multi-level interventions for tobacco prevention and control. MSIs provide access to education and support for populations that are disproportionately affected by tobacco use, such as individuals from historically minoritized racial identities and those from socioeconomically disadvantaged backgrounds (Boland et al., 2021; Garcia et al., 2019). Campus-based tobacco-free initiatives (e.g., peer educators, implementation of tobacco-free policy on campus) have a history of effectiveness, especially on college campuses where such efforts can moderate behaviors by reducing access to tobacco products and help change social norms (Cofer et al., 2022).

Although MSIs and community colleges offer a clear opportunity for tobacco control efforts in high-risk communities, few multi-component programs have been implemented in this environment. The resulting gap in research limits the ability to scale programming and identify best practices for integrating tobacco control efforts at other institutions. Community-based collaborations have shown significant impact, including interventions to reduce childhood obesity (Arteaga et al., 2015), prevent suicide (Grattidge et al., 2023), and improve diabetes management (Hughes et al., 2016). Comparatively, there have been fewer community-based initiatives in cancer prevention, despite data showing how effectively behavior changes can reduce cancer incidence (Colditz et al., 2012; Islami et al., 2018). Limited research has delved into the effectiveness of community-based interventions work on college campuses, including using community-based participatory research approaches to design a healthy lifestyle intervention for college students (Olfert et al., 2018), as well as health-related interventions on college campuses (Brown et al., 2014).

This paper describes the implementation and impact of a 3-year, multi-level tobacco prevention and control program at a community-college MSI on the Texas Gulf Coast. The intervention focuses specifically on the areas of policy, communication and awareness, and education. The outcomes are assessment and measurement of campaign and intervention elements. This intervention focused on simultaneously implementing (a) campus policies that discourage the use of tobacco products and (b) a communication campaign to increase awareness of the new policies and campus resources to help individuals quit smoking and the promotion of tobacco-free living. This place-based intervention is novel in the sense that it is focused on community-based cancer prevention in a primarily bilingual population in suburban and rural communities in Texas.

Methods

Setting

This study took place at Lee College, a Hispanic-serving institution in Baytown, TX. More than 47% of Lee College students identify as Hispanic/Latino (Lee College, 2022), and the college draws from more than 2000 square miles with a population of about 275,000, covering urban, suburban, and rural communities east of the Houston Ship Channel along the Gulf Coast (Lee College, 2022). During 2023, out of the approximately 8619 students attending Lee College, 65% were aged 18–24, and another 23% were aged 25–34, making up most of the learner populations for the institution's academic and technical credit pathways, adult education, workforce training, and continuing education programs. The coursework offered at Lee College is primarily in-person, but there are also a few flexible hybrid courses offered as part of distance education (Lee College, n.d.). In 2019, Lee College launched and pursued tobacco-free living as an area for policy change, tailored communication, and education.

These efforts were supported as part of a larger place-based cancer prevention and control initiative, The University of Texas MD Anderson Cancer Center's Be Well Communities™ (Be Well Communities, n.d.). Be Well Communities is MD Anderson's place-based strategy for comprehensive cancer prevention and control working with communities to address modifiable risk factors for cancer (Rechis et al., 2021; Rechis et al., 2023). Be Well Communities centers on working with community-based organizations to build their capacity to deliver and evaluate evidence-based interventions. This work is guided by a multi-sector,

cross-functional community coalition, or Steering Committee, which includes representatives from multiple local organizations and residents that work together to address the health and wellness needs in the community.

Be Well Communities launched Be Well™ Baytown in 2016. The Steering Committee was formed through an open call for participation and ultimately included "community champions from non-profits, businesses, schools, healthcare institutions, city officials, and residents," (Rechis et al., 2021). Be Well Communities engaged Lee College as a core member of the Be Well Baytown Steering Committee. Through Be Well Baytown, Lee College received funding to support staffing and implementation, biweekly technical assistance calls from the MD Anderson Team, and feedback and support from the Be Well Baytown Steering Committee. Through this partnership, Lee College also received significant support through the EndTobacco® program, MD Anderson's comprehensive, multi-component, tobacco control program (EndTobacco® Program, n.d.).

Intervention Components

This study evaluates a multi-level intervention to encourage tobacco-free living at Lee College. The approach implemented at Lee College was guided by resources from evidence-based guidelines (Rechis et al., 2021) and included (1) a tobacco-free policy, (2) a communication campaign, and (3) education and (4) cessation resources. The programmatic components stem from evidence-based interventions (Rechis et al., 2021) focused on comprehensive tobacco control programs (Guide to Community Preventive Services, 2019), mediated campaigns against tobacco use (Guide to Community Preventive Services, 2019; County Health Rankings & Roadmaps, 2019), and smoke-free policies (Blake et al., 2020; Smoke-Free Policies for Indoor Areas, 2018).

Comprehensive Tobacco-Free Policy and Supporting Policies

Lee College implemented a tobacco-free policy (Lee College, n.d.), which included a policy prohibiting on-campus advertising for tobacco and nicotine products. To support the new policy, Lee College established a Drug-Free Campus Committee (Lee College, n.d.) made up of campus and community representatives that began focusing on tobacco in early 2019.

Communication Campaign Outreach and Messaging

Lee College, in partnership with MD Anderson and the University of Texas at Austin Center for Health Communication, developed and implemented an integrated communication campaign to discourage the uptake of tobacco products and promote control. The campaign followed health-communication best practices for visuals and messaging developed by the Eliminate Tobacco Use (ETU) initiative to reach college-age students. ETU is an evidence-based approach that has been used to coordinate tobacco control across all 14 University of Texas System institutions since 2015 and has been replicated on other campuses around the United States (Cofer et al., 2022; Mackert et al., 2019).

Communication products were customized to feature school colors and reference Lee College specifically. Communication elements were created to feature images representing a range of cultural and ethnic groups, as well as body types, so that as many members of the Lee College community as possible could see themselves in the representations calling attention to the health-promoting messages (Figs. 1, 2 and 3).

The communication campaign plan focused on implementation around the beginning of each semester when students would start attending new classes and potentially be in a highly visible place to consider, or re-consider, potentially harmful health behaviors. The COVID-19 pandemic necessitated that digital communication materials be implemented first through social media, webpages, and emails, among other channels. Physical, on-campus communication products, including digital displays, posters, and permanent signs, were implemented after the return to in-person instruction. The Lee College Facebook page began posting campaign materials in fall 2020, continuing through the end of 2022.

Education

Lee College leadership implemented the Peers Against Tobacco curriculum, including promoting the Tobacco 101 online program, to provide educational resources for students. A campus-wide call was sent out from the Office of Associate Dean, Testing and Student Life, to integrate tobacco control into existing curricula. Faculty were additionally encouraged to incorporate the Tobacco 101 curriculum into their classes once in-person attendance resumed after COVID-19 restrictions were lifted.

Cessation Resources

Lee College also began organizing and coordinating resources to emphasize addiction counseling for tobacco and other substances (Lee College, n.d.) as well as personal health resources. College staff were given the opportunity to become certified Tobacco Treatment Specialists through MD Anderson's Council for Tobacco Treatment Training Program (CTTTP). These tobacco control and addiction-recovery resources became a common menu link across the college's website, available from many pages in their online ecosystem.

Fig. 1 Yard sign from the campaign

Evaluation Metrics and Data Collection

Each of the intervention components was evaluated using the metrics in Table 1.

Following the implementation of the tobacco-free policy but before the communication campaign was initiated, a

Fig. 2 Permanent signage from the campaign

Fig. 3 Social media posts from the campaign

survey was distributed in autumn 2019 to gather initial data about tobacco-related policy changes and tobacco-usage patterns. A follow-up survey was distributed in spring 2022 once all intervention components were in place for more than a calendar year. Both surveys included some basic respondent demographics as well as items on the following: awareness of the Lee College campus tobacco policy (single item, 5-point Likert scale, "Are you aware that Lee College has a tobacco-free policy on campus?") and awareness of resources available to quit tobacco products (single item, 5-point Likert scale, "Are you aware there are free tools and resources designed to help people quit tobacco products?"). Tobacco use was assessed with a single item: "During the last 30 days, have you used a tobacco product (e.g., cigarettes, vapes smokeless tobacco, etc.) on any of the following locations including in a personal vehicle?" Additionally, a single open-ended question was used to obtain a more in-depth understanding of the Lee College community's feelings toward tobacco use on campus. A total of 576 respondents in 2019 and 1076 respondents in 2022 completed the survey sent from Lee College's central administration. Respondents included both students and staff.

Analysis

SPSS version 29 was used for data analysis. Independent sample *t*-tests were conducted to understand changes in awareness between the two time points (2019 and 2022). Two-way ANOVA tests were performed to understand how the campaign impacted the policy awareness of respondents with different campus roles (students vs staff) and those belonging to different tobacco-usage groups (users vs non-users). Participants who indicated that they had used a tobacco product at least once in the last 30 days were categorized as tobacco users for the purpose of analysis. Other respondents were categorized as non-users.

Open-ended responses were analyzed with Linguistic Inquiry and Word Count (LIWC) (Pennebaker et al., 2007), a language analysis program to quantify language-use behaviors and implications. LIWC can be used to identify the overall valence of sentiments expressed and common themes being discussed. Using LIWC 22's Word frequencies feature, word clouds were generated to examine the most common words in participants' responses to the open-ended prompt asking for thoughts on tobacco use. Word clouds were generated based on the students' 2022 responses and staff's responses from both 2019 and 2022; open-ended responses from campus employees were not included in the 2019 survey.

This analysis employed LIWC's Meaning Extraction Method (MEM), which utilizes principal component analysis to extract topics from a given text and identify respondent priorities. MEM-driven theme extraction was guided by best practices from Markowitz (2021) as well as Chung and Pennebaker (2008). A fixed factor approach was used to determine the number of topics to be extracted; the number of fixed factors was finalized based on preliminary findings of the word cloud and the survey design. The themes were individually interpreted and agreed upon by two co-authors as further verification.

Staff responses to the open-ended item ($n = 395$) were less frequent than student responses ($n = 877$) and often contained longer answers. Due to the differing response lengths, MEM principal component analysis was not stable — with derived factors containing only words from a few, specific responses that dominated the data set. The overall lack of depth and number of responses led to the factor analysis results not being weighted distinctly. Staff responses were instead analyzed in a bottom-up, inductive manner to explore themes.

Table 1 Implementation and evaluation metrics

Intervention component	Metrics
Tobacco-free policy	• Implementation of tobacco-free policy • Prohibit tobacco advertising on campus policy • Drug-free campus committee launch • Participation in policy workshops and developmental conferences (e.g., Eliminate Tobacco Use summit)
Communication campaign	• Awareness of Lee College's tobacco-free campus policy (survey) • Awareness of Lee College's tobacco prevention and cessation resources (survey) • # of social media posts • Permanent signage and placements for out-of-home messages, such as digital screens, posters, and metal signs
Education and prevention and cessation resources	• Integration of tobacco control into existing syllabi • Control offerings on college website • Prevention and cessation resources on campus • Events hosted to share information • Staff training through the Certified Tobacco Treatment Training Program

Results

Description of the Survey Sample

The demographics of the survey respondents are shown in Table 2.

Intervention Metrics and Outcomes

Tobacco-Free Policy Outcomes

Lee College campus leadership implemented several policies designed to reduce tobacco use on campus, including prohibiting tobacco use and tobacco-related advertising on campus, as well as the creation and support of campus organizations intended to support those policies through advice and promotion of healthier lifestyles, such as the Drug-Free Campus Committee. Additionally, campus community members engaged in larger conversations about effective policy development, campus health planning, and addressing compliance by participating in events like the Eliminate Tobacco Use summit, in which Lee College has maintained significant attendance and involvement by leading panels and sharing experiences from convened campus events (The University of Texas MD Anderson Cancer Center & University of Texas System, 2022).

Table 2 Demographics of the 2019 student sample and the 2022 student and staff sample

	2019 ($n=576$)[d]		2022 ($n=1077$)	
	N	%	*N*	%
Female	252[a]	77	684[b]	67
Race/ethnicity				
Hispanic	132	41%	428	42%
Non-Hispanic White	125	39%	–	–
Black/African American	44	14%	140	14%
Other	22	6%	271[c]	27%
Role				
Student	327	57%	932	86%
Staff	249	43%	145	14%
Tobacco usage				
Tobacco user	67[e]	13%	218	20%
Non-user	456[e]	87%	859	80%

[a]Includes n = 3 preferred not to answer

[b]$n=34$ preferred not to answer

[c]$n=54$ preferred not to answer

[d]The 2019 survey did not collect demographics about the staff; thus, the reported demographics refer to students only

[e]Does not include $n=53$ who did not provide a response

Awareness Outcomes

Awareness of Lee College's tobacco-free policy increased between 2019 and 2022. In 2019, 91% of students and 97% of employees indicated they were aware of the college's tobacco-free policy. Additionally, 49% of staff were moderately or extremely aware of free tools and resources for tobacco control. In 2022, 93% of students, 98% of staff, and 91% of respondents who did not specify their campus role indicated they were aware of the college's tobacco-free policy. This includes respondents who did not answer the awareness of the policy item and were classified as respondents who were not aware of the policy. In terms of awareness of tobacco prevention and cessation resources, 49% were moderately or extremely aware of free tools and resources for tobacco control. Student tobacco use was also found to decrease by 2% between 2019 and 2022 (Table 3).

Awareness of Lee College's tobacco-free campus policy was significantly greater in 2022 ($M=4.56$, $SD=0.78$) versus 2019 ($M=3.93$, $SD=1.24$) ($t=10.34$, $p<0.05$) (Table 4).

A two-way ANOVA revealed that there was a statistically significant interaction between the effects of campus role and campaign year (F (1, 1445) = 141.79, $p<0.01$) on awareness of Lee College's tobacco-free campus policy. There was a statistically significant increase in students' awareness of the policy between 2019 ($M=3.17$, $SD=1.08$) and 2022 ($M=4.54$, $SD=0.80$). While there was a minor increase in staff awareness between 2019 ($M=4.67$, $SD=0.88$) and 2022 ($M=4.74$, $SD=0.64$), it was not statistically significant (refer to Table 5 in the Appendix) (Fig. 4).

A two-way ANOVA revealed that there was a statistically significant interaction between the effects of tobacco use and campaign year (F (1, 1494) = 24.75, $p<0.01$) on awareness of Lee College's tobacco-free campus policy. There was a statistically significant increase in tobacco users' awareness of the policy between 2019 ($M=3.38$, $SD=1.16$) and 2022 ($M=4.64$, $SD=0.72$). There was also a statistically significant increase in non-tobacco users' awareness between 2019 ($M=4.02$, $SD=1.22$) and 2022 ($M=4.54$, $SD=0.79$). The increase in tobacco users' awareness between 2019 and 2022 was greater than the increase in non-tobacco users (refer to Table 6 in the Appendix) (Fig. 5).

Educational Outcomes

Two Lee College employees became Certified Tobacco Treatment Specialists through MD Anderson's Certified Tobacco Treatment Training Program (CTTTP) to assist with the implementation of tobacco control programs and community-member support. Five classes integrated tobacco control into the curriculum to date. Additionally, student leaders and organizations hosted campus and

Table 3 Summary of awareness measures (2019 and 2022)

	Students			Staff			Total			
2019	*N*	Mean	%	*N*	Mean	%	*N*	Mean	SD	%
Awareness of tobacco-free policy	240[a]	3.17	91%	249	4.67	97%	489[a]	3.93	1.24	94%
Awareness of tobacco prevention and cessation resources (b)	–	–	–	249	3.22	80%	249	3.22	1.45	80%
2022	*N*	Mean	%	*N*	Mean	%	*N*	Mean	SD	%
Awareness of tobacco-free policy	818[c]	4.54	93%	142[d]	4.74	98%	1010[e]	4.56	0.78	94%
Awareness of tobacco prevention and cessation resources	877	3.19	77%	145	3.50	84%	1077[f]	3.22	1.51	77%

[a]$N=87$ did not respond to this item

[b]This item was not part of the 2019 student survey

[c]$N=59$ did not respond to this item

[d]$N=3$ did not respond to this item

[e]$N=67$ (62 *respondents who were either staff or students, and 5 respondents who did not indicate campus role*) did not respond to this item

[f]Includes $N=55$ who did not indicate their campus role

community events about substance use, such as "Escape the Vape."

Further, alongside the other links in its most prominent section covering "About" Lee College information, the college website (Lee College, n.d.) presents a "Maintaining a Drug-Free Campus" link that leads to tobacco-control information and support. The main tobacco-control resource page includes more than a dozen helpful resources ranging from national programs such as American Lung Association services, to the local public health agency's phone counseling support, as well as texting-based programs (Graham et al., 2022) and Spanish-language options.

Table 4 Topics based on the open-ended question's responses of students using MEM

Word1	Weight1	Word2	Weight2	Word3	Weight3
College	0.779	Public	0.681	Employee	0.555
Lee	0.779	Vape	0.53	Smoke	0.55
Tobacco	0.698	School	0.523	Work	0.532
Free	0.532	Place	0.478	Smoker	0.483
Policy	0.529	Product	0.466	Cigarette	0.462
Campus	0.472	Doe	0.427	Time	0.445
See	0.289	Adult	0.413	Student	0.38
Product	0.272	People	0.367	Hand	0.349
Great	0.261	Cigarette	0.361	Campus	0.304
Student	0.22	Area	0.341	Area	0.268
Place	0.206	Smoke	0.279	Vaping	0.268
		Vaping	0.236	Adult	0.245
		Tobacco	0.235	Thank	0.241
				Allow	0.234
				See	0.232
				People	0.215
				Smell	0.2
				Place	−0.214

Text from students' 2022 ($n=877$) responses and staff's ($n=395$) 2019 and 2022 responses were combined and then analyzed as tobacco users and non-users. Two separate word clouds were created based on the responses from the participants who confirm smoking or not smoking on or outside campus in the last 30 days (Fig. 6). These word clouds represented 1073 participants who did not use tobacco in the last 30 days and 253 participants who did use tobacco in the last 30 days.

Students had a higher frequency of words indicating the health hazards of tobacco than staff (Fig. 7). The student word cloud also exclusively displayed words displaying unpleasant characteristics of smoking such as bad smell and trash issues related to cigarette butts. The staff word cloud displayed words such as vape, vehicle, and enforcement that staff members used to raise questions about the aspects of the policy that seemed confusing to them, or they were not satisfied with. For example:

1. "While keeping the campus tobacco free is a great thing, preventing people from smoking cigarettes or vapes in their vehicle might prove to be hard due to it being their personal private property. Additionally, not all vapes have nicotine in them so it would be hard to distinguish which vapes have nicotine and which do not unless they are using disposable vaping products. Just some food for thought."
2. "I have students that smoke and vape, I remind them daily but they still go out to their cars and smoke? How should I handle this situation, I have a student that smokes so much he actually gives me an upset stomach?"

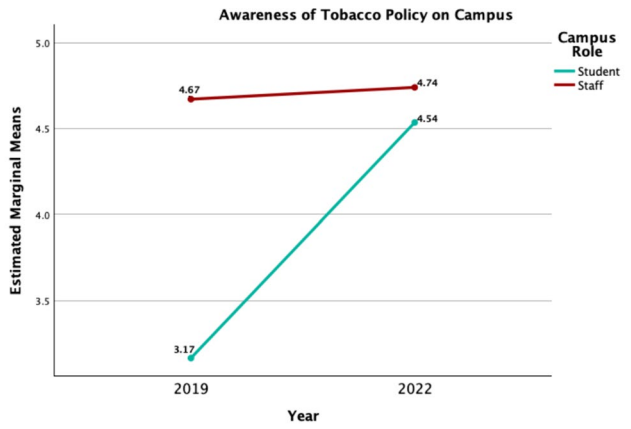

Fig. 4 Awareness of tobacco policy by year and campus role

Lastly, the word cloud of both groups expressed positive emotions about the policy.

Non-users' word clouds displayed more words with positive emotions than the tobacco-users' word cloud. On one hand, health-hazard-related words, words related to quitting, and words representing on-campus resources for tobacco control were present exclusively in non-users' word could. On the other hand, in the users' word cloud, words expressing resistance based on the argument of freedom of choice and words proposing the development of designated areas for the people who want to smoke were observed (Figs. 6 and 7).

Based on the analysis of the word clouds and key topics, three meaningful topics were extracted using the MEM principal components analysis on responses of all participants (Table 4). The first factor indicated agreement with the tobacco-free policy with a discussion about the enforcement using 11 words showing support for the policy and thoughts about its enforcement on campus. The second factor contained participants' responses that questioned the policy by

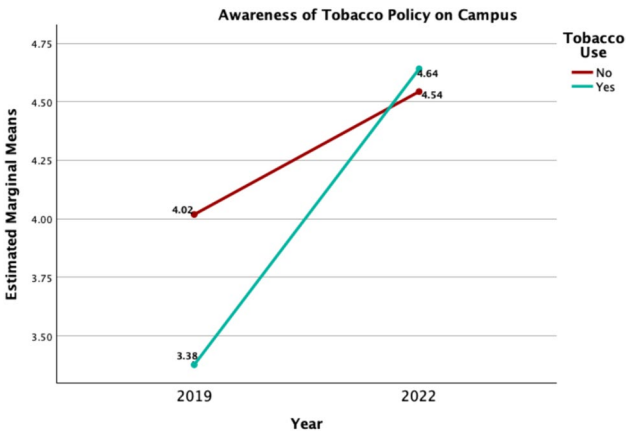

Fig. 5 Awareness of tobacco policy by year and tobacco use

mentioning freedom of choice and pointing out perceived ambiguity about the use of vapes, e-cigarettes, and other products. The third factor represented responses that detailed the benefits associated with the policy.

Discussion

The current study describes the implementation and evaluation of a multi-level intervention to promote tobacco prevention and control among students and staff at Lee College, a minority-serving community college in Baytown, Texas. The intervention employs an approach which includes policy change; a tailored, multimedia communication campaign; and educational and cessation resources to facilitate tobacco-free living. The intervention was able to reach more than 8500 students and staff on the campus of Lee College.

A range of systemic, data-driven interventions has proven to be effective at achieving greater reach and desired behavioral outcomes, specifically in the case of tobacco control efforts (Hohl et al., 2023; Kruger et al., 2016). Results from the first 3 years of implementation at Lee College, including the COVID-19 pandemic lockdowns, show that tobacco-free policies were largely supported by community members as indicated in the word clouds, awareness increased over time, and tobacco prevention, and cessation resources were successfully embedded into campus norms through classes, student-driven events, and a robust digital presence in the college's infrastructure — specifically in terms of the official college website. Additionally, student tobacco use was found to decrease by 2% between 2019 and 2022.

Data from surveys distributed before the media campaign launch in 2019 and then again after more than a year of operations in 2022 show awareness of Lee College's tobacco-free campus policy grew significantly in 2022 compared to 2019, indicating the effectiveness of key communication and education elements over the project's first 3 years. In the responses from 2019, staff had significantly greater awareness of the policy compared to students, potentially because of discussions in staff trainings and other communications from human resources. In 2022 responses, both students and staff had high awareness of the policy, demonstrating the positive impact of using multimedia placements tailored to Lee College. Data also showed there was a greater awareness of the tobacco-free policy between 2019 and 2022 among tobacco users than non-users. Although both users and non-users reported an increase in awareness, it is particularly important to note the greater improvement in policy awareness among users.

In addition to awareness of the tobacco-free policies, project data broadly show the Lee College community's appreciation of prohibiting tobacco on campus. Positive-emotion-based words from student and staff open-ended

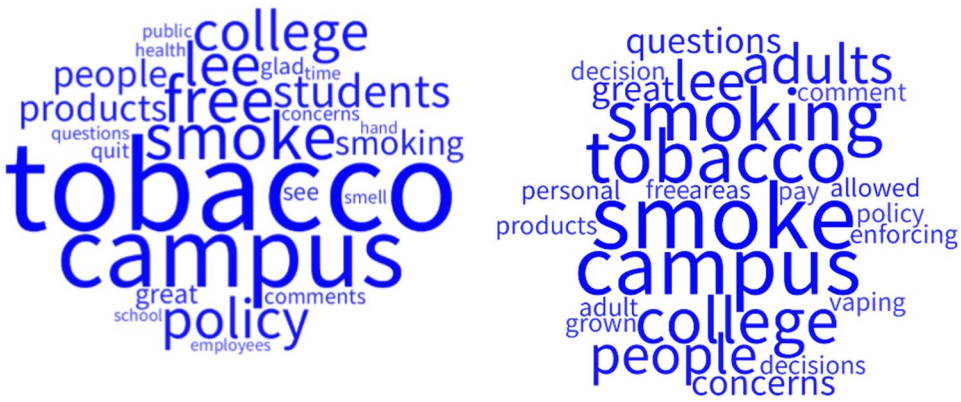

Fig. 6 Word clouds based on the open-ended question's responses of tobacco nonusers (top) vs. tobacco users (bottom)

responses emphasized acknowledgment and appreciation of the policy. Additionally, student vs. staff responses focused on different, but equally important, opinions regarding the policy and tobacco control efforts. This adds additional value to the intervention as the differing feedback from staff versus students can provide more nuanced insights and help inform more tailored future implementation efforts that might lead to greater impact and effectiveness.

Taking a specific instance of the value of these differing responses, staff members' feedback mentioned the negative effects of smoking and their personal rationales for quitting. Pointing to an area of potential growth for the next stages of work, staff also expressed concern about the perceived lack of policy enforcement and raised questions about perceived loopholes related to the use of e-cigarettes on campus. Students' feedback mentioned the odor associated with tobacco and smoking, as well as the potential related concerns of litter and an accumulation of tobacco waste. While these responses flesh out very different issues, they are united in providing essential information aimed at improving tobacco control efforts. Thus, we see how understanding the differences between campus professionals, and students is crucial for more effective implementation of future work.

Similarly, though data indicate that awareness of campus tobacco control efforts increased for both users and non-users of tobacco, investigating the nuances of the two groups presents an opportunity to advance the effectiveness of future interventions. In their open-ended responses, non-users discussed the health hazards of tobacco use, a desire for explicitly clear policy, and past experiences with tobacco use as well as the existence of campus resources, showing a health- and rule-based viewpoint. Users of tobacco tended to employ fewer positive words in their responses and focused on feeling punished and singled out by the policy with no on-campus options for tobacco use, showing an individual perspective on the efforts. Again, like the campus professional and student differences, the distinctions in perspective between tobacco users and non-users offer avenues to inform and enhance future tobacco control efforts in ways that may engender greater audience engagement, thereby accelerating progress. This nuanced feedback does the important work of allowing different audiences to gain access to information, awareness, and resources regarding tobacco control in ways that are most beneficial to them.

Participation in Be Well Baytown, a place-based cancer prevention and control initiative for the entire community,

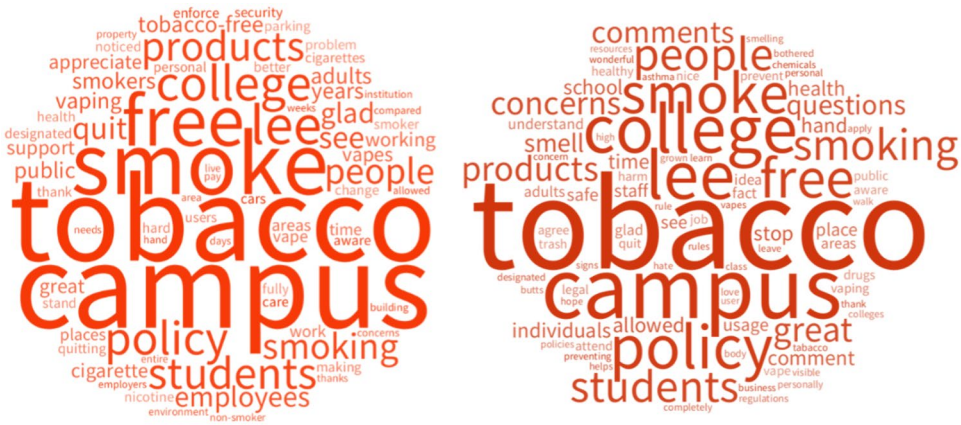

Fig. 7 Word cloud based on the open-ended question's responses of staff (top) vs. student (bottom)

enhanced several aspects of the multi-level intervention at Lee College. Regarding the educational campaign, Steering Committee organizations across sectors amplified campaign messages by sharing social media posts on their own channels. Additionally, Steering Committee organizations served as community partners for tobacco control events hosted by students and campus organizations. These organizations promoted events through their own social media channels to enhance program reach into the broader community. This interaction with the multi-sector coalition may be particularly important for interventions targeting community colleges, as most students and staff reside in the area. Thus, the participation of local organizations has the potential to reinforce tobacco-free living messages for students and staff both on and off campus.

There are important limitations to consider with this study. First, this evaluation is based on a single campus and focused on real-world implementation. To better understand message design and placement, for example, interventions could be tested experimentally in randomized designs, perhaps in partnership with other campuses. Additionally, tobacco use was measured with self-reported surveys which has often been a method that sees the underreporting of tobacco use because of its social undesirability. Thus, there is an opportunity to better validate these data through biochemical assessments. The community survey assessments also did not necessarily include the same individuals at both time points; while the samples match on key variables, there is an opportunity to longitudinally follow individuals over time to more accurately and specifically assess the impact of interventions on respondents' knowledge, attitudes, and behaviors.

Conclusion

The current study provides an overview and evaluation of a multi-component tobacco control program at a minority-serving campus, Lee College, delivered within the context of a multi-sector, placed-based strategy for cancer prevention and control. The interventions studied included a tobacco-free policy, a broad communication campaign, and educational and prevention and cessation resources. These interventions were bolstered by the support of a community-led Steering Committee and tobacco control experts. Through this multi-component approach, Lee College was able to effectively reach the diverse population of students and staff on their campus to increase awareness of both the campus tobacco-free policy and the availability of tobacco prevention and cessation resources. Furthermore, this place-based intervention can be used as a model for future tobacco prevention and cessation programs as it outlines best practices and guidelines for employing a multi-sectoral approach to cancer prevention with a greater focus on community members' involvement. The success of Lee College and Be Well Baytown shows how interventions can be suitably tailored to reach a very specific population, and this tailored approach, in turn, can be much more effective than a general one. While most tobacco-related campaigns happen at larger universities, this intervention takes place at a smaller, technical school in a geographically diverse region. Future iterations of the intervention can experimentally evaluate the respective components of the intervention on an individual basis.

Appendix

Table 5 Two-way ANOVA: effect of campus role and campaign year on awareness of tobacco policy

	SS	*df*	*MS*	*F*	*p-value*
Campus role	177.37	1	177.37	244.76	< 0.01
Campaign year	125.64	1	125.64	173.38	< 0.01
Interaction	102.76	1	102.76	141.79	< 0.01
Within	1047.16	1445	0.73		
Total	28,902	1449			

Table 6 Two-way ANOVA: effect of tobacco use and campaign year on awareness of tobacco policy

	SS	*df*	*MS*	*F*	*p-value*
Tobacco use	11.94	1	11.94	13.44	< 0.01
Campaign year	128.81	1	128.81	145.01	< 0.01
Interaction	21.99	1	21.99	24.75	< 0.01
Within	1327.07	1494	0.89		
Total	29,953	1498			

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Declarations

Ethics Approval Data came from program evaluation surveys initially collected at the institutional level and so were exempt from IRB review. Further, data shared with the research team at a different institution was already anonymized, offering two conditions that categorize the work as Exempt under HHS Protection of Human Subjects regulations (Protections (OHRP), 2016).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare no competing interests.

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