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Best practices to promote the success of students of color: insights from a new type of climate survey

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Despite attempts to promote inclusion in STEM, disparities in belonging, academic achievement, and experiences of discrimination persist between students of color and their White peers. In alignment with the Louis Stokes Alliance for Minority Participation's (LSAMP) focus to better understand the factors contributing to STEM disparities among students of color, we administered a climate survey at three Wisconsin Alliance for Minority Participation (WiscAMP) universities ($N = 3,370$). Unlike traditional surveys, our survey included closed and open-ended questions about the people and the behaviors that shape students' educational experience, creating a basis for actionable improvements. Overall, students reported positive experiences, with few differences between students of color and White students. Students of color identified peers rather than instructors as the target audience for future behavioral interventions, and they described behaviors that had the biggest impact on their educational experience. They also reported ambivalent mental health with high levels of anxiety and stress. We briefly review (a) past initiatives at participating universities that may provide context for positive student experiences, (b) effective methods to design behavior change interventions for a specific target audience, i.e., how to get students to behave more inclusively towards their peers, and (c) recently developed best practices to improve students' mental health. In sum, our article provides insights for LSAMP and STEM leadership to help students of color have a positive experience at higher educational institutions.

KEYWORDS
diversity & inclusion, higher education, intergroup relations, peer inclusion, social marketing, STEM - science technology engineering mathematics, students of color in STEM, university inclusion

Introduction

Despite decades of efforts, students from marginalized backgrounds remain underrepresented and underserved in higher education. Students of color, women, and LGBTQ+ students often have worse college experiences and tend to have lower academic achievement (i.e., exhibit lower academic performance and graduation rates) than their non-marginalized peers. In 2022, 28% of Black students and 25% of Hispanic students held a bachelor's degree or higher, compared to 45% of White students and 72% of Asian students (National Center for Education Statistics [NCES, 2023]). Between 30% and 40% Black and Hispanic students complete their degree within 4 years compared to 50%–60% of White and Asian students (NCES, 2024).

Grade point average (GPA) disparities are also present, with Black and Hispanic students earning lower GPAs than their White and Asian peers (Massey and Probasco, 2010). In science, technology, engineering, and math (STEM) fields, educational achievement gaps are especially pronounced. For example, Black students hold just under 5% of engineering bachelor's, master's and doctoral degrees, whereas White students possess more than half (American Society for Engineering Education [ASEE], 2024). And despite recent progress, women were still underrepresented among degree recipients in many STEM fields at every degree level as of 2020 (National Science Foundation [NSF], 2023).

Improving the educational experience and mental health among students from marginalized groups—especially in STEM—is critical for closing achievement gaps. One way to identify areas for university growth and guide effective interventions is by administering climate surveys. The current paper details findings from a new type of climate survey that we administered to students at three colleges in the Wisconsin Louis Stokes Alliance for Minority Participation (WiscAMP). Among other constructs, our survey included questions to measure (a) questions about students' educational experience (instructor teaching quality, university support quality, overall ratings of the educational experience), (b) questions about the groups of the university community and the types of behaviors that affect students' experiences the most, and (c) questions about mental health. We will describe in this article the new climate survey, present the most important results, and provide readers with a list of concrete recommendations on how to implement the insights gained from these results. We hope these insights help universities, program coordinators, and instructors enhance academic achievement and overall student experiences.

Persistent educational disparities

Students from marginalized groups tend to have a poorer overall university experience. They report lower social belonging, more instances of discrimination, and reduced sense of inclusion within the university community (Duran et al., 2020; Steele, 1997; Walton and Cohen, 2007). In addition, students from marginalized groups often shoulder greater non-academic responsibilities—such as full-time work or caregiving—which can potentially limit their engagement in university life and contribute to feelings of isolation and reduced belonging (Yang, 2023). More broadly, evidence suggests that STEM contexts present uniquely challenging environments for marginalized students (Li, 2023).

It is also the case that students from marginalized groups often suffer from poorer mental health, which in turn affects academic outcomes. For example, students of color were significantly more likely to experience higher levels of anxiety and depression, as compared to White students (Kodish et al., 2022). LGBTQ+ students also report poorer mental health in college compared to non-LGBTQ+ students (Oswalt and Wyatt, 2011). Underrepresentation in university environments can contribute to marginalized students feeling discriminated against as well as physically and psychologically unsafe, which contributes to feelings of heightened anxiety (Allen et al., 2020; Polanco-Roman et al., 2022). The issue becomes magnified for marginalized students in STEM fields as they navigate the struggles of their identity with a competitive and high-pressure environment (Wilkins-Yel et al., 2022). As mental health and academic performance are tightly linked across all undergraduate years (Chu et al., 2022), poor mental health can cause declines in academic achievement. This relationship is often more pronounced for students from marginalized backgrounds, as their mental health tends to be poorer overall.

Many instructors, administrators, and STEM practitioners are aware of persistent educational disparities between students of color and their White peers. They might even have identified specific factors that contribute to these disparities (e.g., decreased sense of belonging, worse mental health). Despite this awareness, there is a huge gap between identifying contributing factors and being able to propose and implement solutions that change the status quo. The purpose of this article is to propose ways to close this gap at least partially.

One reason why it is difficult to address gaps in academic achievement is that the fields of behavioral sciences and educational psychology are progressing quickly with new findings often refining initiatives that were considered standard practice only a decade earlier (Canning et al., 2019; Kennedy et al., 2025; Yeager et al., 2022). In addition, there are recent advances in the literature that many instructors, administrators, and practitioners are not yet familiar with.

Another challenge in finding solutions is that some existing approaches can unintentionally harm students of color. For example, liberal paternalism—endorsing "weak-victim" narratives that conflate disadvantage with weakness—can lead to disempowering behaviors directed at minority groups (Bauer and Walton, 2024). Adopting the belief that overcoming adversity is a purely individual responsibility may increase stress by implying students must overcome adversity alone. Relatedly, DEI roles often create "invisible labor", where instructors from marginalized groups shoulder extra responsibilities with little recognition, causing burnout (Jones and Kee, 2021). While these instructors can enhance belonging and success for students of color (Llamas et al., 2021), witnessing their exhaustion may potentially erode students' own sense of belonging and aspirations. Additionally, those who publicly advocate for equity yet continue to benefit from or reinforce systems of inequity can undermine the experiences of students of color and impede genuine progress (al-Gharbi, 2024).

University climate surveys

While informative climate surveys have been administered at many universities, their current format and content limit efforts to address educational disparities between students of color and White students. One problem is that many climate surveys can be relatively narrow in focus. They primarily assess student perceptions and feelings or, said differently, they limit themselves to "measuring the temperature". For example, the surveys will assess whether belonging is high or low for students, or they will ask students to rate their educational experience as positive or negative. Although these questions are enlightening – especially when students' perceptions can be compared from one iteration of the survey to the next – they do not always provide concrete insights that can then be used as

the basis for the development of behavioral interventions, best practices, or new DEI initiatives.

In order to point to solutions, climate surveys must achieve two goals (Moreu et al., 2021). First, they should help identify the "population segment" whose behaviors need to change in order to create a more inclusive campus environment. The goal is to identify the group on campus – e.g., faculty, teaching assistants, staff, peers – that has the biggest impact on the well-being of students from marginalized groups. It is thus necessary to include specific questions in the climate survey that ask students to rank order various groups on campus in terms of how much they affect the respondents' daily experiences [e.g., "If you could change the behaviors of one of the following groups (but not all), whose behaviors would you want to change …"].

Second, climate surveys need to include measures of specific behaviors that affect the educational experience of students of color, as well as the circumstances in which these behaviors occur. Too often, there is an emphasis on people's attitudes with the underlying assumption that the experience of students of color will improve when the people they interact with develop more positive attitudes towards marginalized groups. However, not only are attitudes difficult to change, but the experiences of students of color are often shaped by behaviors rather than by cognitions or attitudes (Brauer, 2024; Paluck et al., 2021). For this reason, changing the educational experience of students of color often involves the implementation of behavioral interventions, which can be done only if one has identified the target behavior(s) to be promoted.

The so-called "social marketing approach" provides a helpful framework for the development of interventions that lead to lasting behavior change. Social marketing is the application of marketing principles to influence behaviors for social good, and it offers a powerful, evidence-based set of principles for addressing problems that require behavior change (Campbell and Brauer, 2020; Lee and Kotler, 2019). A detailed description of the social marketing approach and how it can be used in educational settings to promote the well-being and academic achievement of students of color can be found elsewhere (Brauer et al., 2021; Campbell and Brauer, 2020; Campbell and Brauer, 2022; Campbell et al., 2026). Two key elements of this approach are to identify a target audience (i.e., "Whose behavior are we trying to change?") and a target behavior (i.e., "Which behavior are we trying to promote?"). As we will describe below, our climate survey included questions that allowed us to do precisely that. Therefore, our approach represents a new conceptual and methodological contribution, as it applies social marketing principles to climate survey design by explicitly identifying both target behaviors and target audiences.

Taken together, our new climate survey addressed three key aims. First, by incorporating elements from traditional climate surveys (e.g., perceptions of university engagement, evaluations of instructor performance, intentions to persist), we were able to examine whether the educational experience differs between students of color and White students. Second, the questions derived from our social marketing approach allowed us to identify who should change and what behaviors they should adopt. Finally, the inclusion of a section on well-being and the experience of various emotional states allowed us to assess the mental health of all students, even though our focus was on students of color.

Methods

Participants

We recruited students at three universities belonging to the Wisconsin Louis Stokes Alliance for Minority participation (WiscAMP). The universities were midsize institutions with between 7,000 and 16,000 undergraduate students, and they had relatively similar demographic characteristics. All universities had an approximately even gender split (average percentage of women = 53.61%) and were predominantly White (average percentage of domestic White students = 73.41%). The average percentage of domestic students who identified as a non-White (i.e., Black, Asian, Hispanic, or another race[‡]) was 24.79%. The number of international students was small (1.79% across the three universities), and first-generation college students (i.e., students whose parents do not have a college degree) were represented at an average of 43.22% across universities. Most students were under 22, and grade-level representation was roughly even.

The average response rate across universities was approximately 11%. We collected data in Spring 2024 from $N = 3{,}370$ students across the three universities. Our sample differed slightly from overall university demographics. Among the respondents who provided demographic information, women were overrepresented (63.10% women, 32.42% men, with remaining percentage identifying as another gender), and non-White students were slightly underrepresented in our sample (on average, 18.80% identified as a non-White student and 76.70% identified as White, with the remaining 4.50% identifying as international students or specifying that their race was not listed). One-fifth (25.41%) of the sample who provided demographics identified as LGBTQ+, and one-third (33.88%) reported being first generation.

Survey

Students completed an online survey on Qualtrics. Unless otherwise stated, students reported their responses on 5-point Likert scales with the following labels: "1 = Strongly disagree", "2 = Disagree", "3 = Neither agree nor disagree", "4 = Agree", and "5 = Strongly agree". Except where noted, measures had been previously used by Campbell et al. (2026) as well as Murrar et al. (2020). The first seven constructs described below are "traditional" in the sense that they have been included in many previous climate surveys. The next three constructs are new constructs that were inspired by the social marketing approach. The last constructs we included in the survey measured students' mental health.

Instructor teaching quality

Students indicated their satisfaction with their instructors' teaching practices and support. After the question stem "In the

[‡]"Another race" refers to students who chose one of the following categories: "Arab / Middle Eastern / North African," "Native American / American Indian," or "Pacific Islander / Native Hawaiian."

past year, how satisfied have you been with the extent to which your instructors have done the following?" students responded to nine corresponding statements on a 5-point Likert scale from "1 = Very dissatisfied" to "5 = Very satisfied". Example statements included "Clearly explained course goals and requirements" and "Taught in a way that aligns with how you prefer to learn". The nine statements were averaged to create a composite score for instructor teaching quality (Cronbach's α = .90).

University support quality

This construct was similar to instructor teaching quality but measured students' satisfaction with the institutional support and responsiveness to student needs. There were also nine statements after the question stem: "In the past year, how satisfied have you been with the extent to which your university has done the following?" Example statements were "Provided support to help students succeed academically" and "Provided support for students' overall well-being (recreation, health care, counseling, etc.)". Students responded using the same scale as the instructor teaching quality questions. Similar to the instructor teaching quality questions, these nine statements were averaged to create a composite score for university support quality (Cronbach's α = .89).

Instructors motivating students

We included a question to measure the extent to which instructors motivate students to do their best work. The exact wording of the question was "Instructors at the [University] motivate me to do my very best work".

Intergroup comfort

There were three items measuring students' comfort in interacting with members of different social groups. The first statement measured the degree to which students feel anxious interacting with other social groups. For consistency with the other two questions, we reverse scored this statement such that higher scores indicated more comfort with interacting with other social groups. The second statement assessed the opposite construct, or the degree to which students felt comfortable talking to other social groups. The last of the statements was: "I feel just as comfortable talking to someone from a different social group as I do talking to someone very similar to me". Similar to the other constructs, we created a composite score by averaging the three statements; however, it had low reliability (α = .55).

Considerations of dropping out

We asked whether students had seriously considered dropping out of their university in the past school year (answers: "yes" = 1, "maybe" = 2, "no" = 3).

Intentions to return to the university

We asked students if they intended to return to their university in the following year (answers: "no" = 1, "not sure" = 2, "yes" = 3, "Not applicable, graduating this semester"). Students who selected the last response option (15.77% of respondents) were excluded from the analyses for this question.

Overall evaluation

This construct was measured with three questions. The first question asked students if they would recommend their university to future students on a 5-point Likert scale from "1 = Definitely not" to "5 = Definitely yes". Next, we asked how they would evaluate their entire educational experience at their university on a 5-point Likert scale from "1 = Poor" to "5 = Excellent". Finally, we included a measure asking students whether they would still attend their university if they could start over again, and students answered on a 5-point Likert scale from "1 = Definitely not" to "5 = Definitely yes". The three measures were averaged to create a composite score of overall evaluation (Cronbach's α = .87).

Peers vs. instructors

One multiple choice question in our survey specifically identified the target audience of interventions. Students were asked: "If you could change the behaviors of either students or instructors (but not both), whose behaviors would you want to change in order to improve the campus climate?" The two choices were either "students" or "instructors".

Behaviors experienced

To identify target behaviors, students were asked about exclusionary as well as inclusive behaviors, and they were invited to describe experiences of these behaviors from both students and instructors. The questions asked were similar to those included in Campbell and Brauer (2021). For each type of behavior, we first provided a definition (e.g., "Inclusive behaviors are actions through which people express friendliness, show an interest in others, show respect, ensure that all feel included, and avoid language that is offensive to others"). Students then reported whether they had experienced this type of behavior from either instructors or students at their university (students provided one yes-no answer per group). If they had reported experiencing the behavior, they were asked to briefly describe a specific situation in one or two sentences.

Behavior change

We then asked participants four open-ended questions at the end of the survey. The first two questions focused on problem behaviors: "What do you think are the most common discriminatory/exclusionary behaviors that occur at [University]?" and "What do you think is the most hurtful behavior to address at [University]? In other words, if you could eliminate one specific type of behavior that has the most negative impact on your sense of belonging, what would it be?"

The last two questions focused on identifying positive behaviors that should be promoted in students [or instructors]: "If you could get students [instructors] to adopt certain behaviors more frequently, what would they be? What behaviors would signal to you that you are respected, welcome, and included by the other students [by your instructors]?"

Mental health

We measured mental health by asking: "During the past 30 days, how often have you felt the following ways?" This question assessed four indicators of positive mental health ("happy", "proud", "enthusiastic", and "excited") as well as five indicators of negative mental health ("depressed", "lonely", "stressed", "sad", and "anxious"). Students responded on 5-point Likert scales from "1 = Never" to "5 = Very often". We averaged positive and negative indicators into positive mental health and negative mental health scores, respectively. Cronbach's α for our averaged positive and negative mental health composite scores were both .85. We also computed a difference score by subtracting the average of the negative mental health indicators from the average of the positive mental health indicators. This approach reflects a balance-based index of well-being, with higher scores indicating more positive relative to negative experiences. Although positive and negative affect are often empirically distinct, prior work suggests that their combination can represent a unidimensional continuum of well-being, providing a meaningful summary of individuals' overall affective experience (Bradburn, 1969; van Schuur and Kruijtbosch, 1995).

Note that the survey also assessed several other constructs which are reported elsewhere (see Redd & Brauer, this volume).

Race/ethnicity coding

The survey included demographic questions assessing students' race/ethnicity, gender, and nationality, among other variables. For race/ethnicity specifically, respondents were categorized as "students of color" and assigned a score of +0.5 for analyses if they identified as domestic students of color. Said differently, students who indicated that their nationality was American (and no other nationality) and who identified as Black, Hispanic, or another race (including multiracial individuals) were included. Note that this categorization aggregates diverse racial and ethnic groups whose experiences in STEM likely differ in important ways; however, we adopted this approach to examine broad patterns of inclusion and exclusion while maintaining sufficient statistical power. Students who identified as domestic White only were placed into the "White students" group and were assigned a score of −0.5.

We excluded students who identified as Asian ($N = 91$) and Asian and White ($N = 27$) from the analyses. This decision was guided by our analytic focus on group differences among students who tend to be less academically achieving in STEM contexts. Although many Asian students report and experience challenges related to belonging, prior research suggests that, on average, they are not underrepresented in STEM fields and often demonstrate comparable or better academic outcomes relative to other groups (Fischer, 2007; NCES, 2024; U.S. Census Bureau, 2023; Whitcomb and Singh, 2021).

Students who left the race/ethnicity question blank or only selected "Not listed, please tell us:" were also excluded from analyses, leaving a final sample size of 2,220 ($N = 327$ students of color).

Procedure

To recruit students, we contacted the provosts at three universities in the WiscAMP research alliance and asked them to send tailored recruitment emails to their student body. The first email, sent one to two weeks before survey distribution, explained the purpose of the survey (improving the student experience), the expected duration, and noted that the survey link would be sent at a later date. Students were informed that responses would be used for research purposes. To motivate participation, students were also informed that they would be entered into a lottery for a $50 gift card upon completion of the survey. The provost then sent a follow-up email with the link when the survey opened. Because the survey was administered online, students could complete it at their convenience within a two-week period.

Results

Students' educational experience

We first examined if students of color had an equally positive experience at their university as their White peers. We estimated a series of general linear models in which we regressed the outcome variable on our dichotomously coded race/ethnicity variable (−0.5 = White students, 0.5 = students of color) and two orthogonal contrast codes to account for differences between the three schools (c1: 0.33, 0.33, and −0.67, and c2: −0.5, 0, and 0.5, for University 1, University 2, and University 3 respectively).

The results are summarized in Table 1. Generally speaking, there were virtually no differences between students of color and their White peers. Across the 27 items and 4 composite scores, we did not observe a single difference between White students and students of color that was statistically significant at the alpha = 0.05 level—and the 95% confidence intervals for all comparisons included zero. Note that this lack of statistical significance is not due to low statistical power because degrees of freedom for all comparisons exceeded 2,000. Consistent with this pattern, effect sizes were uniformly small ($\eta_p^2 \approx 0.00$), suggesting limited practical differences between groups. It is notable that the average responses are all close to 4 on a five-point scale, suggesting that students – both students of color and White students – have a rather positive, albeit not perfect, experience. We did not apply formal corrections for multiple comparisons. If we had done so, the p-values would have been even larger than the ones we observed.

Target audience and behaviors

The analyses reported in this section only included students of color. When asked whose behaviors they would want to

TABLE 1 Raw means, standard deviations, and linear regressions comparing students of color and White students on survey constructs assessing students' educational experience.

Survey construct	Students of Color		White students				
	M	*SD*	*M*	*SD*	*N*	*t*	*p*
Instructor teaching quality	3.89	0.70	3.91	0.63	2,219	−0.53	.597
Explains course goals	4.07	0.78	4.06	0.72	2,220	0.07	.943
Teaches in organized way	3.95	0.81	3.90	0.81	2,220	1.05	.293
Used examples	3.90	0.91	3.94	0.84	2,220	−0.83	.409
Provides feedback on work	3.83	0.97	3.81	0.90	2,219	0.49	.621
Provides prompt feedback	3.74	0.98	3.72	0.96	2,219	0.24	.808
Explains criteria for assignments	3.93	0.88	3.95	0.86	2,219	−0.52	.603
Summarize key ideas	3.92	0.88	4.00	0.78	2,220	−1.47	.142
Teaching style aligns with student learning	3.62	1.08	3.70	0.91	2,220	−1.31	.189
Provides quizzes and assignments	4.03	0.81	4.09	0.77	2,220	−1.38	.168
University support quality	3.73	0.74	3.72	0.66	2,215	−0.96	.337
Encourage time on academic work	3.94	0.80	3.89	0.79	2,218	1.19	.235
Provides academic support	3.91	0.93	3.93	0.86	2,218	−0.01	.994
Provides learning support services	3.94	0.93	3.89	0.90	2,219	0.71	.478
Encourages diverse student contact	3.64	1.06	3.69	0.94	2,219	−0.58	.562
Provides social opportunities	3.84	0.98	3.82	0.91	2,219	0.92	.359
Provides wellness support	3.77	1.01	3.75	0.95	2,219	1.17	.243
Manage non-academic responsibilities	3.33	1.11	3.27	1.04	2,218	1.57	.117
Organize events	3.72	1.00	3.73	0.89	2,218	0.44	.662
Events to address social issues	3.47	1.05	3.50	0.93	2,217	0.29	.773
Instructors motivating students	4.00	0.89	4.04	0.84	2,218	−0.46	.644
Intergroup comfort	3.45	0.79	3.46	0.78	2,217	0.16	.876
Lack of anxiety interacting with other groups (R)	3.22	1.23	3.30	1.14	2,217	−1.03	.303
Comfort talking with other groups	3.83	0.97	3.81	0.94	2,218	0.36	.721
Rarely worry when interacting	3.31	1.12	3.26	1.10	2,219	1.11	.266
Considered dropping out[1,2]	2.55	0.79	2.60	0.75	2,219	−1.45	.148
Intentions to return[1,3]	2.87	0.45	2.86	0.46	1,870	0.11	.912
Overall evaluation	3.75	0.90	3.81	0.87	2,219	−0.94	.348
Would recommend university	4.01	0.96	4.02	0.95	2,220	0.16	.869
Evaluation of entire education	3.55	0.95	3.60	0.93	2,219	−0.77	.440
Would attend again	3.69	1.12	3.81	1.05	2,220	−1.78	.076

[1]Question is on a 3-point scale.
[2]Higher values indicate that students did not seriously consider dropping out.
[3]Seniors were excluded from analysis of this question, as they would not be returning the following year.

change in order to improve university climate, most students of color chose their peers, and only a small numerical minority chose instructors (see Table 2). A one-sample chi-square test revealed that these percentages were reliably different from chance (i.e., a 50/50 distribution). Students of color also reported that they had experienced more exclusionary behaviors from students than instructors and more inclusive behaviors from instructors than students. Our McNemar's chi-square tests showed that these percentages were reliably different from each other. Taken together, these findings suggest that students, rather than instructors, should be the target audience of future interventions and initiatives to promote the educational experience and the academic success of students of color.

We also examined responses from students of color to the open-ended questions. We examined five of our open-ended questions in particular: exclusionary student behaviors, the most common discriminatory/exclusionary behaviors, the most hurtful behaviors to eliminate, inclusive student behaviors, and student behaviors to promote.

Before we started coding, we removed non-responses (e.g., "Nothing comes to mind" or "None") as well as responses that

TABLE 2 Behavioral comparisons across instructors and students.

Behavioral comparison	Instructors %	Students %	*N*	χ^2	*p*	ω/g
Target audience for behavior change	22.64	77.36	265	79.34	<.001***	$\omega = 0.54$
Have you experienced exclusionary behaviors from _____?[a]	4.04	13.47	297	17.36	<.001***	$g = 0.33$
Have you experienced inclusive behaviors from _____?[a]	83.77	71.85	302	15.31	<.001***	$g = 0.23$

[a]Percentages shown in row represent the percentage of students who indicated "yes" to the question for the specified target audience.
***$p < .001$.

were very vague (e.g., "Racism"). Importantly, we read all responses critically to only include responses that described concrete behaviors (e.g., "Telling other students to "go back to their country" if they do not have the same beliefs") or responses detailed enough to serve as the basis of behavioral interventions (e.g., "To study as groups more often"). Following this screening process, the final sample consisted of: exclusionary student behaviors ($N = 20$), the most common discriminatory/exclusionary behaviors ($N = 78$), the most hurtful behaviors to eliminate ($N = 52$), inclusive student behaviors ($N = 80$), and student behaviors to promote ($N = 106$).

We analyzed qualitative using an iterative inductive coding approach. Members of the research team conducted initial rounds of coding to develop and refine the codebook, with particular attention to identifying behaviorally specific responses aligned with the study's focus on actionable peer behaviors. Through this process, we refined broader thematic categories into more concrete behavioral codes. Once the final, highly structured codebook was established, a trained coder systematically applied it to the full dataset. This approach ensured consistent assignment of responses to the most salient behavioral category while maintaining the integrity of the team's initial coding decisions. Responses were coded into a single primary category to capture the most salient behavioral recommendation expressed in each response and to facilitate interpretation of actionable insights.

Table 3 presents the two most common categories identified across each of the five open-ended questions. In general, students of color mostly described being left out of group settings and activities when asked to report on exclusionary behaviors (e.g., "Students of a particular race did not want to be friendly with students of any other race"), and they reported the opposite when asked to report on inclusive behaviors (being included in groups, e.g., "Being asked to join a lunch group"). Additionally, they detailed that negative comments and jokes, whether general comments or those targeted at social identity groups, were common and hurtful behaviors at their universities (e.g., "Calling the n word", "Body shaming"). Finally, students of color desired for their peers to demonstrate more welcoming and friendly behaviors (e.g., "a hello") as well as to remain open minded when engaging in conversations with others who have differing opinions (e.g., "asking and hearing your opinion and trying to accommodate them").

Mental health issues in students

Our results show that the mental health of students of color was generally strained. Students report relatively high levels of both positive and negative emotions. For example, reports of being sad, lonely and anxious were near the midpoint and not much lower than the positive emotions (see Table 4). The mean of the stress variable was 4.06 ($SD = 0.91$), indicating that the average student of color felt stressed "often". Students of color reported feeling positive emotions slightly more than negative emotions, but the difference was not statistically significant, $M_{diff} = 0.14$, $SD_{diff} = 1.41$, $t(326) = 1.78$, $p = .076$ (see last row of Table 4). Additional analyses showed that students of color did not differ from White students in terms of their mental health [all $ps > .10$ except for happiness, $M_{White} = 3.76$, $SD_{White} = 0.85$, $t(2215) = 2.13$, $p = .033$].

Discussion

To address persistent university disparities between students of color and White students, our climate survey aimed to assess various aspects of students' educational experience. Specifically, our climate survey utilized a novel methodology grounded in social marketing, as we included questions about behaviors to be promoted (i.e., target behaviors) and the segments of the university population that should be the focus of future interventions or initiatives (i.e., target audiences).

Overall, both students of color and White students reported relatively positive experiences, with few differences between groups. When asked who affected their daily experiences the most, most students of color named students much more often than instructors. When asked which peer behaviors most affected their well-being and sense of belonging, students of color told us that behaviors like leaving peers out from group activities and making negative comments or jokes have a negative impact, while behaviors such as inviting peers to join group settings and engaging in positive, accepting interactions and conversations have a positive impact. The mental health of students of color was a concern, with many reporting high levels of stress and anxiety. Although students of color did not report significantly worse mental health than White students, the finding nevertheless suggests the improvement of students' mental health is a key factor in promoting the academic success and broadening the participation of students of color in STEM.

Although our results offer valuable insights, our study does have limitations. The response rate was 11%, raising the possibility of nonresponse bias. Despite efforts and engagement with university leadership, we were unable to capture perspectives from a subset of students who did not complete the survey. Additionally, our analytic sample of students of color was relatively small ($N = 327$), which led us to aggregate across

TABLE 3 Overview of two most common categories in open-ended responses: Names, descriptions, examples, and percentages.

Name of category	Description	Example response	%
Exclusionary student behaviors[a]			
Leaving others out from group activities	Peers leaving others out from groups, either in general or based on social identity groups. Includes peers ignoring others.	"When I'm in a class where I am the only BIPOC Individual I can tell no one wants to talk to me even in group work"	90.00
Negative nonverbal behaviors	Unwelcoming body language, such as staring, snickering, or making faces.	"giving dirty looks when I walk in"	10.00
Most common discriminatory/exclusionary behaviors[a]			
Negative comments/ jokes	Making generally rude comments or jokes, including bullying. Can be general comments or comments about specific social identity groups.	"politically incorrect/ignorant jokes and comments"	50.00
Leaving others out from group activities	Peers leaving others out from groups, either in general or based on social identity groups. Includes peers ignoring others.	"Ignoring others and not including them in discussion or just being antisocial"	50.00
Most hurtful behaviors to eliminate			
Negative comments/ jokes	Making generally rude comments or jokes, including bullying. Can be general comments or comments about specific social identity groups.	"Name calling"	61.54
Leaving others out from group activities	Peers leaving others out from groups, either in general or based on social identity groups. Includes peers ignoring others.	"The cliques that form with people talking about other students"	25.00
Inclusive student behaviors			
Inviting others to join group activities	Peers extending invitations to others to join group settings, including in casual/social settings, clubs and class groups.	"I had been sitting alone for many classes until a few peers invited me to their group table"	52.50
Discussing social identities	Explicitly having conversations related to social identity groups and using positive language to show support for these groups.	"Students will openly engage with students outside of their ethnic backgrounds. Ask questions about them to gain insightful information"	26.25
Student behaviors to promote			
Friendly behaviors	Performing more positive and welcoming behaviors towards all peers, including saying hello, smiling, waving, etc.	"Smiling, responding when spoken to"	28.30
Open-minded discussions	Engaging in conversations with others with the goal of responding to differing views with openness and curiosity, not dismissal or disapproval.	"Have difficult conversations with people you may disagree with"	25.47

[a]Percentages sum to 100 because all responses fell into the two most common categories.

TABLE 4 Means and standard deviations for students of color on mental health constructs.

Mental health constructs	*M*	*SD*
Positive mental health	3.36	0.78
Happy	3.60	0.92
Proud	3.24	0.98
Enthusiastic	3.23	0.92
Excited	3.36	0.96
Negative mental health	3.22	0.91
Depressed	2.65	1.31
Lonely	2.70	1.26
Stressed	4.06	0.91
Sad	3.03	1.08
Anxious	3.66	1.13
Difference score (pos. minus neg.)	0.14	1.41

racial groups. This approach may mask important differences in experiences among students from different racial backgrounds. Relatedly, our qualitative coding was based on a limited number of responses, as most students of color reported not experiencing exclusionary behaviors. This could constrain the strength of our conclusions regarding the impact of peer inclusion on these students. Nonetheless, we believe our findings provide meaningful insights and have potential implications for improving student experiences and overall campus climate.

In the following sections, we will discuss best practices to promote the well-being and success of students of color in college. Although the initiatives described below address the issues that emerged in our climate survey, they were not developed in direct response to our results. The implementation of these best practices is especially important in STEM, where high achievement gaps and competitive environments prevail. Therefore, our recommendations are particularly important for LSAMP program coordinators and instructors. We will first

review some initiatives that have been implemented at the universities where we administered our climate survey. We will then explain how the social marketing approach can be used to design interventions that significantly and durably improve the experience of students of color. Finally, we will briefly review best practices to improve students' mental health.

Best practices to improve students' educational experience

We contacted administrators, DEI leaders, and LSAMP coordinators at the three universities from our survey and asked them to share a list of best practices they had recently adopted that may be relevant to the relatively positive experiences reported by students of color. The practices are summarized in Table 5. Across the four themes—university centers, collaborative leadership, classroom practices, and university programming—the common goal is to foster inclusion through institutional support and personal connection. University centers build identity-based communities, collaborative leadership shares responsibility for equity, inclusive classroom practices enhance engagement and belonging, and university programming (e.g., mentoring and bridge programs) promotes persistence beyond the classroom.

Best practices to get students to behave more inclusively

As stated earlier, it is critical to focus on behavioral interventions rather than attitudes to improve experiences of students of color. We discuss social marketing as an optimal solution to improve experiences of students of color; this method helps bridge the gap between theory and practice (Campbell and Brauer, 2020). As we demonstrate in the current study, our social marketing-focused climate survey provides insights in how to design interventions to promote peer inclusion.

There are a variety of practices that likely could be successful to promote peer inclusion. One evidence-based strategy utilizes social norms, which are shared expectations about how people typically behave in a given context (Cialdini and Trost, 1998). Emphasizing social norms in verbal or written communication is a practice known as social norms messaging and can increase peer inclusion (Miller and Prentice, 2016). This is because people often base their behaviors on what they think society would approve of (Bicchieri, 2017). In one study, researchers used insights from a social marketing-based research process to create a syllabus page outlining injunctive and descriptive norms, incentives, and behavioral recommendations (Brauer et al., 2021). When tested, the syllabus pages were shown to reduce gaps between marginalized and non-marginalized students in belonging, health, and course grades (Campbell et al., 2026). Another option is to create classroom posters as well as short videos highlighting peer support for inclusion, as they have similarly improved intergroup attitudes among non-marginalized students and increased belonging and peer inclusion among students of color (Murrar and Brauer, 2023; Murrar et al., 2020). The above-mentioned best practices all serve as examples of concrete interventions that can be applied within classrooms and departments to promote peer inclusion.

One other method to promote peer inclusion uses the idea of commitment and consistency. People desire to maintain consistency in values and behaviors, so providing opportunities for people to commit to certain acts can help reinforce

TABLE 5 Strategies from WiscAMP universities to support students' success and belonging.

Themes	Best practices	Impact
University centers	• Development of centralized and intersectional student centers within student unions. • Centers for a variety of social identities (e.g., multicultural, LGBTQ+, first generation students, etc.) • Spaces for student organizations to gather and share ideas.	• Enhance cross-campus collaboration and accountability. • Provide social and professional engagement opportunities. • Facilitate student belonging and community building.
Collaborative leadership	• Decentralized leadership models including students, faculty, and staff in decision-making. • Leadership committees addressing university needs and advancing initiatives. • Strategic equity, diversity, and inclusion plans with measurable goals.	• Serve as a bridge between students and administration. • Promote accountability in diversity initiatives. • Foster inclusive and equitable workplace and learning environments.
Classroom practices	• Instructor training to identify curricular obstacles and understand student backgrounds. • Implementation of growth-focused syllabus messages and value-sharing activities. • Accessibility centers and training programs as resources.	• Support equity-focused learning environments. • Promote student success, especially in STEM. • Increase engagement and belonging in classrooms.
University programming	• Pre-college, retention-focused, and career-preparation initiatives. • STEM-Inspire program: mentoring, career development, research, year-round support [see Vang, Prince, Otieno, Zhao, & Ruiz, this volume] • STEM Boot Camp (SBC): summer bridge program with mentoring, coaching, and stipends. [see Lisberg, Levas, Lin, & Hidayat, this volume]	• Support academic and professional success. • Reduce barriers for underrepresented students. • Promote a sense of belonging in STEM communities.

consistency towards their values (Isenberg and Brauer, 2022). Different variables may affect level of commitment and consistency; for example, public acts, acts regarded as intrinsically motivated, and irrevocable acts often predict stronger commitment to values or behaviors. Commitment and consistency can be readily applied to the realm of peer inclusion, as certain acts can remind students of their pro-inclusion values. Examples include signing a university-wide statement supporting marginalized groups or pledging to join diverse study groups (Gordon Perue et al., 2021; Uhlmann and Cohen, 2005; Brauer, 2024).

A final method is the use of behavioral "nudges", or subtle environmental or contextual cues that encourage a certain type of decision or behavior (Thaler and Sunstein, 2008). Nudges work by making certain behaviors easier to engage in, such that not engaging in the behavior would require additional effort from the participant to alter the environmental context. Relatedly, research on wise interventions emphasizes changing peers' beliefs or construals about social norms, belonging, or the meaning of social interactions, which can in turn shape more inclusive behavior (Walton, 2025; Walton and Wilson, 2018). Nudges have been studied and used widely in behavioral science, such as automatically enrolling employees in retirement plans or placing healthy food items at eye level (Beshears et al., 2008; Ledderer et al., 2020). When applied to peer inclusion, nudge-based interventions can be particularly effective. For example, using round tables in classrooms instead of individual desks can promote greater peer interaction (Brauer, 2024; Cornell, 2002). In addition, instructors could create peer mentoring programs, study groups, or learning communities that rely on automatic enrollment with the option to opt out. By reshaping classroom structures and defaults to make inclusion the norm, these nudges can foster more frequent and equitable peer interactions without requiring explicit instruction or coercion.

To maximize the effectiveness of these peer inclusion interventions, it is important to understand the barriers and benefits associated with the target behaviors among the intended audience. In social marketing, identifying what makes inclusive behaviors easier or harder to perform is often more impactful than attempting to change attitudes or beliefs alone (Albarracín et al., 2024). Background research methods such as interviews or focus groups can reveal concrete, perceived, or social barriers—and corresponding benefits—that should guide the selection of intervention tools (Brauer et al., 2021; Campbell and Brauer, 2020). By grounding intervention design in a barrier–benefit analysis, practitioners can more strategically deploy techniques such as social norms messaging, commitments, or nudges to promote peer inclusion (McKenzie-Mohr and Schultz, 2014).

Best practices to promote students' mental health

Students of color generally reported ambivalent mental health, reporting positive emotions alongside a notable amount of distress. Because LSAMP seeks to support persistence and success in STEM, addressing the mental health of students of color is especially important given its close links to academic engagement and retention in STEM fields. As our findings reveal general similarities between students of color and White students in terms of their mental health, it is plausible that mental health initiatives aimed to help students of color will similarly benefit White students. Two popular approaches for improving mental health are mindfulness-based programs and Cognitive Behavioral Therapy.

Mindfulness interventions help people notice their thoughts and feelings as they happen without judging themselves, and these interventions can reduce stress and improve well-being (Kabat-Zinn, 2015). Mindfulness practices can help students cultivate attention, emotional balance, and resilience—skills that are especially relevant for students of color who face unique stressors at predominantly White universities. For students in STEM, mindfulness has the potential to improve concentration during complex problem-solving, reduce stress in high-pressure lab or coursework settings, and support collaborative group work, helping students engage more fully with challenging STEM content. Whether offered as a brief in-class workshop or as a semester-long course, they can provide concrete support for navigating mental health challenges (Wodika et al., 2025). Students of color in STEM, who face unique academic, social, and identity-related stressors, may especially benefit from these interventions, but such programs are also valuable for the broader student body.

There is a large body of research on mindfulness programs with a range of interventions studied. Mindfulness programs for university students typically involved eight-week courses combining weekly 75–90 min sessions with guided meditation, mindful-breathing and awareness exercises, home practice, and reflective activities, delivered either in person or online through formats such as mindfulness-based stress reduction (MBSR), mindfulness based cognitive therapy (MBCT), or acceptance and commitment therapy (ACT) based training (Galante et al., 2018; Gallo et al., 2023; González-Martin et al., 2023; Simonsson et al., 2021). Across studies, findings have shown that these programs reduce anxiety and stress, improve resilience, self-regulation, self-compassion, social connectedness, and overall quality of life (Terrell et al., 2025; Cary et al., 2024; Zhou et al., 2025; Bearden et al., 2024; St. Martin et al., 2024).

Cognitive Behavioral Therapy (CBT) is a widely used approach for addressing negative emotional experiences in students—including loneliness, anxiety, and depression. It focuses on identifying and reframing maladaptive thinking. Students may struggle with isolation, academic pressure, or social stress, but the negative thoughts that follow can intensify feelings of disconnection, heighten anxiety, and contribute to depressed mood. To interrupt these harmful cognitive patterns and reduce emotional distress, cognitive reframing—most commonly delivered through cognitive behavioral therapy—has become a popular and effective strategy (Hickin et al., 2021). Within the context of LSAMP, CBT-based approaches are particularly relevant given their potential to support STEM students' mental health, academic engagement, and persistence in demanding coursework.

Across studies, CBT-based interventions targeting loneliness, depression, and anxiety have been implemented in a range of brief, scalable formats—including 7-day chatbot programs, 8-week or 14-day internet-based CBT modules, therapist-

supported online sessions, and app-based tools for college students—that combine cognitive restructuring, behavioral activation, social-skills practice, and structured challenges to increase meaningful social engagement (Bruehlman-Senecal et al., 2020; Käll et al., 2020; Ohue, 2025; Wan and Zhou, 2025; Wang et al., 2025). Overall, findings have shown that even short, technology-supported CBT programs can effectively disrupt negative thinking, reduce emotional distress, and promote healthier social and behavioral functioning.

The above practices provide complementary, evidence-based strategies for reducing stress, supporting resilience, and promoting both academic and emotional success among students. These approaches not only help students manage immediate challenges but also equip them with long-term coping skills that improve well-being and persistence in demanding academic environments. Importantly, such practices offer particular benefits for students of color, who often face additional stressors related to belonging, representation, and navigating institutional barriers. Aligned with LSAMP's mission to broaden participation and persistence in STEM, integrating these mental health supports can help create conditions that enable students—especially those from underrepresented backgrounds—to thrive in STEM pathways. By integrating these strategies across classrooms, support programs, and university environments, universities can more effectively foster inclusive, supportive settings that enhance student thriving.

Conclusion

In summary, our climate survey allowed us to gather important information regarding university and classroom climate, as well as students' perceptions of general engagement and inclusion levels of instructors and students. Because LSAMP specifically aims to support inclusion and persistence in STEM, these data are particularly informative for understanding the climate experienced by STEM students and the extent to which it aligns with LSAMP priorities. Results showed that the universities and instructors were performing quite well overall; students seem to evaluate their university relatively positively. We found that students of color reported that their peers are less inclusive than their instructors, and they reported having relatively poor mental health.

To increase STEM engagement and foster inclusion in line with LSAMP priorities, we proposed a set of evidence-based best practices for universities. We first highlighted pro-diversity initiatives implemented at the WiscAMP universities we surveyed, as they likely contributed to students of color reporting a positive experience. Assuming that our findings generalize to other universities, we suggest that one key goal is to promote inclusive behaviors among students. Based in the social marketing approach, we outlined some targeted and effective interventions. Finally, mental health is not optimal in our sample, yet it seems to be important to improve the experience of students of color. We described some best practices how to promote positive mental health among students.

All recommendations share an underlying goal: creating a university where every student feels valued, included, and empowered to succeed. Particularly, we aim for our results to promote inclusive climates and improve academic experiences for students of color in STEM. We hope that the results of our survey and the present paper can help university administration and STEM practitioners identify their strengths and continue to build on its successes, as well as identify areas of growth and consider implementing different strategies to enhance student experiences and well-being. By taking intentional steps to address disparities and foster inclusion, the university can create a stronger, more equitable learning environment where all students have the opportunity to thrive.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by University of Wisconsin–Madison Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KR: Data curation, Formal analysis, Project administration, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. KK: Conceptualization, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. MB: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2026.1798646/full#supplementary-material

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