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The Impact of Organisational Interventions on Student Perceptions of the Learning Environment: A Repeated Cross-Sectional Study

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ABSTRACT

Background: The learning environment (LE) refers to the social interactions, organisational culture and physical spaces that shape learners' perceptions and learning. With numerous efforts to measure and improve it, there is still a lack of clearly identified, evidence-based interventions that impact the LE. Our aims were to design LE interventions and measure their effectiveness using a comparison of student responses on the Association of American Medical Colleges Graduation Questionnaire (AAMC GQ).

Approach: Root causes of problems in the LE were identified, and comprehensive interventions were then put in place. Interventions addressed three main categories where problems were identified as follows: faculty development, physician wellness, and the learning climate committee. To evaluate changes postintervention, we utilised a repeated cross-sectional design.

Evaluation: Deidentified item-level response data were analysed and organised as a pre-intervention period (2016–2018) and postintervention period (2021–2023). None of the mistreatment events were statistically significant between the periods, except for “required to perform personal services”. However, perceptions of faculty professionalism improved significantly in the postintervention period for all questions except the hidden curriculum (HC).

Implications: Taken together, our results show that large-scale interventions may be effective at improving perceptions of faculty professionalism but have limited effect on frequency of mistreatment events. The hidden curriculum failed to show improvement with our interventions and has been identified as an area of further research and ongoing interventions.

1 | Background

The learning environment (LE) refers to the social interactions, organisational culture and structures and physical and virtual spaces that surround and shape the learners' experiences, perceptions and learning [1]. Studies suggest that the quality of the LE is closely correlated with healthcare delivery, patient care and learning outcomes [2], with poor LE associated with adverse patient and educational outcomes [3–9], including burnout,

decline in empathy and career regret among medical students and residents [10–13]. While these and other studies underscore the perceived importance of the LE and the numerous efforts to measure and improve it [14], there is still a lack of clearly identified, evidence-based interventions that positively impact the LE [3].

The organisational component of the LE is one of its key components and provides structure, guidance, and support

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for learning, but has had mixed results when evaluating interventions that can impact the LE [3]. Examples from the literature include curricular modifications, faculty and staff development or instructional programmes focused on eliminating mistreatment and disrespect [3]. We adopted educational interventions directed towards faculty and also broadened our efforts with health system interventions to address problems such as physician burnout. With a focus on

broad organisational interventions, our goals were to decrease mistreatment incidents and make a positive impact on the LE as a whole. Given its importance, the LE is assessed annually in the Association of American Medical Colleges Graduation Questionnaire (AAMC GQ) survey of fourth year medical students, which provides data on medical school performance compared to other schools nationally, as well as year-over-year trends [15]. We used the survey to rigorously evaluate our

TABLE 1 | Major problems identified and interventions that were put in place for faculty development and engagement, learning climate committee revamp and physician wellness.

Faculty development and engagement
<p>Major problems identified</p> <ul style="list-style-type: none">• Faculty expressed feeling unprepared in their role as educator and conflicted between clinical productivity goals and expectations to fulfil learner educational needs.• Faculty were not aware of GQ results, and affiliated sites utilised faculty that did not identify as educators• Changing demographics conveyed increasing diversity in our medical school class for which there was little specific faculty developme• Education was typically delivered through formal programmes, mostly voluntary, and attended by self-identified educators <p>Changes that were implemented</p> <ul style="list-style-type: none">• A mandatory four-part, on-line and in-class training for Supporting Educational Excellence in Diversity (SEED) was required of all key teaching faculty throughout the medical school, health system, and affiliated sites. The total duration of this training was 12 h, including a mandatory in-person 3-h session.• The inclusion, diversity, antiracism, and equity (I-DARE) initiative was created to realise a health system-wide effort to advance equity and address disparities.• Faculty development was enhanced with in-person sensitivity training and microaggressions training. Modules were developed on teaching and mentoring diverse trainees that featured practicing skills through case interactives and providing feedback to millennials utilising a learner-centred approach.• LE grand rounds were delivered to all clinical departments. AAMC GQ results were shared during these grand rounds, using actual student reports of mistreatment, with discussion about how those incidents might be addressed.• Mistreatment incidents with a description of steps taken to address them were summarised in quarterly reports that were circulated widely across the campus community (Figure 2).
Learning climate committee revamp
<p>Major problems identified</p> <ul style="list-style-type: none">• The School of Medicine had established a Learning Climate Committee in 2014 that met monthly and worked towards addressing campus-wide problems with the learning environment.• There was little critical analysis of the GQ results or survey data• Membership consisted of loosely affiliated faculty and students with little decision-making capacity• The committee lacked specific agenda items or clear direction• The committee made few recommendations to address mistreatment or the learning environment. <p>Changes that were implemented</p> <ul style="list-style-type: none">• The need to reorganise the committee was recognised to better reflect relevant stakeholders. Leadership and membership were reorganised with medical student representatives, graduate medical education leaders, faculty directors from affiliated sites, programme directors, curriculum instructors and importantly, leaders from the health system including nursing and medical staff.• The committee reviewed survey results and policy changes, and it provided feedback on how to address mistreatment patterns and develop ways to cultivate and promote faculty professionalism.• The Associate Dean for Students was named chair of the LCC due to their proximal role to the student body.• Subsequently, an LE director was appointed who worked closely with the Associate Dean for Students to co-chair the Committee, follow up on reports and ensure timely follow-up and action.• New survey instruments were created that assessed professionalism, mistreatment and the learning environment; these were distributed at shorter intervals and at critical junctures of the education curriculum.• Questions pertaining to the learning environment were embedded into end of clerkship and course evaluations.• Committee membership was extended to leaders at major affiliate sites where trainees rotated.• Recognition of faculty for positive feedback in the LE was distributed campus-wide.• Refined mistreatment reporting mechanisms which allowed students to file reports on-line with greater ease were implemented. By 2021, 100% of students were aware of how to report mistreatment as reflected in the AAMC GQ survey.

TABLE 1 | (Continued)

Physician Wellness

Major problems identified

- Both faculty and clinical staff reported a high level of dissatisfaction and burnout, and the health system recognised the need for systems-based, organisational level efforts to enhance physician wellness.
- It was thought that inherent stressors in the workplace and conflicts around patient care were a significant contributor to professionalism lapses and mistreatment incidents in the learning environment.
- Increasing patient complexity and ACGME restrictions on resident workhours necessitated an update to how patients were admitted to inpatient services, and an organisational approach to resolving conflict was needed.
- Many faculty expressed that the time and effort needed to provide clinical teaching needed more support, with an emphasis on education in addition to clinical productivity.

Changes that were implemented

- Physician leadership was structured into a physician advisor programme overseen by the associate Chief Medical Officer (2019). This group resolved conflicts, answered questions and facilitated hospital throughput and problem-solving.
- An inpatient admissions committee was implemented in 2020 to help streamline decisions regarding admitting services and revise agreements between departments.
- An expansion of a peer responder programme for faculty to help process patient care events. Known as the “Support U peer responder programme”, this group created a safe environment to discuss stressful and traumatic experiences and “provide emotional support, compassion, and understanding”.
- Promotion of an Academic Staff Assistance Programme, staffed by clinical psychologists, to support faculty and staff well-being.
- Environmental enhancements for clinical faculty, including a physician lounge where physicians from different departments could intermingle and foster collaborative relationships.
- Wellness ambassador programme—Our Chief Wellness Officer recruited faculty to deliver wellness messaging, programmes, activities and resources with a focus on improving employee engagement and productivity. Wellness ambassadors attend quarterly trainings that promote cross-collaboration with other departments and receive small stipends to support well-being initiatives within their respective departments.
- Implementation of an innovative reimbursement model (Funds Flow model) with decreased emphasis on clinical productivity and enhanced support to faculty in key teaching and leadership roles. The new Funds Flow model included a \$100,000 annual stipend to all clinical departments with required clinical clerkship courses to support faculty teaching.

Interventions	2016	2017	2018	2019	2020	2021	2022	2023
Chief Wellness Officer Appointment (*not an intervention)				1/19				
ACMO/PA Structure (*not an intervention)				2/19				
Admissions Grid Revamp					1/20			
Grand Rounds Delivery to Individual departments				10/19				
In-person Microaggressions Training and Modules					4/20			
Learning Climate Committee re-organization					1/20			
Learning Environment Director appointment					7/20			
Quarterly Reports					1/20			
LCC to include GME						7/21		
SEED Training					1/20			
I-DARE (Inclusion, Diversity, Anti-racism, Equity) Initiative					11/20			
Physician and provider wellness initiatives (U Peer responder)					4/2020			
Be Bold Task Force				10/19				
Wellness Ambassadors				10/19				
Funds Flow Model (*Not an intervention)				7/19			7/22	

FIGURE 1 | Timeline of interventions. Gantt chart representing year in which interventions were initiated. Approximate dates of kickoff are also labelled. ACMO, Associate Chief Medical Officer; GME, Graduate Medical Education; LCC, Learning Climate Committee; PA, Physician Advisor; SEED, Supporting Educational Excellence in Diversity.

organisational interventions using a comparison of student responses on the AAMC GQ.

“We adopted educational interventions directed towards faculty and also broadened our efforts with health system interventions.”

2 | Approach

To evaluate change in the LE, we utilised a repeated cross-sectional design. This is a subtype of cross-section analysis in which data are collected from different subjects of the target population at different time points and are used for analysing

aggregate change over time [16]. If the LE interventions are effective, survey responses for the LE would show significant improvement over two time points.

2.1 | Setting

In 2019, in response to persistent low AAMC GQ scores in the LE, the Dean of the School of Medicine created a

multidisciplinary body made up of administration, faculty, staff, residents and students who were charged “to develop a proposal designed to impact the LE for all by addressing critical root systems issues and restore and inspire trust, hope and engagement.”

The group utilised a root cause analysis (RCA) approach to identify root causes for systems issues while comprehensive changes were put in place. Interventions targeted faculty

Total	9		
Report Classification	# of Reports	Report Summary	Action Taken
Curriculum	3	<ul style="list-style-type: none"> A. Inappropriate comment by facilitator during patient panel B. See A (same event) C. Inappropriate faculty comments to a patient (racial) 	<ul style="list-style-type: none"> A. Faculty provided feedback by curriculum Dean B. See A C. Faculty received feedback from clerkship director
Mistreatment	3	<ul style="list-style-type: none"> A. Five incidents of students being publicly embarrassed by residents, nurses, attendings, and scrub techs at main medical center and/or affiliate sites. B. Inappropriate facilitation of session including requiring students to remove clothing to perform clinical skill exercise C. Unprofessional behavior by an attending during consult from another service 	<ul style="list-style-type: none"> A. All incidents have been discussed with the residency program director, affiliate partners, site director, OR leadership with feedback to those involved. B. Faculty member and clerkship leadership given feedback by Learning Climate committee. Teaching session will be modified moving forward. C. The incident was reported to the site director. Program leadership provided feedback and counseling to the source.
LE Survey	1	<ul style="list-style-type: none"> A. Faculty sharing inappropriate political, racial and religious comments 	<ul style="list-style-type: none"> B. Course director removed faculty - will not be working with students moving forward.
Non-Mistreatment	2	<ul style="list-style-type: none"> A. Unprofessional student comment made about a faculty member B. Examination environment concern (related to ill student) 	<ul style="list-style-type: none"> A. Action deemed not necessary. B. Action deemed not necessary.

FIGURE 2 | Quarterly reports. Quarterly reports outlining specific actions taken to address mistreatment were distributed across campus and affiliated sites.

which were identified by students as the main driver of mistreatment and negative LE. Problems with the LE and their root causes fell into three main categories: lack of faculty development and engagement, underemphasis on physician wellness and an ineffective learning climate committee, which was made up of abroad coalition of students and faculty that met monthly to address problems with the LE. See Table 1 for a brief description of major initiatives introduced and Figure 1 for their timeline. Figure 2 provides an example of distributed quarterly reports. “Interventions targeted faculty which were identified by students as the main driver of mistreatment and negative LE.”

The efforts were evaluated over a span of 8 years with a comparison of two periods of student responses on the AAMC GQ: a pre-intervention (2016–2018) and postintervention period (2021–2023) with exclusion of the years 2019 and 2020 (implementation and ramp-up years). Years 2016–2018 were chosen to reflect baseline, since organisational initiatives were initiated in 2019 during different timeframes.

3 | Evaluation

Deidentified item-level response data were obtained from the Association of American Medical Colleges (AAMC) for all students who completed the Graduation Questionnaire (GQ) from 2016–2023. For the 2016–2018 Cohort (before), there were a total of 255 survey respondents out of 319 graduates. For the 2021–2023 Cohort (after), there were a total of 298 respondents out of 337 graduates (Table 2).

4 | Statistical Methods

For mistreatment, statistical analysis was performed utilising R version 4.3.2. with a significance level defined as 0.05.

For faculty professionalism, two-tailed *t*-tests were used to identify statistically significant differences in item means between the two cohorts. A $p < 0.05$ defined statistical significance, using R version 4.3.1 (2023-06-16).

4.1 | Ethical Considerations

The Institutional Review Board determined that the study did not meet federal regulations' definition of human subject research and deemed the study exempt from full institutional board review.

5 | Results

5.1 | Mistreatment Analysis

None of the mistreatment events were statistically significant between the pre-intervention and postintervention periods, except for “required to perform personal services” (Table 3).

5.2 | Faculty Professionalism Analysis

In 14 of the 15 items being measured, students who graduated from 2021 to 2023 perceived faculty to demonstrate professional behaviours more frequently than did students who graduated from 2016 to 2018. (Table 4). The only question that did not demonstrate statistical significance was the question pertaining to the hidden curriculum.

In subgroup analysis, there were no significant differences in gender distribution between the cohorts.

6 | Implications

Taken together, our results show that large-scale interventions directed towards faculty may be effective at improving perceptions of faculty professionalism over time but have no or a limited effect on the number of reported mistreatment events. This is the only study to our knowledge that has made a significant impact on the faculty professionalism subset of the AAMC GQ LE. The interventions were derived from an in-depth RCA which involved faculty, front-line staff, and students. Institutions committed to improving perceptions of faculty professionalism can utilise a similar approach for

TABLE 2 | Demographic characteristics of the students completing the graduate questionnaire from 2016 to 2023.

	2016	2017	2018	2019	2020	2021	2022	2023	2023 all schools
Male	42%	47.9%	41.9%	32.5%	38%	30.8%	35.8%	40.6%	46.1%
Female	58%	52.1%	58.1%	67.5%	62%	69.2%	64.2%	59.4%	53.9%
Ages 24–32	91.8%	90.7%	83.8%	90.4%	83.3%	85.7%	86.8%	89.2%	94.1%
White	48.9%	39.4%	37.6%	35.4%	29.6%	37.4%	38.1%	27.7%	59.6%
Black or African American	6.8%	8.5%	4.7%	8.5%	8.3%	2.2%	3.8%	13.9%	7.2%
Hispanic, Latino, or Spanish origin	19.2%	16%	22.4%	19.5%	31.5%	19.8%	21%	19.8%	10.2%
Other ^a	35.6%	47.9%	43.6%	50%	10.2%	50.6%	52.4%	53.5%	34.1%
Total who responded to questionnaire	73	96	86	83	101	91	106	101	16,699

^aOther—American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, non-US Citizen and nonpermanent resident and other undefined.

TABLE 3 | Fisher's exact *t*-test to examine significance of mistreatment events.

Questions	<i>p</i> -value	Significant
Denied opportunity for training based on gender	0.21350	False
Denied opportunity for training because of race or ethnicity	0.39414	False
Denied opportunity for training because of sexual orientation	1.00000	False
Lower grades because of gender rather than performance	0.49235	False
Lower grades because of race rather than performance	0.47293	False
Lower grades because of sexual orientation	1.00000	False
Offensive remark because of sexual orientation	0.71677	False
Offensive sexist remark or name	0.09412	False
Physically harmed	0.83766	False
Publicly embarrassed	0.58366	False
Publicly humiliated	0.40611	False
Required to perform personal services	0.00452	True
Sex for grade or other reward	0.44867	False
Subjected to offensive behaviour based on personal beliefs	0.75295	False
Subjected to racially offensive remarks or names	0.15082	False
Threatened with physical harm	0.62808	False
Unwanted sexual advances	0.95663	False

Note: UC Davis graduating students answered 17 mistreatment-related questions with responses falling into one of four categories: never, once, occasionally and frequently. A Fisher's exact test was conducted with a significance level of 0.05 to examine the relationship between each instance of mistreatment and intervention period. There was no significant difference in any of the mistreatment periods except for "Required to perform personal services" (highlighted in bold text) which had decreased significantly in the postintervention period.

their setting, including an RCA to identify problems in their respective LE.

“Large-scale interventions directed towards faculty may be effective at improving perceptions of faculty professionalism over time.”

There were likely other benefits of improved perceptions of faculty professionalism. With less conflict in the clinical environment, there may have been improvement in throughput and quality metrics. Nursing, house-staff and other disciplines likely benefited from improvement in relationships with faculty. Patient satisfaction surveys may also reflect improved perceptions which align with student perceptions. Further

research would be helpful to see if these collateral benefits occurred.

The sole question that did not show improvement was the question pertaining to the hidden curriculum (HC), defined as a set of values informally conveyed to learners through clinical role-modelling. One factor that may have contributed to lack of improvement during this study is the high proportion of underrepresented in medicine (URM) students not mirrored by URM faculty. There is literature suggesting that URM students experience the HC differently than non-URM students due to increased rates of moral injury [17]. Moral injury is defined as the emotional discomfort trainees experience because of pressure to conform to ideologically incongruent values and behaviours that are demonstrated by superiors in a hierarchical system [17]. Faculty and staff who come from URM backgrounds with comparable life experiences may share similar values and have a deeper empathy with patients' lived experiences. This likely plays a significant role in limiting moral injury from distressful encounters with the HC where URM students are forced to reconcile their personal and professional identities. One consequence of faculty instructors from predominantly non-URM backgrounds is more frequent negative encounters with the HC for our URM learners. This warrants further study alongside robust faculty and staff diversity recruitment efforts. Additionally, the HC for students is influenced both by faculty and resident supervisors, and during the time of this study, we did not develop LE interventions at the Graduate Medical Education (GME) level. Since inception, the mistreatment reporting survey has been extended to include GME learners; GME representatives and programme directors have been invited to participate in the LCC and engage in interventions to improve the LC. With a prioritised emphasis on GME involvement, it will be important to follow survey responses to see if the HC improves over time.

“The sole question that did not show improvement was the question pertaining to the hidden curriculum.”

We often assume that faculty are the main drivers of mistreatment, but our study underscores the nuanced nature of these incidents. A high degree of variability in medical student perceptions of mistreatment has been corroborated in other studies [18]. We may have been able to make an impact on mistreatment by setting expectations or preparing students for their clinical experience, which others have demonstrated can decrease mistreatment reports [19]. Expanding the RCA approach to include student perspectives on mistreatment may allow us to better understand the root causes of these types of incidents and implement interventions accordingly. As noted with the HC, make-up of the class may also impact mistreatment incidents. We have seen increased diversity in our medical school classes without a commensurate increase in faculty diversity. The mismatch between student and faculty diversity may lead to an increase in certain types of mistreatment events such as exposure to discriminatory comments based on race, ethnicity, gender or sexual orientation.

Finally, under-reporting may have improved with our interventions, leading to increased student willingness to report

TABLE 4 | Two-tailed *t*-tests to examine significance of perceptions of faculty professionalism.

Item	Mean score 2016–2018	Mean score 2021–2023	Difference	<i>p</i> -val	95% CI-low	95% CI-high
• Faculty respecting patient confidentiality:	5.33	5.54	−0.21	< 0.001	−0.34	−0.08
• Faculty using professional language/avoiding derogatory language:	4.89	5.11	−0.22	0.01	−0.38	−0.06
• Being respectful of house-staff and other physicians:	4.91	5.19	−0.28	< 0.001	−0.41	−0.14
• Faculty respectful of diversity:	4.85	5.05	−0.20	0.01	−0.35	−0.05
• Faculty respectful of other healthcare professions:	4.73	5.07	−0.34	< 0.001	−0.50	−0.19
• Faculty respectful of other specialties:	4.32	4.82	−0.50	< 0.001	−0.66	−0.34
• Faculty provides direction and constructive feedback:	4.29	4.71	−0.42	< 0.001	−0.59	−0.25
• Faculty showing respectful interaction with students:	4.65	4.92	−0.27	< 0.001	−0.42	−0.13
• Faculty showing empathy:	4.70	4.97	−0.27	< 0.001	−0.42	−0.13
• Faculty respectful of patient dignity:	4.89	5.17	−0.28	< 0.001	−0.43	−0.14
• Faculty listens to patients:	4.75	5.05	−0.30	< 0.001	−0.44	−0.16
• Faculty takes time to explain to patients:	4.61	4.92	−0.31	< 0.001	−0.45	−0.16
• Faculty advocates for patients:	4.75	5.01	−0.26	< 0.001	−0.39	−0.11
• Faculty resolving conflict respectfully:	4.72	5.01	−0.29	< 0.001	−0.44	−0.15
• Student sees disconnects (hidden curriculum):	2.84	2.90	−0.06	0.54	−0.25	0.13

Note: Independent sample two-tailed *t*-tests were used to identify statistically significant differences in item means between the pre-intervention and postintervention groups with *p* < 0.05 defining statistical significance. Differences in mean item scores between the two cohorts were found to be significantly improved in 14 out of 15 items being measured, with the exception the hidden curriculum.

individual faculty members who exhibit negative behaviours. All these factors may have contributed to a lack of improvement in mistreatment events, while still resulting in improvements in perceptions of faculty professionalism as a whole.

“The mismatch between student and faculty diversity may lead to an increase in certain types of mistreatment events.”

While our results demonstrate the overall success of a comprehensive set of system-wide interventions towards improving faculty professionalism, there were contextual factors that need to be considered when interpreting the results of our study. In 2020 and to a lesser degree in 2021, the COVID-19 pandemic led to an absence of students on clinical rotations. Our results represent a nonexperimental, before–after study,

and there are inherent biases in survey instruments that need to be considered. Finally, our results do not identify the relative contributions of the individual interventions to the final observed improvements in faculty professionalism. It may be helpful to have follow-up discussions with the original workgroups to elicit perspectives of what the most effective interventions were.

Despite these limitations, our interventions demonstrated significant improvements in faculty professionalism and may be utilised with those who are struggling with this portion of the LE. At our institution, mistreatment continues to be an elusive problem similar to others [20, 21] and ongoing research into interventions and contextual factors beyond faculty, such as the HC, is necessary to determine how best to optimise this portion of the LE.

Author Contributions

Mithu Molla: writing – review and editing, conceptualization, investigation, writing – original draft, methodology, validation, visualization. **Mark Servis:** conceptualization, investigation, writing – original draft, methodology, validation, writing – review and editing, visualization, supervision, resources. **Tiffany Hodgens:** formal analysis, data curation. **Zainab Akinjobi:** formal analysis. **Sharad Jain:** conceptualization, investigation, funding acquisition, writing – original draft, methodology, validation, writing – review and editing, visualization, supervision, resources.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.