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PRACTICE GUIDELINES

Mitigating minority stress in simulation-based education: educational strategies for inclusive simulation practice

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ABSTRACT

Simulation-based education relies on learner engagement, psychological safety and equitable participation. However, learners from minoritized backgrounds may experience simulation environments differently due to identity-related stressors such as stereotype threat, belonging uncertainty and concerns about biased evaluation. Minority Stress Theory provides a framework for understanding how social environments can activate stress processes that interfere with learning and performance. Building on prior conceptual work applying Minority Stress Theory to simulation-based education, this article translates that framework into practical guidance for simulation educators. We propose eight practice strategies addressing prebriefing, scenario design, facilitator training, debriefing structure, assessment practices, environmental signals of belonging and programme-level improvement processes. By reducing minority stressors in simulation environments, educators can promote more inclusive, psychologically safe learning experiences that enable all learners to engage fully in simulation.

Introduction

Healthcare simulation has become a central modality within health professions education, providing structured opportunities for experiential learning, deliberate practice and reflective debriefing [1–4]. The effectiveness of simulation-based education depends heavily on learners' willingness to engage, take interpersonal risks and openly examine their performance during debriefing. These processes rely on psychological safety and equitable participation within the learning environment [5,6].

Despite growing attention to diversity, equity and inclusion in simulation, learners from minoritized backgrounds frequently report experiencing simulation environments differently than their peers [7–10]. Concerns related to stereotype threat, belonging and evaluation bias may shape how learners participate in scenarios and debriefings [11–14]. These dynamics can influence engagement, help-seeking behaviour and learning outcomes [15,16]. Recent conceptual work has applied Minority Stress Theory to healthcare simulation, proposing that core features of simulation-based education, including observable performance, social evaluation and structured debriefing, may activate minority stress processes among learners [17]. The theory itself originates from psychological research examining how stigma-related stress affects the health and functioning of marginalized populations [18–20].

While this conceptual framework helps explain how minority stress processes may arise in simulation environments, educators require practical guidance for

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translating these insights into educational practice. Despite growing attention to equity and inclusion in simulation-based education, there remains limited conceptual guidance for understanding how simulation environments themselves may activate identity-related stress processes. The purpose of this article is therefore to translate Minority Stress Theory into practical recommendations for simulation educators. This work builds on prior conceptual scholarship applying Minority Stress Theory to simulation-based education [17], including the author's prior work, as well as broader theoretical and empirical literature on minority stress.

Minority stress processes in simulation

Minority Stress Theory describes how individuals occupying stigmatized social positions experience chronic stress arising from both external conditions and internalized expectations of bias [18–20]. Prior conceptual work has applied this framework to healthcare simulation, identifying how simulation's performance-based, socially intensive and evaluative characteristics may activate minority stress processes [17]. Distal stressors refer to external, objective conditions such as experiences of discrimination, exclusion or structural inequities, whereas proximal stressors involve internal psychological processes, including expectations of bias, heightened vigilance, identity concealment and internalized stigma [18–20].

Simulation environments possess characteristics that may intensify these processes. Simulation activities require observable performance, occur in socially intensive settings and frequently involve explicit or implicit evaluation by peers and faculty [1–5]. For learners who already anticipate bias or exclusion, these conditions may heighten vigilance and increase cognitive load. These identity-related stress processes may also reduce learners' willingness to engage fully in simulation activities, potentially limiting the reflective and experiential learning processes central to simulation-based education. Research across educational and psychological contexts suggests that stereotype threat, belonging uncertainty and identity management can consume cognitive resources and reduce performance even among highly capable learners [11–13].

Educational research also demonstrates that learners from historically marginalized groups often experience training and learning environments differently due to social and structural dynamics [9]. In simulation settings, these dynamics may manifest as reduced willingness to volunteer for leadership roles, reluctance to ask questions, diminished engagement during debriefing or heightened anxiety during performance.

Because minority stress processes are shaped by environmental cues, simulation educators can influence their activation through thoughtful design and facilitation choices [7,8]. Drawing on Minority Stress Theory and related educational psychology literature, these processes provide a useful framework for identifying aspects of simulation design, facilitation and assessment that may unintentionally activate identity-related stressors. Translating these insights into educator practices can help reduce barriers to participation and support more equitable learning environments.

Many established simulation practices, including structured prebriefing, facilitated debriefing and attention to psychological safety, already align with principles that may mitigate minority stress. However, these approaches are not typically framed through an explicitly equity- or identity-informed lens. Applying Minority Stress Theory provides a framework for understanding how these practices may be adapted or refined to better address identity-related stressors in simulation environments.

Table 1 summarizes common minority stress processes that may arise in simulation environments and corresponding strategies educators can use to mitigate these dynamics. The following guidelines outline practical strategies for reducing minority stressors and promoting identity-safe simulation environments.

Practical strategies for simulation educators

Drawing on Minority Stress Theory and related educational psychology literature, the following strategies outline practical approaches that simulation educators can use to reduce minority stressors and promote identity-safe learning environments.

Strategy 1: establish identity-safe prebriefing practices

Prebriefing plays a critical role in shaping learners' expectations of psychological safety [6]. Facilitators should clearly communicate that simulation is a learning environment rather than an evaluative test and emphasize that diverse perspectives and experiences are valued. Explicit statements of inclusion and respect may reduce anticipatory anxiety among learners who expect bias or exclusion [18–20].

Strategy 2: design scenarios that avoid stereotyped representations

Scenario narratives should reflect diverse patient populations without reinforcing stereotypes. When minoritized identities appear only in association with specific conditions or social problems, simulations may inadvertently reinforce harmful assumptions [7,8]. Programmes should periodically review scenario libraries for representational patterns and intentionally diversify patient roles across a range of clinical contexts.

Strategy 3: train facilitators to recognize minority stress dynamics

Facilitators influence psychological safety through both verbal and nonverbal behaviours [6]. Faculty development programmes should include training on stereotype threat, microaggressions and bias in educational environments [11–13]. Facilitators who understand these dynamics are better able to interpret participation patterns and respond constructively when identity-related tensions arise during scenarios or debriefings. Awareness of these processes may also help facilitators recognize when minority stress is affecting learner participation or performance.

Table 1: Minority stress processes in simulation and strategies for educators

Minority stress process	Potential manifestation in simulation	Educator strategies
Expectation of bias or negative evaluation	Learners may anticipate harsher judgement from faculty or peers during performance-based scenarios	Communicate clearly during prebriefing that simulation is a learning environment rather than a test. Use structured evaluation tools and transparent criteria to reduce perceived subjectivity.
Stereotype threat	Learners may worry that errors reinforce stereotypes about their identity group, increasing anxiety and cognitive load	Emphasize growth-oriented framing during prebriefing and debriefing. Normalize mistakes as expected elements of experiential learning.
Belonging uncertainty	Learners may question whether they are accepted within the training group	Establish inclusive ground rules during prebriefing and intentionally invite contributions from all participants during debriefing discussions.
Identity vigilance	Learners may carefully monitor their behaviour to avoid confirming stereotypes	Avoid singling learners out to represent identity groups and encourage multiple perspectives through structured facilitation techniques during discussion.
Environmental signals of exclusion	Simulation spaces or materials may implicitly signal limited diversity	Review simulation spaces and scenario materials for representation, including diverse patient portrayals and varied manikin skin tones.

Note: Concepts derived from Minority Stress Theory and related educational psychology literature [9,11–13,18–20] and applied to healthcare simulation contexts.

Strategy 4: structure debriefing to promote equitable participation

Debriefing discussions can unintentionally privilege more vocal participants, limiting opportunities for quieter learners to engage. Facilitators should use structured approaches that distribute opportunities for reflection across the group, such as open-ended prompts, written reflection or small-group discussion [5]. Importantly, facilitators should avoid directly calling on quieter learners or singling out individuals based on their level of participation, as this may increase performance pressure and undermine psychological safety. Instead, the goal is to create conditions in which all learners, including quieter participants, have equitable opportunities to contribute voluntarily.

Strategy 5: avoid positioning minoritized learners as identity representatives

During discussions of cultural or identity-related issues, facilitators should avoid placing learners in the position of representing entire social groups. Such expectations may create discomfort or impose additional emotional labour [9]. Instead, facilitators should frame discussions using general principles and evidence-informed perspectives.

Strategy 6: use structured and transparent assessment processes

Assessment practices may be perceived as biased when criteria are unclear or subjective. Structured evaluation tools, explicit performance criteria and the use of multiple evaluators can help reduce opportunities for implicit bias [14]. Transparency in assessment processes may also reduce anxiety related to potential discrimination.

Strategy 7: attend to environmental signals of belonging

Physical environments communicate implicit messages about who belongs. Simulation centres should consider representation in imagery, diversity in equipment (such as varied skin tones in manikins), accessibility features and inclusive signage [7,8]. These environmental cues may shape learners' perceptions of belonging within the training environment.

Strategy 8: engage learners in continuous improvement of simulation programmes

Learners possess valuable insight into how simulation environments are experienced. Programmes should regularly solicit anonymous feedback regarding inclusivity and psychological safety [7]. Engaging learners as partners in improvement efforts may help identify barriers that educators might otherwise overlook.

Implementation considerations

Effective implementation of equity-informed simulation practices requires attention at both the faculty and programme levels. Faculty development initiatives should integrate training on inclusive facilitation alongside existing instruction on debriefing and simulation pedagogy [5]. Programme leaders can support these efforts by establishing formal processes for reviewing scenario design, assessment practices and learning environments [7,8].

Implementation of these practices may vary across simulation programmes depending on available resources, faculty development infrastructure and institutional priorities. Programmes may therefore need to adapt these strategies to local contexts while maintaining the underlying principles of inclusive facilitation and equitable learning environments.

Importantly, responsibility for addressing minority stress should not fall solely on individual educators. Organizational commitment is necessary to ensure sustained attention to equity in simulation [7]. This may include allocating resources for faculty development, incorporating inclusivity metrics into programme evaluation and supporting diversity among simulation faculty and leadership.

These efforts should be understood not only as equity initiatives but also as quality improvements in simulation-based education. Learning environments that reduce unnecessary psychological burdens allow all learners to engage more fully in experiential learning and reflective practice [6,18–20]. Collectively, these strategies highlight how simulation programmes can translate conceptual insights from Minority Stress Theory into practical actions that promote more inclusive and equitable learning environments. While this framework is grounded in Minority Stress Theory and highlights the experiences of learners from minoritized backgrounds, many of the strategies described may benefit all learners by promoting psychological safety, inclusive facilitation and equitable participation across a range of visible and invisible identities including those that may not be immediately apparent to facilitators.

Conclusion

Simulation-based education offers powerful opportunities for experiential learning, yet its performance-based and socially evaluative nature can inadvertently reproduce inequities experienced in broader educational and clinical environments [9,11–13]. Building on prior conceptual work applying Minority Stress Theory to simulation-based education, this article translates that framework into practical strategies for simulation educators [17]. Thoughtful attention to scenario design, facilitation strategies, assessment practices and programme structures can reduce minority stressors and promote equitable participation in simulation-based education.

Future research should evaluate how minority stress processes operate within simulation-based learning environments and whether targeted educator practices mitigate their effects. Empirical studies could examine relationships between simulation design, facilitation practices and learners' perceptions of psychological safety, belonging and evaluation fairness. Mixed-methods research incorporating learner surveys, performance metrics and qualitative reflections may be particularly useful for identifying how identity-related stressors influence participation, cognitive load and learning outcomes in simulation [6,11–13,18–20]. Such work would help refine implementation strategies and support the development of evidence-based guidelines for inclusive simulation practice. Continued research is needed to evaluate these approaches and further refine strategies for fostering inclusive simulation environments.

Declarations

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