Perspective: **The Negativity Bias, Medical Education, and the Culture of Academic Medicine: Why Culture Change Is Hard**

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Abstract

Despite ongoing efforts to improve working conditions, address well-being of faculty and students, and promote professionalism, many still feel the culture of academic medicine is problematic. Depression and burnout persist among physicians and trainees. The authors propose that culture change is so challenging in part because of an evolutionary construct known as the negativity bias that is reinforced serially in medical education. The negativity bias drives people to attend to and be more greatly affected by the negative aspects of experience. Some common teaching methods such as simulations, pimping, and instruction in clinical reasoning inadvertently reinforce the negativity bias and thereby enhance physicians' focus on the negative. Here, the authors examine the concept of negativity bias in the context of academic medicine, arguing that culture is affected by serially emphasizing the inherent bias to recognize and remember the negative. They explore the potential role of practices rooted in positive psychology as powerful tools to counteract the negativity bias and aid in achieving desired culture change.

Recently, the culture of academic medicine has become the subject of rich dialogue. At its best, this culture exemplifies commitment, achievement, collaboration, innovation, awe, and connection.[1] We academic physicians consider ourselves to be high-achieving, focused, and scholarly.[2] Nonetheless, despite these favorable attributes, academic medicine demonstrates a high incidence of faculty dissatisfaction,[3,4] student moral distress,[5] and the perception of mistreatment among trainees.[6] In these accounts, we describe ourselves as perfectionistic, hierarchical, intensely individualistic, and competitive.[2,3,7] This unforgiving culture contributes to high rates of burnout, depression, and suicide among physicians.[8,9]

Throughout medical school and graduate medical education, physicians in training not only acquire the knowledge and skills required for the practice of medicine but also learn the culture of academic medicine. Researchers and educators have turned to aspects of medical education, such as professionalism,[10] the hidden curriculum,[11] student–teacher relationships,[7] and relationship-centered care,[12] seeking strategies to improve our culture from the earliest stages of training. As a result, we have implemented educational interventions such as core competencies that emphasize professionalism, and interpersonal and communication skills. We have improved working conditions with resident duty hours limitations. Beyond training, physician wellness programs improve the satisfaction of practicing physicians by helping them achieve more balanced lives,[13] and disruptive physician programs work to eliminate threatening and unprofessional behaviors.[14,15] Many academic health centers have created opportunities for reflective practices such as mindfulness, reflective writing, yoga, or meaning-in-medicine discussion groups that have been shown to decrease burnout and enhance learning experiences.[16,17] Despite these various innovations, many still consider the culture of academic medicine to be problematic.[3,18]

We propose that culture change is so challenging in part because of an evolutionary construct known as the negativity bias[19,20] that is reinforced serially in medical education. Here, we examine the concept of negativity bias in the context of academic medicine and explore the potential role of practices rooted in positive psychology as powerful tools to counteract the negativity bias and aid in achieving desired culture change.

The Negativity Bias

The negativity bias has been exhaustively explored in the field of psychology. It describes the idea that humans are more attentive to and are more influenced by the negative aspects of their environment than by the positive. Presumably, there has been an evolutionary benefit from becoming instinctively wary, and over time the negativity bias has come to affect us across a broad spectrum of the human experience.[19,20] Baumeister and colleagues[19] detail the science that demonstrates how negative events, emotions, and interpersonal interactions greatly influence us. Researchers have shown that the learning, memories, and information processing that result from negative experiences dominate over those related to positive experiences.[19,20]

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The profound effect of negative experiences and the dominance of memories and learning resulting from them are clearly illustrated in our everyday experience in medicine and in our education process. For example, a physician who has previously missed a particular diagnosis may choose to pursue further imaging and lab work on a patient despite evidence-based guidelines suggesting a low risk of that disease. Physicians who develop this "once bitten, twice shy" approach after a negative patient experience have difficulty disavowing it no matter how strong the evidence to the contrary.[21] The pain, anger, devastation, or feeling of having failed a patient can endure indefinitely.[22]

Remarkably, even the anticipation of a negative interaction can change one's behavior.[23] Every day, people inherently and instinctively watch for what is dangerous, react based on previous experiences, and anticipate or plan for the worst that might happen. The negativity bias unconsciously permeates all reactions and relationships. It is therefore not surprising that the negativity bias also affects the processes important in education: how people learn, how people process information, and what people remember.

Learning is the acquisition of knowledge or skill that manifests in behavioral or cognitive change. Positive reinforcement (reward) and negative repercussion (punishment) are two accepted strategies that can motivate a learner. Researchers have evaluated the efficacy of reward versus punishment with varying experimental constructs and across developmental stages.[20,24,25] Vaish and colleagues[20] concisely summarize these data:

> Learning research indicates a powerful negativity bias at a very basic psychological level: Negative reinforcement, as opposed to comparable positive reinforcement, leads to faster learning that is more resistant to extinction in both human adults and in animals.

Information processing is the mechanism by which newly obtained information is manipulated, coded, and combined with previous experience, allowing it to be used in thinking, problem solving, and performance of tasks. Information processing is a critical step in determining the meaning of new data and the commitment of that knowledge to long-term memory.[19] The negativity bias is manifest in information processing in that negative experiences have been shown to command a greater quantity of thought than positive ones.[26,27] This suggests that people have a greater drive to understand the factors and meaning of negative events. In medicine, this is illustrated by the tremendous energy devoted to understanding medical errors and bad outcomes.

Negativity bias is present in the results of studies on memory as well. Several researchers have demonstrated that, compared with positive memories, both children and adults have greater recall of unpleasant memories, more vivid descriptions of undesirable behaviors, and consistent recollection of the content of negative memories over time.[28–30] Interestingly, the affective intensity of the memory is determined by its content. Negative memories of self are downplayed, whereas negative memories of others are not.[31,32] These data suggest that we place great value on the detail of negative experiences but that a protective instinct minimizes our own contributions while maintaining an awareness of the perceived negative behaviors of others.

The negativity bias is a powerful force that humans have developed to protect themselves from threat. It affects how we act in the moment. It shapes what we learn, understand, and retain from past experiences. It can influence our relationships with others. Most important, our negativity bias is so instinctual, most of us are not even aware that it exists.

Reinforcement of Negativity in Medical Education

Medical education reinforces the negativity bias in many ways. Some are explicit, some are subtle, and some are likely unconscious to both the teacher and learner. In his book *How Doctors Think*, Groopman[33] articulates that physicians are trained always to entertain the worst-case scenario first to avoid missing an important diagnosis. Medical students, for example, learn early in their education always to rule out the myocardial infarction before attributing chest pain to heartburn or a musculoskeletal source. Although this algorithm is necessary and designed with noble intent, it clearly reinforces an inherent bias toward the negative. Lane[34] describes how this fatalistic thinking permeates her life: "Upon closer observation everything that seemed benign was not…. It captured one aspect of a physician's point of view: in all places, the potential for pathogens and pathology is real."

Simulations are particularly effective learning tools and are therefore being increasingly incorporated into medical education.[35,36] Young and colleagues[36] assert that it is imperative to create a learning environment of "deliberate practice," one in which the tension and emotion would be similar to that which would be present in a real-life scenario. In mock codes and trauma simulations, the high-stakes nature of the simulated patient's situation can cause situational anxiety in even the most experienced providers. For students and trainees, the affective component of being involved in experiential learning creates a more intense learning environment than simply writing an essay or responding to a multiple-choice question. Many instructors recognize this dynamic and try to mitigate the tension associated with simulations in their introductions and debriefing sessions. Nonetheless, for some students simply performing in front of an audience of peers and instructors can provoke anxiety. Although the purpose of simulation is certainly not to produce learner discomfort, we must entertain the possibility that the efficacy of this teaching method is due at least in part to a learner's uneasiness.

Another common teaching strategy that reinforces the negativity bias is "pimping." This technique has likely evolved from the Socratic Method, in which,

> [r]ather than giving information, a teacher instead asks students a series of questions. The students either come to the desired knowledge by answering the questions or become more deeply aware of their own limits.[37]

Whereas the Socratic Method can be a positive experience through which a teacher leads a learner to the correct answer, Louie and colleagues[38] describe pimping as follows: "the attending will query students in turn about medical facts…. Students who fail to provide

the answer sought are *shamed* into reading more that evening" (emphasis added). Simply put, "pimping is teaching by intimidation."[7] Here, the negative relational aspect is a powerful motivator toward the acquisition of knowledge.

In her award-winning Humanism in Medicine essay, Miller[39] captures how fear is an integral component of the culture of academic medicine.

> As medical students, whether preclinical or on the wards, we live in fear, afraid to make a mistake, to forget a fact, to appear stupid in front of peers or superiors, or even to cause harm to patients through our ignorance…. [I]t does not end with graduation; the rigid hierarchy of medical training means that the underlying fear persists, albeit at a more subtle level, as the physician-in-training advances up the ranks.

This statement suggests that the reinforcement of many of the educational biases toward the negative persist into graduate medical education as well.

The Culture of Academic Medicine

Presumably, the culture of academic medicine has evolved to its current state because many aspects of the negativity bias enhance our culture. It is appropriate to critically appraise factors contributing to medical errors or unanticipated patient outcomes so that we may practice more safely. Acutely remembering the teaching points from a mock code can improve performance in a real one. Healthy skepticism has led to revolutionary changes and advancements in our field. Yet, there may be unintended consequences to this pervasive focus on the negative.

By inadvertently serially reinforcing our inherent negativity bias, we may not simply be teaching young physicians necessary critical thinking skills and clinical judgment. We may also be heightening their natural tendency to look for threats in myriad situations. If this is true, it is not surprising that physicians can become pessimistic and problem-focused, creating a dominant culture that seeks and expects the worst.

Given that the negativity bias is basic and fundamental to us all, it is no wonder that the culture of medicine is extraordinarily difficult to change. Academic medicine, however, is changing for the better. We are increasingly aware of the potential lasting effects of events and interactions both in the academic realm and with our patients.[7,40] Initiatives to improve work conditions, promote professionalism, and address physician wellness send a strong message that positive experiences and role models are important.[41,42] Our inherent bias toward the negative, however, encourages us to continue to find faults, dangers, and pitfalls. As a result, we underestimate the improvements and sharpen our focus on the next problem. For this reason, if we hope to fully realize culture change in academic medicine, we must begin to educate ourselves and our learners to intentionally acknowledge and emphasize the positive.

Positive Psychology

Researchers in the field of positive psychology assert that day-to-day emotional experiences affect the very course of people's lives. By deliberately noticing positive emotion and experiences, individuals have the opportunity to fundamentally change how they perceive their environment, how they think, and how they act. In a placebo-controlled trial, Seligman and colleagues[43] established that simply keeping a daily "what went well" journal can markedly lower the incidence of depression at three and six months.

In comparison with negative emotions that narrow people's ideas about possible actions, Fredrickson and colleagues[44,45] demonstrated that positive emotions broaden people's ideas about possible actions. Losada and Heaphy's[46] work with management teams confirms this. Losada and Heaphy observed the character of conversation in the team meetings of high-, medium-, and low-performing teams (as determined by profitability, customer satisfaction, and 360-degree evaluation). High-performing teams were significantly more likely to speak positively to one another (5.6:1 positive: negative remarks) than were low-performing teams. Members of high-performing teams explored each other's remarks and ideas with questions rather than simply advocating their own points of view. Additionally, high-performing teams considered the effects of their actions on others as well as themselves. Losada and Heaphy[46] concluded that the positive interactions among the team enhanced their functioning and ultimately contributed to the organization's success.

In his book *Flourish*, Seligman[47] demonstrates the translation of positivity into desirable outcomes in an education setting. In a controlled intervention in a Philadelphia high school, half of ninth-grade students were assigned to language arts classes that incorporated positive psychology and personal strength identification, whereas the others had the standard curriculum. He found that, when rated by blinded teachers, the students who received the intervention had improved curiosity, creativity, love of learning, and engagement in school.[47]

With this knowledge, consider bedside rounds: How would the content of those conversations be coded? Is there more inquiry or advocacy? Are comments supportive or cynical? Is the focus on other or self? Although these concepts are not as fully explored in academic medicine as they are in other disciplines, two investigations suggest that deliberate infusions of positivity can have a desirable effect on medical professionals. Isen and colleagues[48] studied the influence of positive affect on clinical problem solving in third-year medical students. This study demonstrated that students with an induced positive affect showed greater efficiency and integrative consideration. They were also more likely to go beyond the scope of the assigned task and had improved organization. Similarly, Estrada and colleagues[49] studied 44 internists as they reasoned through a simulated case study of a patient with chronic active hepatitis. They found that the internists who were in the induced positive affect group considered liver disease earlier than those in the control group did and were more likely to consider additional pieces of information between hypothesis generation and arriving at their final diagnosis (demonstrating greater flexibility in their decision making).

Interestingly, the techniques used to induce positive affect in the participants in these studies were very simple. The medical students were praised for their performance on a simple puzzle prior to starting the study case. The internists were given a small bag of candy in appreciation for their participation. This suggests that positive interventions need not be grandiose to be effective.

In fact, Fredrickson[45] found that excess positivity (a ratio of 11:1) was perceived as insincere and was therefore dismissed. From these data, one can conclude that simple, sincere positivity used commonly, but not excessively, could be the spark for culture change in academic medicine. Thanking a colleague for his or her consult, complimenting a speaker's grand rounds, or listening to a student who has had a difficult experience may have lasting effects that extend beyond their intended meaning.

Changing the Culture

Guarnaccia and Rodriguez[50] assert that "to become a professional involves at least two processes of acculturation—one to the dominant culture and the other to that of the profession." Schools of medicine have created extraordinary programs to integrate students and trainees into the profession of medicine. Now we must turn our attention to the dominant culture. Changing our perspective is an uphill battle. The powerful evolutionary negativity bias is reinforced by some essential aspects of medical education. It is crucial that we continue to teach critical decision making and to entertain the possibility of life-threatening disease first. We must continue to improve our care of patients through evaluation of error and flawed judgment. But if we choose, we can balance their effects by making a conscious effort also to notice the positive. Following the lead of appreciative inquiry,[51] we can recognize successes and seek to learn how they are achieved. We can inquire into how our practices affect others and elicit their thoughts. We can explore how a master clinician was able to arrive at a diagnosis and learn from his or her paradigm. We can ask our patients about the times they have been healthiest or have overcome an adverse event so that we may understand their strengths and capitalize on that information to contribute to their continued health.

Many of these changes are simple, but they do not come naturally. Being intentional about taking time to change our focus to include not only the worst-case scenario but also to envision the ideal will take effort. Nonetheless, the imperative for culture change is clear. Burnout, faculty dissatisfaction, and depression in medical schools are visible all around us. Appreciating the aspects of medicine that give it meaning may be the antidote to the cultural contaminant of negativity. Initiatives like Remen's Healer's Art course[52] and the interprofessional Schwartz Center Rounds[53] create dialogues and positive relationships that lend support, cultivate understanding, and reinforce the importance of service. Business[46] and education[47] studies suggest that creating an environment that incorporates positivity and inquiry leads to superior teamwork and personal success. Studies in medical communities suggest that this philosophy might also improve our clinical performance.[48,49]

Louie and colleagues[38] suggest that "every time a medical student or resident walks into an inpatient service to start a new rotation, we have an opportunity to teach from a sociocultural perspective." We can take advantage of this opportunity to truly change the culture of academic medicine.

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