



Teaching and Learning in Medicine

An International Journal

ISSN: 1040-1334 (Print) 1532-8015 (Online) Journal homepage: <https://www.tandfonline.com/loi/htlm20>

The Relationship of Emotions and Burnout to Medical Students' Academic Performance

Justin Burr & Gary L. Beck Dallaghan

To cite this article: Justin Burr & Gary L. Beck Dallaghan (2019) The Relationship of Emotions and Burnout to Medical Students' Academic Performance, *Teaching and Learning in Medicine*, 31:5, 479-486, DOI: [10.1080/10401334.2019.1613237](https://doi.org/10.1080/10401334.2019.1613237)

To link to this article: <https://doi.org/10.1080/10401334.2019.1613237>



Published online: 22 May 2019.



Submit your article to this journal [↗](#)



Article views: 349



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

GROUNDWORK



The Relationship of Emotions and Burnout to Medical Students' Academic Performance

Justin Burr^a and Gary L. Beck Dallaghan^b 

^aUniversity of Nebraska College of Medicine, Omaha, Nebraska, USA; ^bEducational Scholarship and Research Associate Professor of Pediatrics, UNC School of Medicine, Chapel Hill, North Carolina, USA

ABSTRACT

Phenomenon: Medical school curricula challenge even the most adept learner, potentially leading to feelings of burnout. When faced with uncertainties in a new curriculum, confidence in achieving academic goals may be threatened. We previously found associations between academic performance and pride, hope, anxiety, and shame in medical students. Are these emotions still associated in the context of an evolving curriculum? *Approach:* All 1st- and 2nd-year medical students were invited to participate in a survey study ($n = 264$). Year 1 students were in the first semester of the new curriculum. The Hope, Pride, Shame, and Anxiety subscales of the Achievement Emotions Questionnaire and the Maslach Burnout Inventory (MBI) General Survey for Students were administered in fall 2017. Academic performance (semester overall percentage) was matched to participants completing all 4 questionnaires. Descriptive and inferential statistics were used to analyze the results. *Findings:* Response rates for those who completed every survey administered was 18.5%. Combined data from the classes revealed relationships between academic performance with MBI subscale-professional efficacy ($r = .577$), hope ($r = .497$), pride ($r = .411$), anxiety ($r = -.307$), and shame ($r = -.402$). Upon analyzing data from each class, professional efficacy (M1: $r = .535$; M2: $r = .674$) and pride (M1: $r = .591$; M2: $r = .450$) were correlated to academic performance. In a stepwise regression model, professional efficacy was the only predictor of academic performance ($B = .560$, $t = 3.82$, $R^2 = .31$). *Insights:* When faced with challenges from medical school, positive emotions strengthen self-efficacy, allowing students to identify strategies to accomplish academic goals. Although it is important to acknowledge the emotions that students experience, our finding that professional efficacy was the most significant predictor of academic performance suggests the need for strategies to enhance self-efficacy. Use of flipped classrooms or problem-based learning offers opportunities for cognitive appraisal to foster their self-efficacy.

KEYWORDS

medical student;
achievement
emotions; burnout

Medical education has been undergoing reform throughout the nation. The American Medical Association has partnered with 32 medical schools in an effort to make this process more approachable.¹ According to the Liaison Committee on Medical Education's Annual Medical School Questionnaire,² of 136 medical schools surveyed, 93.4% were implementing or planning to implement a curriculum change in 2012–2013. This shift in curricula comes at a time when medical student wellness is being studied extensively.

Over the past decade, research about medical student wellness has been increasingly reported.^{3–7} Medical students encounter high rates of burnout. Dyrbye et al. showed that 49.6% of medical students experience burnout and 11.2% exhibit suicidal

ideation.⁸ Furthermore, burnout and emotional states of medical students have been studied as predictors of future well-being of practicing physicians.⁹ A similar study in 2010 demonstrated 52.8% of medical students exhibiting burnout, with higher rates of burnout contributing to unprofessional conduct and less altruistic views of the physician's role in a patient's health.³

It is not surprising that learners experience a wide range of emotions given the pressures of doing well in medical school.¹⁰ Even so, because of the intensity of medical school curricula, these emotional responses may be heightened, perhaps even further by a newly implemented curriculum.

High rates of burnout are also concerning because medical students' emotions are negatively affected at a

time when they are learning to care for others, with these emotions affecting learning achievements. For instance, enjoyment and hope have been tied to higher academic achievement, whereas hopelessness and boredom have been correlated to lower academic achievement.¹¹ Emotional exhaustion is one of the three dimensions of burnout, according to Maslach.¹² In this way, burnout may affect academic achievement through emotional mechanisms. Emotions have been defined in very general terms of affective contexts, states, and experiences.¹³ Artino et al.¹⁰ further conceptualized emotions as a psycho-physiological change in response to meaningful situations. Research has shown that emotions can impact perception and information processing, memory retrieval, and cognitive load.^{13,14}

Because of the impact that emotions can have on student performance, Pekrun et al.¹¹ further investigated the emotions tied directly to achievement activities. The control-value theory of achievement emotions was constructed based on a two-by-two matrix of control attributions and value appraisals.¹⁵ This defined emotional responses based on the perceived control in situations and subjective value ascribed to the transaction. These emotions may have been the result of specific events or recurring arousals.¹⁶ Therefore, if there was perceived control of an activity and it was appraised as valuable, then positive-activating emotions were elicited, such as enjoyment or pride.¹⁷ Conversely, if perceived control is low and the activity is perceived as not valuable, negative-activating emotions are elicited, such as shame or anxiety. Implementation of new curricula may reduce students' perceived control at a time when they are already exhibiting high rates of emotional exhaustion, thus stimulating negative affect, increasing burnout, and reducing academic achievement.

The Achievement Emotions Questionnaire was administered to our medical students in a previous study.¹⁸ This descriptive study sought to identify which, if any, of the achievement emotions were most closely associated with anatomy course performance. We found that four emotions were significantly associated with anatomy academic performance: hope, pride, anxiety, and shame. We ultimately found that pride was the best predictor of academic performance.

Not unlike other medical schools, our midwestern public medical school has traditionally presented a subject-based curriculum (e.g., Anatomy, Physiology, Neuroanatomy, and Biochemistry are taught individually). This curriculum was lecture based, with little small-group engagement. Recent curricular reforms

based on Knowles' adult learning theory¹⁹ integrated clinical and basic science material in the first 18 months of medical school. Applying basic science foundational knowledge in clinical contexts was thought to aid in encoding material by making it relevant to their career goals.¹⁹ In addition, more small-group, interactive sessions were planned to allow use of spaced practice, elaboration, and retrieval.²⁰

Curricular changes presented an opportunity to investigate achievement emotions and burnout associated with academic performance of medical students in two distinct curricula. Year 1 medical students' expectancy and competency perceptions may be impacted by frustration and anxiety because they are forging new territory. Year 2 students in the legacy curriculum have the luxury of advice from their predecessors, which may mitigate cognitive appraisals and achievement emotions.

The purpose of this research was to identify students' emotion states in the new curriculum and 2nd-year students in the legacy curriculum. Our research questions were as follows: What is the relationship between achievement emotions, burnout, and academic performance? Are the relationships between achievement emotions, burnout, and academic performance different based on year in the curriculum? What is the association between specific achievement emotions or burnout subscales with academic performance?

Methods

Sample

The convenience sample consisted of medical students enrolled in a state-funded Midwest medical school. Inclusion criteria consisted of any student actively enrolled in Years 1 and 2 of medical school. Each class comprised 132 students, for a total of 264 possible participants. Age, gender, ethnic background, or other demographic criteria were not considered for inclusion. This study was reviewed and approved by the Institutional Review Board (IRB #436-17-EX).

Achievement emotions questionnaire

To measure achievement emotions, portions of the Achievement Emotions Questionnaire (AEQ) instrument were used. The AEQ is a multidimensional self-report instrument designed to assess students' achievement emotions. It is based on a program of quantitative and qualitative research examining students' emotions experienced in academic achievement

situations (for a summary, see Pekrun et al.¹⁵). Emotions are defined as sets of interrelated psychological processes including three positive emotions (enjoyment, hope, and pride) and five negative emotions (anger, anxiety, hopelessness, shame, and boredom).²¹ These achievement emotions can be assessed in three academic situations: class related, learning related, and test related. Reliability measures for the AEQ ranged from adequate to very good ($\alpha = .75-.93$).²¹

For the purposes of this study, Hope, Pride, Anxiety, and Shame subscale questions were used. A previous study at our institution identified these emotions most closely correlated to students' academic performance.¹⁸ Out of consideration for the students' time, we also chose to limit the AEQ questions used. This resulted in AEQ surveys composed of three scales: class-related AEQ with 34 items, learning-related AEQ with 31 items, and test-related AEQ with 36 items. Responses to each item were measured by a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Maslach Burnout Inventory

To measure burnout, we administered the Maslach Burnout Inventory (MBI) General Survey for Students. Initially published in 1981, this instrument includes three scales to assess experienced feelings.²² This version of the MBI evaluates three aspects of burnout: exhaustion, cynicism, and professional efficacy. Exhaustion assesses feelings of exhaustion in general. Cynicism assesses feelings of indifference and represents dysfunctional coping with strains of school. Professional Efficacy assesses the individual's feelings of effectiveness in school. Responses to each item were measured by a 6-point Likert scale from 1 (*never*) to 6 (*every day*). Internal reliability from a variety of studies ranged from $\alpha = .70$ to $.90$ for the three subscales.²³⁻²⁵ Development of the MBI emerged from the perspective that burnout is a psychological response to aspects of daily experiences. Burnout has been associated with brain function related to emotional regulation, fine motor functioning, executive functioning, attention, and memory.²²

Academic performance

Academic Performance was measured using participants' final overall percentage for the semester. This percentage was constructed based on various components, including summative assessments, quizzes,

objective structured clinical examinations, and small-group rubrics. The final overall percentage reflects the weighted final percentage from each course for the semester. For example, for Year 1 students, their first course was 5 weeks and the final grade was determined by multiple-choice exam (70%), labs/small-group assignments (20%), and quizzes or other activities (10%). The remaining four courses in the semester weighted the final grade in a similar fashion. Academic performance used in our study was based on the final overall percentage for the semester, which was calculated by the final course percentage weighted by length of course, for example, Courses 1 and 4: $\% \times .3125$ (5 weeks/16 weeks); Courses 2 and 3: $\% \times .1875$ (3 weeks/16 weeks). The sum of these weights made up the final academic performance percentage. For Year 2 students, they had three courses: One course was 10 weeks, one 6 weeks, and one spanned the entire 16 weeks. Weighing of multiple-choice exams was 90% and small-group or lab work was 10%. The final semester percentage was calculated similarly to Year 1. Year 1 students received a final grade of pass or fail, whereas Year 2 students could have been assigned a grade of honors, high pass, pass, marginal pass, or fail.

Data collection and analysis

Surveys were administered at different time points in fall 2017 using SurveyMonkey. The survey for class-related emotions was sent to both classes at the end of the 1st week of the semester. The test-related survey was sent after a course final multiple-choice examination, which was early October for Year 1 students and late October for Year 2 students. The learning-related survey was sent in early November. The MBI was administered to students 3 weeks before the end of the semester. These administration dates were determined based on exam schedules and when the authors felt students would respond.

All students were invited via e-mail to participate in the first survey. Two reminders were sent during the first survey administration period. Only those students who completed the first survey were invited to complete the remaining surveys.

The methods for analyzing the data included using correlational and multiple regression statistics. Subscale scores from the questionnaires and final overall percentage performance for the semester were used to explore the correlational relationship between the Maslach burnout scores, specific achievement emotions, and academic performance. Participants'

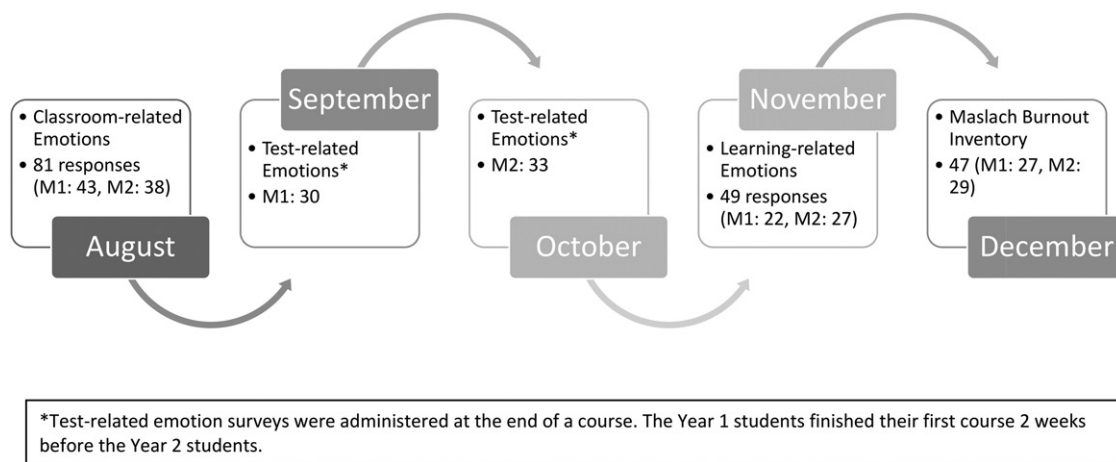


Figure 1. Time line of survey administrations. *Test-related emotion surveys were administered at the end of a course. The Year 1 students finished their first course 2 weeks before the Year 2 students.

AEQ subscale scores for hope, pride, anxiety, and shame were used in a stepwise linear regression model with backward removal.^{26,27} Analyses were conducted in aggregate as well as by class.

Results

Demographics

The classroom-related AEQ items, administered first, were sent to both classes. Ten of these e-mails were returned undeliverable, so our sample consisted of 254 potential participants. Of those invited, 31.9% were completed for classroom-related emotions (16.9% first years, 15.0% second years). For test-related emotions, 11.8% first-year and 13.0% second-year students completed the survey. For learning-related emotions, 19.3% students completed the survey (8.7% first years, 10.6% second years). Forty-seven participants completed the MBI (10.6% first years, 11.4% second years). Our final response rate was 18.5%. **Figure 1** shows the time line for administration and response rates.

To ensure that participants were representative of each class, we compared the academic performance (overall semester percentage) of students who completed all four surveys with those who did not. For Year 1 students, the participant mean was 86.27% ($SD = 5.44$) compared to nonresponding students (87.06%, $SD = 3.93$). For Year 2, participants' mean was 88.48% ($SD = 5.62$) compared to nonresponders (88.61%, $SD = 5.52$). These differences were not statistically significant.

The internal reliability of subscales results indicated adequate to very good reliability. Specifically, the MBI subscale reliability for emotional exhaustion was $\alpha =$

.91, for cynicism was $\alpha = .84$, and for professional efficacy was $\alpha = .89$. For the four emotions measured with the AEQ, reliability measure for hope was $\alpha = .90$, for pride was $\alpha = .89$, for anxiety was $\alpha = .94$, and for shame was $\alpha = .93$.

Relationship between achievement emotions, burnout, and academic performance

To identify a relationship between the Maslach burnout scores, AEQ, and academic performance in medical students, Pearson correlations were analyzed. Aggregate analysis revealed statistically significant relationships between academic performance with professional efficacy ($r = .577$), hope ($r = .497$), pride ($r = .411$), anxiety ($r = -.307$), and shame ($r = -.402$). Statistically significant relationships were not identified for emotional exhaustion or cynicism (**Table 1**).

In addition, correlation analyses were conducted for Year 1 and Year 2 participants. Statistically significant correlations for Year 1 participants' academic performance with emotional exhaustion ($r = -.576$), cynicism ($r = -.497$), professional efficacy ($r = .535$), and hope ($r = .591$). For Year 2 participants, academic performance was correlated professional efficacy ($r = .674$), hope ($r = .450$), and pride ($r = .405$).

Regression analysis between achievement emotions, burnout, and academic performance

Upon analysis of the combined results of both classes, the relationship between Maslach burnout scores, AEQ, and academic performance was sufficiently correlated to warrant use of a stepwise linear regression analysis with backward elimination. The results of Pearson r correlations were used to identify the order

Table 1. Correlations of academic performance (%) with Maslach Burnout Inventory and Achievement Emotions Questionnaire subscales for combined classes.

	<i>M</i>	<i>SD</i>	α	Overall %	Emotional Exhaustion	Cynicism	Professional Efficacy	Hope	Pride	Shame
Emotional Exhaustion	19.85	6.37	.91	-.210						
Cynicism	11.59	6.24	.84	-.097	.593**					
Professional Efficacy	24.74	6.76	.89	.577**	-.417**	-.332*				
Hope	73.18	11.36	.90	.497**	-.479**	-.495**	.687**			
Pride	68.47	11.10	.89	.411**	-.315	-.309	.649**	.677**		
Shame	75.35	18.13	.93	-.402**	.504**	.344*	-.538**	-.654**	-.385**	
Anxiety	93.06	21.67	.94	-.307*	.613**	.447**	-.571**	-.543**	-.357*	.748**

*Correlation is significant at the .05 level (two-tailed).

**Correlation is significant at the .01 level (two-tailed).

Table 2. Stepwise regression of academic performance (%) with Maslach Burnout Inventory and Achievement Emotions Questionnaire subscales for combined classes.

Model		Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for Beta	
		Beta	SE	Beta	<i>t</i>	Sig.	Lower Bound	Upper Bound
1	(Constant)	70.989	11.902		5.965	.000	46.610	95.368
	Prof Efficacy	.365	.238	.421	1.533	.137	-.123	.852
	Hope	.001	.147	.002	.008	.994	-.300	.302
	Pride	.096	.130	.182	.739	.466	-.170	.361
	Anxiety	.036	.066	.134	.553	.585	-.098	.171
2	Shame	-.049	.081	-.153	-.609	.547	-.215	.117
	(Constant)	71.050	8.716		8.151	.000	53.223	88.877
	Prof Efficacy	.365	.225	.422	1.626	.115	-.094	.824
	Pride	.096	.114	.183	.844	.405	-.137	.329
	Anxiety	.036	.064	.134	.568	.574	-.094	.166
3	Shame	-.050	.076	-.153	-.653	.519	-.204	.105
	(Constant)	72.845	8.032		9.070	.000	56.442	89.248
	Prof Efficacy	.332	.214	.383	1.548	.132	-.106	.769
	Pride	.103	.112	.194	.914	.368	-.127	.332
	Shame	-.023	.059	-.072	-.392	.698	-.145	.098
4	(Constant)	70.554	5.434		12.984	.000	59.472	81.636
	Prof Efficacy	.376	.178	.435	2.110	.043	.013	.740
	Pride	.094	.109	.179	.867	.393	-.127	.316
	(Constant)	74.320	3.249		22.876	.000	67.703	80.938
	Prof Efficacy	.485	.127	.560	3.822	.001	.226	.743

Note. Dependent variable: Academic Performance (%). Prof = professional.

of variables entered into the model (Table 1).²⁷ The subscales with statistically significant Pearson *r* values included Professional Efficacy, Hope, Pride, Anxiety, and Shame.

Professional efficacy ($B = .485$, $t = 3.822$) was the only significant predictor of academic performance in the final model (Table 2). The remaining variables did not account for a statistically significant contribution to the regression model and were subsequently removed from the final model. Overall, 31.3% of the variability on overall academic performance can be attributed to professional efficacy (Table 3).

Results were similar upon analysis of each class. Year 1 participant results were not statistically significant for any of the subscales, although the final model included professional efficacy, but it was slightly greater than the level of significance of $p = .05$ ($B = .376$, $t = 2.152$). Year 2 participant results were significantly associated with professional efficacy ($B = .617$, $t = 3.56$). For Year 1 students, the regression model indicated professional efficacy contributed 26.3% of

the variability on overall academic performance but contributed 42.6% for Year 2 students.

Discussion

Over the past 60 years, personal factors have been considered influential in successful academic pursuits.²⁸ When emotional antecedents were considered, anxiety has been the most pervasive focus of study in education.^{29–32} In the past 20 years, educational researchers have broadened the scope of emotions potentially impacting academic performance,^{33,34} identifying emotions that have a positive or negative association with learning and recall.³⁵

Our results indicate that professional efficacy was significantly associated with medical student academic performance over other subscales of the MBI or achievement emotions. Bandura's self-efficacy theory suggests that behavior is influenced by the belief that one has the capability to accomplish a goal. Medical students are primarily goal oriented, and individuals

Table 3. Stepwise regression model summary^f for academic performance (%) with Maslach Burnout Inventory and Achievement Emotions Questionnaire subscales for combined classes.

Model	<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	<i>SE</i> of the Estimate	Change Statistics					Durbin-Watson
					<i>R</i> ² Change	<i>F</i> Change	<i>df</i> ₁	<i>df</i> ₂	Sig. <i>F</i> Change	
1	.583 ^a	.340	.223	5.15827%	.340	2.890	5	28	.032	
2	.583 ^b	.340	.249	5.06856%	.000	.000	1	28	.994	
3	.577 ^c	.333	.266	5.01102%	-.007	.323	1	29	.574	
4	.574 ^d	.330	.286	4.94215%	-.003	.154	1	30	.698	
5	.560 ^e	.313	.292	4.92287%	-.016	.751	1	31	.393	1.942

^aPredictors: (Constant), Shame, Pride, Anxiety, Professional Efficacy, Hope.

^bPredictors: (Constant), Shame, Pride, Anxiety, Professional Efficacy.

^cPredictors: (Constant), Shame, Pride, Professional Efficacy.

^dPredictors: (Constant), Pride, Professional Efficacy.

^ePredictors: (Constant), Professional Efficacy.

^fDependent Variable: Academic Performance (Percentage).

tend to engage in activities in which they feel confident they will be successful.³⁶ Therefore, increasing professional efficacy of medical students may lead to increased engagement in activities conducive to improving academic performance.

The positive emotions included in this study support the contribution of professional efficacy in academic performance. Hope has been defined as an optimistic expectancy related to achievement in academic activities.^{37,38} In a previous study investigating anatomy performance with achievement emotions, pride was the only achievement emotion statistically associated with academic performance.¹⁸ Pride is closely related to self-efficacy in that it is an enhanced sense of self-esteem attributed to individual effort.³⁵ Both of these emotions were strongly correlated to academic performance with our study participants.

These findings reinforce research related to incremental theories of intelligence and well-being.³¹ Learners exhibiting incremental beliefs tend to use more adaptive, self-regulatory behaviors to increase odds of success.³⁹ Based on Frederickson's findings, experiencing positive emotions increased personal resources, allowing individuals to be more creative, knowledgeable, and resilient long after the experience was over.³² Those individuals who exhibit entity theories perceive intelligence as fixed⁴⁰ and ultimately lack confidence in personal attributes to be successful. Our findings expand on the previous study¹⁸ of a single class to an entire semester of experience, further demonstrating the association with self-efficacy and positive emotions.

Based on these findings, efforts should be made to enhance student self-efficacy, which has its roots in feeling confident about one's capabilities. To facilitate self-efficacy, mastery experiences are the most powerful at giving students feelings of success.⁴¹ Low-stakes examinations or flipped classroom experiences in which students find success frequently may be used to

enhance self-efficacy. With the structure of our new curriculum, these types of activities were incorporated to a greater degree than the legacy curriculum. This could explain why self-efficacy resulted in a relatively weaker association with academic achievement in Year 1 students. The introduction of these activities can lead to a larger majority of students exhibiting uncertainty, which may reduce the variation in subscale scores. The decreased emphasis on multiple-choice examinations in the new curriculum may explain the lower variance in academic achievement as well. In addition, Year 2 students have the additional year in their curriculum and thus have developed strategies to achieve academic goals, thereby enhancing their self-efficacy.

Another source of self-efficacy is drawn from physiological, emotional, and mood states. Positive affective states strengthen self-efficacy, allowing students to cognitively appraise situations as challenges to be achieved. Should negative emotions present, students may be dejected and anticipate failure. Lee et al.⁴² found that ruminating on negative experiences also inhibits emotional self-regulation. Our results that Year 1 students' professional efficacy was nearly statistically significant may be indicative of the uncertainties related to the new curriculum. The students had no clear way of appraising performance due to variability in weights of grading in each block. This uncertainty may have added to stress⁴³ and rumination,^{42,44} leading to an inability to self-regulate learning.

Providing students with academic coaching coupled with guidance on how to master material may develop incremental mind-set, which will help them identify strategies to achieve goals and overcome negative emotions.^{39,42} Coaching can help students identify specific short-term milestones to better achieve their goals.⁴⁵ This could be done by helping students incorporate self-testing into studying to enhance

retrieval, which will help them on exams. These activities may, in turn, enhance their sense of pride and self-efficacy. Providing individual coaching may be a challenge,⁴⁵ but worth the investment over the cost of remediating students.⁴⁶ Individualized attention through coaching is supported by the social cognitive career theory, which notes interventions such as coaching may increase efficacy potential.⁴⁷

Sample selection was limited to one medical school, which may have limited external validity. The final sample size was also small. This may be the result of students being overwhelmed with their studies later in the semester or perhaps not doing well in their courses. However, a comparison of those completing all four questionnaires with those who did not showed no significant difference in overall academic performance. To generalize the results of this study, repeating this study in conjunction with other medical schools will offer a broader population from which to draw inferences about the findings.

Conclusion

Understanding emotional responses and feelings experienced in academic settings may offer medical educators insight into how attributions and appraisals influence academic performance. Due to the influence of positive emotions on incremental mind-sets,³⁹ programs focused on problem-solving strategies, metacognitive skill development, and test-taking skills can enhance self-efficacy. This, in turn, may enhance their cognitive reappraisal of situations and potentially improve achievement outcomes.⁴⁸

ORCID

Gary L. Beck Dallaghan  <http://orcid.org/0000-0002-8539-6969>

References

1. Skochelak SE, Stack SJ. Creating the medical schools of the future. *Acad Med*. 2017;92(1):16–19. doi:10.1097/ACM.0000000000001160.
2. Association of American Medical Colleges. Curriculum Inventory: Curriculum Change in US Medical Schools. <https://www.aamc.org/initiatives/cir/427196/27.html>. Accessed January 30, 2019.
3. Dyrbye LN, Massie FS, Eacker A, et al. Relationship between burnout and professional conduct and attitudes among US medical students. *JAMA*. 2010;304(11):1173–1180. doi:10.1001/jama.2010.1318.
4. Wolf MR, Rosenstock JB. Inadequate sleep and exercise associated with burnout and depression among medical students. *Acad Psychiatry*. 2017;41(2):174. doi:10.1007/s40596-016-0526-y.
5. Hojat M, Vergare M, Maxwell K, et al. The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med*. 2009;84(9):1182–1191. doi:10.1097/ACM.0b013e3181b17e55.
6. Gupta S, Choudhury S, Das M, Mondol A, Pradhan R. Factors causing stress among students of a medical college in Kolkata, India. *Educ Health (Abingdon)*. 2015;28(1):92–95. doi:10.4103/1357-6283.161924.
7. Yusoff MS, Rahim AF, Baba AA, Ismail SB, Esa AR. A study of psychological distress in two cohorts of first-year medical students that underwent different admission selection processes. *Malays J Med Sci*. 2012;19:29–35.
8. Dyrbye LN, Thomas MR, Massie FS, et al. Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med*. 2008;149(5):334–341. doi:10.7326/0003-4819-149-5-200809020-00008.
9. Bughi SA, Lie DA, Zia SK, Rosenthal J. Using a personality inventory to identify risk of distress and burnout among early stage medical students. *Educ Health (Abingdon)*. 2017;30(1):26–30. doi:10.4103/1357-6283.210499.
10. Artino AR, Jr., Holmboe ES, Durning SJ. Control-value theory: using achievement emotions to improve understanding of motivation, learning, and performance in medical education: AMEE Guide No. 64. *Med Teach*. 2012;34(3):e148–e160. doi:10.3109/0142159X.2012.651515.
11. Pekrun R, Goetz T, Titz W, Perry RP. Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educ Psychol*. 2002; 37(2):91–106. doi:10.1207/S15326985EP3702_4.
12. Maslach C. *Burnout: The Cost of Caring*. Englewood Cliffs, NJ: Prentice Hall; 1982.
13. McConnell MM, Eva KW. The role of emotion in the learning and transfer of clinical skills and knowledge. *Acad Med*. 2012; 87(10):1316–1322. doi:10.1097/ACM.0b013e3182675af2.
14. Fraser K, Ma I, Teteris E, Baxter H, Wright B, McLaughlin K. Emotion, cognitive load and learning outcomes during simulation training. *Med Educ*. 2012;46(11):1055–1062. doi:10.1111/j.1365-2923.2012.04355.x.
15. Pekrun R. Emotions in students' scholastic development. In Perry RP, Smart JC, eds. *The Scholarship of Teaching and Learning in Higher Education: An Evidence-Based Perspective*. Dordrecht, The Netherlands: Springer; 2007:553–610.
16. Pekrun R. The control-value theory of achievement emotions: assumptions, corollaries, and implications for educational research and practice. *Educ Psychol Rev*. 2006;18(4):315–341. doi:10.1007/s10648-006-9029-9.
17. Pekrun R, Elliot AJ, Maier MA. Achievement goals and discrete achievement emotions: a theoretical model and prospective test. *J Educ Psychol*. 2006; 98(3):583–597. doi:10.1037/0022-0663.98.3.583.
18. Beck G. Investigation of the relationship between achievement emotions and academic performance in

- medical students. Capella University. ProQuest Dissertations and Theses 2011; <http://search.proquest.com/docview/894260388?accountid=27965>.
19. Knowles MS. *The making of an adult educator: an autobiographical journey*. San Francisco, CA: Joseey-Bass Inc.; 1989.
 20. Pashler H, Bain PM, Bottage BA, et al. *Organizing Instruction and Study to Improve Student Learning. IES Practice Guide*. Washington, DC: Institute of Education Sciences; 2007.
 21. Pekrun R, Goetz T, Perry RP. *Achievement Emotions Questionnaire (AEQ) – user's manual*. Unpublished manual, Germany: University of Munich; 2005.
 22. Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*, 4th Edition. Menlo Park, CA: Mind Garden, Inc. <http://www.mindgarden.com>. 2016.
 23. Leone SS, Huibers MJ, Knottnerus JA, Kant IJ. Similarities, overlap and differences between burnout and prolonged fatigue in the working population. *QJM*. 2007;100(10):617–627. doi:10.1093/qjmed/hcm073.
 24. Schutte N, Toppinen S, Kalimo R, Schaufeli WB. The factorial validity of the Maslach Burnout Inventory - General Survey (MBI-GS) across occupational groups and nations. *J Occup Org Psychol*. 2000;73(1):53–66. doi:10.1348/096317900166877.
 25. Halbesleben JRB, Demerouti E. The construct validity of an alternative measure of burnout: investigating the English translation of the Oldenburg Burnout Inventory. *Work Stress*. 2005;19(3):208–220. doi:10.1080/02678370500340728.
 26. Keith TZ. *Multiple regression and beyond*. Boston, MA: Pearson Education, Inc.; 2006.
 27. Field A. *Discovering statistics using SPSS* (2nd ed.). London, England: Sage; 2005.
 28. Crossman J. The role of relationships and emotions in student perceptions of learning and assessment. *Higher Educ Res Develop*. 2007;26(3):313–327. doi:10.1080/07294360701494328.
 29. Brown CH. Emotional reactions before examinations: II. Results of a questionnaire. *J Psychol*. 1938;5(1):11–26. doi:10.1080/00223980.1938.9917549.
 30. Sarason SB, Mandler G. Some correlates of test anxiety. *J Abnorm Psychol*. 1952;47(4):810–817.
 31. King R. A fixed mindset leads to negative affect. *Z Psychol*. 2017;225(2):137–145. doi:10.1027/2151-2604/a000290.
 32. Frederickson BL. The broaden-and-build theory of positive emotions. *Phil Trans R Soc Lond B*. 2004;359:11367–11377.
 33. Eysenck MW, Calvo MG. Anxiety and performance: the processing efficiency theory. *Cog Emotion*. 1992;6(6):409–434. doi:10.1080/02699939208409696.
 34. Liebert RM, Morris LW. Cognitive and emotional components of test anxiety: a distinction and some initial data. *Psychol Rep*. 1967;20(3):975–978. doi:10.2466/pr0.1967.20.3.975.
 35. Weiner B. An attributional theory of achievement motivation and emotion. *Psychol Rvw*. 1985;92(4):548–573. doi:10.1037/0033-295X.92.4.548.
 36. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84(2):191–215. doi:10.1037/0033-295X.84.2.191.
 37. Pekrun R. The impact of emotions on learning and achievement: towards a theory of cognitive/motivational mediators. *Appl Psychol-Int Rev*. 1992;41(4):359–376. doi:10.1111/j.1464-0597.1992.tb00712.x.
 38. Feldman D, Rand K, Kahle-Wroblewski K. Hope and goal attainment: testing a basic prediction of hope theory. *J Soc Clin Psychol*. 2009;28(4):479–497. doi:10.1521/jscp.2009.28.4.479.
 39. King RB, Dela Rosa ED. Are your emotions under your control or not? Implicit theories of emotion predict well-being via cognitive reappraisal. *Pers Individ Dif*. 2019;138:17–182.
 40. Dweck CS, Chiu C-Y, Hong Y-Y. Implicit theories and their role in judgments and reactions: a world from two perspectives. *Psychol Inq*. 1995;6(4):267–285. doi:10.1207/s15327965pli0604_1.
 41. Palmer DH. Sources of self-efficacy in a science methods course for primary teacher education students. *Res Sci Educ*. 2006;36(4):337–353. doi:10.1007/s11165-005-9007-0.
 42. Lee DS, Orvell A, Briskin J, et al. When chatting about negative experiences helps – and when it hurts: Distinguishing adaptive versus maladaptive social support in computer-mediated communication. *Emotion*. 2019; epub ahead of print. DOI: 10.1037/emo0000555.
 43. Fetter M, Robbs R, Cianciolo AT. Clerkship curriculum design and USMLE Step 2 performance: Exploring the impact of self-regulated exam preparation. *Med Sci Educ*. 2019;29(1):265–276. doi:10.1007/s40670-019-00691-8.
 44. Nolen-Hoeksema S, Wisco BE, Lyubomirsky S. Rethinking rumination. *Perspect Psychol Sci*. 2008;3(5):400–424. doi:10.1111/j.1745-6924.2008.00088.x.
 45. Deiorio NM, Carney PA, Kahl LE, Bonura EM, Miller Juve A. Coaching: a new model for academic and career achievement. *Med Educ Online*. 2016;21(1):33480. doi:10.3402/meo.v21.33480.
 46. Foo J, Ilic D, Rivers G, et al. Using cost-analyses to inform health professions education – The economic cost of pre-clinical failure. *Med Teach*. 2018;40(12):1221–1230. doi:10.1080/0142159X.2017.1410123.
 47. Bakken L, Byars-Winston A, Wang M-F. Viewing clinical research career development through the lens of social cognitive career theory. *Adv Health Sci Educ Theory Pract*. 2006;11(1):91–110. doi:10.1007/s10459-005-3138-y.
 48. Urry HL. Seeing, thinking and feeling: emotion-regulating effects of gaze-directed cognitive reappraisal. *Emotion* 2010; 10(1):125–135. doi:10.1037/a0017434.