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The role of academic emotions on medical and allied health students' motivated self-regulated learning strategies

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ABSTRACT

Objective: Academic emotions have been found to be important predictors of students' self-regulation. The goal of this study was to investigate the role of academic emotions on undergraduate students' self-regulation at a medical college in Malawi. **Materials and Methods:** 1st year students ($n = 205$) from the college responded to two separate questionnaires assessing their emotions and motivated self-regulated learning (SRL) strategies employed in their classes of anatomy ($n = 51$), pharmacy ($n = 44$), medical laboratory science ($n = 44$), and physiotherapy ($n = 66$). Data were analyzed using IBM SPSS Statistics, version 20. **Results:** Students experienced hope ($F[3, 201] = 3.05$, $P = 0.030$) differently across the four programs. Female students reported high levels of anxiety ($P < 0.05$) and boredom ($P < 0.05$) than male students, while male students reported high levels of enjoyment ($P < 0.001$) and hope ($P < 0.001$) than their counterparts. Cognitive strategies were positively predicted by enjoyment ($\beta = 0.42$), hope ($\beta = 0.34$), anger ($\beta = 0.18$), and value ($\beta = 0.61$) while resource management was positively predicted by enjoyment ($\beta = 0.56$) and value ($\beta = 0.46$). Finally, task value was positively predicted by hope ($\beta = 0.33$) and enjoyment ($\beta = 0.29$), while expectancy was positively predicted by hope ($\beta = 0.37$). **Conclusions:** The study shows that class-related emotions and motivation have an influence on medical students' SRL. Therefore it is important to foster pleasant emotions, which trigger motivation for the betterment of students' self-regulation.

KEY WORDS: Academic emotions, cognitive strategies, motivation, resource management, self-regulated learning

INTRODUCTION

Medical institutions have a special responsibility to train medical and health personnel to be fit for the practice. Research indicates that one of the major goals of formal education is to equip students with self-regulatory skills [1]. These skills are viewed as very important in guiding one's own learning during formal schooling. This aspect of learning has been referred to as "self-regulated learning (SRL)" [2]. Pintrich [3] defines SRL as a process whereby students set their own goals and regulate, monitor and control their own cognitive behavior. To this date, a number of studies have been conducted on SRL, but the complexity of it still remains: What are the factors that affect the effectiveness of self-regulation among various students in various fields of study? In an attempt to find out about this complexity, personal factors such as emotions, together with some motivational beliefs of self-efficacy and task value, come into play. Schutz and Pekrun [4] claim that emotions are important predictors of students' self-regulation. A number of empirical studies[5,6] provide a general support for the claim that emotions influences learning.

Although a growing body of both theoretical and empirical literature exists on academic emotions and SRL as separate aspects within learning, empirical evidence on the role of emotions on SRL is scanty [4,6]. As Artino *et al.* [7] notes, these emotional factors have almost been neglected in medical education literature. Instead, medical education literature tends to focus mostly on cognitive factors such as prior academic achievement, which do not explain much on the variance in academic outcomes. Yet, a large body of medical literature on emotions indicates that many medical students experience stressful situations during their education resulting to depression and anxiety [7-12]. There has been very little attempt to look at how these emotions influence students' SRL. In this study, we aimed to address these issues at a medical college in Malawi. First, we investigated students' class-related emotional experiences, their motivation and their use of SRL strategies. Second, we explored whether these emotions have associations with students' motivation and strategy use, and also whether motivational beliefs have associations with strategy use.

Academic Emotions and Their Dimensions

Academic emotions are students' reactions to situations usually tied directly to academic learning, classroom instruction, and achievement [13]. Two important dimensions are used to describe emotions, and these are valence (positive or negative) and activation (activating or deactivating). Based on such classification, Pekrun [14] derived four broad categories of academic emotions: Activating positive emotions (e.g., joy, hope), deactivating positive emotions (e.g., relief, relaxation), activating negative emotions (e.g., anger, anxiety) and deactivating negative emotions (e.g., hopelessness, boredom). Students experience academic emotions differently. Concerning gender, literature indicates that emotional experiences between male and female students differ. For instance, one study reposted that girls experienced less enjoyment in learning mathematics than boys but experienced higher enjoyment in English than boys [15]. Academic emotions are also considered to be organized in domain specific ways [13]. This means that academic emotions are experienced in a different manner for different school (academic) subjects. The assumption has been supported by literature [16]. Therefore, it is difficult to conclude that because students experience enjoyment in one subject, they would also experience the same emotion in other subjects.

Motivated Self-regulation and Learning Strategies

Students who are self-regulated proactively look for information when needed and take the necessary steps to master it. There are three main approaches to students' learning which can be categorized as deep approach, surface approach, and organized studying [17]. Students adopting deep approach aim at understanding the content and use deep and metacognitive learning strategies such as critical thinking, planning, and monitoring to construct meaning in the study material [2]. Those who adopt surface approach aim at memorizing without understanding the material [17] and use superficial cognitive strategies such as repetition, highlighting, and memorization [2]. The third approach, organized studying, refers to the student's ability to seek help from either peers or teachers, and manage time and effort [17]. For the purpose of this study, two strategies were measured: Cognitive strategies representing both deep and metacognitive strategies for deep learning approach, and resource management. Superficial cognitive strategies were not included in the study because they reflect surface approach which was not the focus of the study.

Pintrich [3] further argues that students must be motivated to implement and regulate appropriate learning strategies and behaviors. Pintrich *et al.* [2] summarized different motivational aspects into three general constructs. The first category is expectancy. It refers to students' beliefs that they can accomplish a task, and its components include self-efficacy and control beliefs for learning. The second general category is value, which focuses on the reasons students involve in academic tasks. Its components include task value beliefs, intrinsic, and extrinsic goal orientations. The third general motivational construct is affect, which focuses on test anxiety. However, this study did not examine test anxiety because it is an aspect within the emotions which were also under investigation.

Theoretical Framework

Control-value theory

Pekrun's [14] control-value theory of academic emotions was an effort to provide an integrative framework of research on emotions in education. The theory's assumption stipulates that students experience specific academic emotions when they feel in control of, or out of control of, academic activities, and outcomes that are important to them. It implies that control and value appraisals are the proximal determinants of these emotions [13]. This theory also addresses the influence of these academic emotions on students' academic involvement and performance. Specifically, it is hypothesized that emotions have an impact on cognitive resources, motivation, self-regulation, and external regulation of learning [6]. The theory further takes Bandura's [18] social cognitive approach. Based on the social cognitive assumption, the theory proposes that contextual features of the learning environment (classroom-related factors such as teachers' instruction and behavior) affects students' academic emotions (positive or negative). These emotions further affect students' motivational beliefs which in turn, affect the emotions again, forming a reciprocal relationship, and finally, the two personal factors (emotions and motivation) influence students' behavior, in this case, the SRL strategies [13].

Interactions between academic emotions and SRL

Extrapolating from a number of studies on emotions, their antecedents and their effects, it may be assumed that academic emotions can enhance or hinder self-regulation of learning in various ways. First, these emotions can intensely affect students' thoughts, motivation, and action [5,17]. Academic emotions may activate, sustain or decrease students' motivation and some related volitional processes. Positive emotions, such as

enjoyment and hope, enhance motivation, facilitate learning and increase performance [5,19], whereas negative emotions, such as anxiety and hopelessness decrease motivation, and undermine performance [3,18,19]. However, other categories of emotions may show more complicated effects. On one hand, negative activating emotions such as anger and anxiety can be assumed to decrease intrinsic motivation thereby enhancing the use of shallow learning strategies. In contrast, it follows from their activating nature that these emotions can trigger strong motivation to cope with negative events that come along with them, thus, strengthening specific kinds of extrinsic motivation [6].

Research Questions

The aim of this study was to investigate self-regulation and class-related emotional experiences of 1st year undergraduate students, and explore the relationship between these academic emotions and the motivated SRL strategies. Emotions of enjoyment, hope, anger, anxiety, boredom and hopelessness, and the motivated strategies of cognitive, and resource management were the focus of the study. Three research questions guided the study:

1. To what extent do 1st year undergraduate students experience class-related academic emotions?
2. What type of motivated SRL strategies do 1st year undergraduate students employ in their learning?
3. Is there any relationship between students' experienced emotions and the use of their motivated SRL strategies?

MATERIALS AND METHODS

Study Design and Participants

To answer our research questions, the study adopted a quantitative cross-sectional approach. The study participants were the 1st year medical and allied health students of ages between 18 and 22, enrolled at the University of Malawi, College of Medicine in the year 2014. A total number of 205 students (121 male students, 83 female students – one participant did not indicate sex variable) participated in the survey. The participants were divided into four groups according to their programs of study: 51 students (31 males and 19 females) for Bachelor of Medicine Bachelor of Surgery (MBBS), 44 students (26 males and 18 females) for Bachelor of Pharmacy (PHARM), 44 students (24 males and 20 females) for Bachelor of Physiotherapy (PHYSIO), and 66 students (38 males and 28 females) for Bachelor of Medical Laboratory Science (MLS).

Data Collection

Two separate questionnaires were used to measure students' experienced academic emotions and their SRL strategy use. The concepts were measured in their major courses of their respective programs: Anatomy for MBBS, Introduction to Pharmacy for PHARM, Introduction to Physiotherapy for PHYSIO, and Introduction to MLS for MLS.

Academic emotions questionnaire (AEQ)

Different students' class-related academic emotions were assessed using an adapted version of a self-report instrument of AEQ, alpha: 0.79-0.93 [20]. Students responded to a total of 60 items. Each item had a 5-point Likert scale ranging from 1 (not at all true of me) to 5 (very true of me), and the scores were averaged to form the emotion indices. Cronbach's alpha values were calculated for each emotion. This Cronbach's alpha reliability coefficients for the instrument ranged from 0.76 to 0.89.

Motivated strategies for learning questionnaire (MSLQ)

General components of self-regulated motivational aspects and general categories of SRL strategies were assessed using items adapted from the MSLQ, alpha: 0.52-0.93 [2]. For this study, the motivational scales were based on two general motivational constructs: Expectancy (self-efficacy and control) and value (goal orientation and task value). The learning strategies' scales were based on two categories of cognitive (cognitive and metacognitive strategies), and the use of resource management. The questionnaire consisted of 22 items on the motivation section and 50 items on learning strategies section. These items were scored on a 5-point Likert-type scale, from 1 (not at all true of me) to 5 (very true of me). The reliabilities of the subscales from this survey were acceptable, with Cronbach's alpha ranging from 0.72 to 0.91.

Procedure

Since this study involved human subjects, it had to conform to some ethical principles for it to be authentic. First, the research protocol was submitted to the College of Medicine Research and Ethics Committee (COMREC) for their approval before the study began. Second, to safeguard the participants' privacy, the survey was made anonymous, and an informed written consent was obtained from the participants themselves. Surveys assessing both emotions and strategies were stapled together to match each participants' data, and they were given to the participants in their respective classrooms, and they were reminded of anonymity and confidentiality. The participants were asked to fill in the questionnaires at their own convenient time. After completion, they were advised to drop their completed questionnaires in the sealed box which was placed in the secretary's office.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 20. Before actual analysis, the data were screened for accuracy and missing values and each survey item was checked for normality. Pearson correlations were computed to determine the relationship between variables tested in the study. Descriptive statistics for all the tested variables were realized and tabulated from raw data.

We used one-way analysis of variance (ANOVA) to check for disparities in emotional experiences and motivated learning

strategies among four study programs of MBBS, PHARM, MLS, and PHYSIO ($P < 0.05$). Furthermore, to find out whether there were significant gender differences on emotional experiences and motivated learning strategies, independent *t*-test was used ($P < 0.05$). Finally, we used a stepwise multiple regression ($P < 0.05$) to: (1) Find out if classroom-related emotions would predict motivation and the learning strategies, and (2) investigate further if motivational components would also predict the learning strategies.

RESULTS

Descriptive Statistics and Correlation Analysis

Descriptive statistics are presented in Table 1. The mean score comparisons on emotions show that students experienced a variety of emotions in the classroom with positive emotions outweighing negative emotions. Looking at the low mean scores of negative emotions, one can conclude that overall, students in this study were not emotionally very negative. On self-regulation, the mean score comparisons reveal that students exhibited high motivated learning strategies, especially their motivational belief of value, which is descriptively, the highest score (mean = 4.22, standard deviation = 0.63) of all the variables measured in this study.

Table 2 presents results from the Pearson correlation analysis of all the study variables. All the significant correlation coefficients range from weak to mild except the correlation pairs of enjoyment/hope, anger/hopelessness, anger/boredom, anxiety/hopelessness, and cognitive/resource management. From Table 2, it can also be observed that a mild correlation exists between emotions and motivated learning strategies of task value, cognitive and resource management ($P < 0.01$).

Table 1: Descriptive statistics for all the study variables (*n*=205)

Variable	Mean±SD	Male Mean±SD	Female Mean±SD	Total (203)	*P*
Positive emotions					
Enjoyment	3.88±0.81	4.07±0.74	3.60±0.84	4.235**	<0.001
Hope	4.08±0.71	4.24±0.62	3.83±0.78	3.983**	<0.001
Negative emotions (activating)					
Anger	1.79±0.74	1.78±0.75	1.81±0.73	−0.226	0.821
Anxiety	2.19±0.71	2.11±0.70	2.32±0.73	−2.065*	0.040
Negative emotions (deactivating)					
Hopelessness	1.69±0.65	1.64±0.65	1.78±0.65	−1.484	0.139
Boredom	2.19±0.91	2.06±0.82	2.40±1.02	−2.536*	0.012
Motivation					
Value	4.22±0.63	4.27±0.66	4.13±0.57	1.636	0.103
Expectancy	4.10±0.58	4.9±0.59	4.11±0.56	−0.234	0.816
Strategies					
Cognitive	3.64±0.71	3.71±0.72	3.54±0.68	1.782	0.076
Resource management	3.50±0.61	3.48±0.61	3.54±0.62	−0.633	0.528

**P<0.001, *P<0.05. SD: Standard deviation

Furthermore, a weak inverse relationship between negative emotions and the strategies, except between enjoyment and boredom (mild correlation), is observed. Correlations on variables between anxiety and expectancy, anxiety and cognitive strategies, and boredom and expectancy were not significant.

Emotional Experiences and the Motivated Learning Strategy use

This study categorized students based on study program, i.e., MBBS, PHARM, MLS, and PHYSIO. The ANOVA was done to compare outcomes based on students' affiliation to a particular program. Out of all the variables tested in this study, significant differences were observed on hope ($P < 0.05$) across the four categories of students ($F [3, 201] = 3.05, P = 0.030$). The *post-hoc* comparisons using the Tukey honestly significant difference test on hope indicated that the mean score for MBBS group was significantly lower than that of PHARM (MD = −0.317, $P = 0.029$) and PHYSIO students (MD = −0.267, $P = 0.042$). However, MLS group (MD = 0.015, $P = 0.918$) did not significantly differ from that of MBBS. However, MLS group had a significant lower mean score than PHARM (MD = −0.332, $P = 0.027$) and PHYSIO (MD = −0.282, $P = 0.040$). There was no significant difference between PHARM outcome and PHYSIO (MD = 0.050, $P = 0.713$).

Regarding gender differences, independent samples *t*-test reveals that there were no significant gender differences on all the four learning strategies ($P < 0.05$). On emotions, the analysis reveals that there were significant gender differences on four emotions. Table 1 indicates all the means, standard deviations, *t*-test scores and their *P* values on gender. Male students reported higher levels of positive class-related emotions of enjoyment and hope than female students. Conversely, female students reported higher levels of negative class-related emotions of anxiety and boredom than their male counterparts.

The Relationship between Emotions and Motivated Self-regulated Strategies

In finding out the influence of motivational beliefs on the learning strategies; value and expectancy were tested in a stepwise multiple regression analysis to predict the learning strategies. Table 3 presents results from the multiple regression analysis. Predicting value, emotions were tested and the model was statistically significant ($F [2, 202] = 51.132, P < 0.001$], and accounted for approximately 33% (adjusted $R^2 = 0.330$) of its variance. The value was predicted by the higher levels of hope and enjoyment. To predict expectancy, only hope was accepted in the model. A significant regression model was found ($F [1, 203] = 31.765, P < 0.001$), with an adjusted R^2 of 0.131.

Regarding the influence of emotions and motivation on SRL strategies, the regression analysis reveals that three emotions of enjoyment, hope, and anger and a motivational aspect of the value predicted cognitive strategies. The model was statistically significant ($F [4, 200] = 53.799, P < 0.001$), and it accounted for approximately 51% (adjusted $R^2 = 0.509$) of the variance

Table 2: Inter-correlations among all study variables (*n*=205)

Variable	1	2	3	4	5	6	7	8	9	10
Enjoyment	-									
Hope	0.751**	-								
Anger	−0.423**	−0.425**	-							
Anxiety	−0.230**	−0.322**	0.691**	-						
Hopelessness	−0.441**	−0.474**	0.756**	0.742**	-					
Boredom	−0.578**	−0.467**	0.734**	0.595**	0.676**	-				
Value	0.538**	0.547**	−0.329**	−0.171*	−0.380**	−0.301**	-			
Expectancy	0.336**	0.368**	−0.234**	−0.123	−0.279**	−0.111	0.629**	-		
Cognitive strategy	0.598**	0.578**	−0.144*	−0.041	−0.182**	−0.271**	0.606**	0.414**	-	
Resource management	0.557**	0.473**	−0.231**	−0.140*	−0.272**	−0.289**	0.461**	0.301**	0.727**	-

**P<0.01, *P<0.05

Table 3: Step-wise regression results for the motivated learning strategies (*n*=205)

Variable	Predictors	Unstandardized coefficients		*t*	*P* value
		β	Standard error		
Value	Hope	0.290	0.077	3.776	<0.001
	Enjoyment	0.226	0.067	3.353	0.001
Expectancy	Hope	0.299	0.053	5.636	<0.001
Cognitive strategies	Enjoyment	0.366	0.067	4.070	<0.001
	Hope	0.337	0.078	2.823	0.004
	Anger	0.200	0.053	3.798	<0.001
	Value	0.434	0.068	6.373	<0.001
Resource management	Enjoyment	0.329	0.051	6.443	<0.001
	Value	0.222	0.066	3.377	0.001

of cognitive learning strategies. The analysis further reveals that enjoyment and value were the only predictors of resource management and a significant regression model was found (F [2, 202] = 53.685, $P < 0.001$), with an adjusted R^2 of 0.341.

DISCUSSION

Students' Class-related Emotional Experiences

The descriptive results [Table 1] reveal that students experienced a variety of emotions in their classes supporting the previous studies documenting the rich variety of sources of student emotions in education [5,6], and in medical field [7-12]. Medical school is recognized as a stressful environment that often exerts a negative effect on the academic performance and psychosocial well-being of students. Furthermore, students who start medical career already have concerns about the medical profession [8,21]. Coupled with the excitement of new students in their new college life, it is inevitable for them to experience a variety of class-related emotions.

Findings regarding emotions by program of the study reveal that MBBS and MLS students had lower levels of hope. Certainly, according to the previous research on the learning of Anatomy done by Alam [22], and Ebomoyi, and Agoneyo [23], MBBS students experienced less hope in anatomy because they perceived the subject as difficult to understand and as the most overloaded subject in basic medical sciences. Conversely, in line with other previous studies on pharmacy and

physiotherapy [22,23], this study reports that students enjoyed their respective lessons. As for MLS students, results on hope do correspond with the previous research. McClure [24] argue that the majority of students entering the MLS profession do not see the profession as their final career choice, but rather a stepping stone to another related field. In Malawi, the situation is similar [25]. It can be deduced that loss of hope in MLS students might be due to the same reasons of perceiving the profession as without any prospects of career advancement and as such, it is not taken as a final career choice.

Concerning gender differences on emotions, the previous studies support the current study's outcome that female students exhibit more negative related emotions than male students [9]. These results suggest that there are some factors that bolster male students' emotional experiences, or harm female students' emotional experiences when learning science subjects. Gender-linked stereotypes of domain-related abilities are a plausible factor for this gender discrepancy in sciences. For example, girls often think and believe science subjects are for boys, and eventually they do not put much effort on it [15]. As suggested in the previous studies [15,26], these negative attitudes toward science come from factors such as stereotypes, lack of female role models, gender bias, and interaction with teachers. In Malawi, this gender gap toward learning science exists as early as primary school. Boys' performance in science subjects like mathematics outweighs that of girls [26]. Consequently, girls think they are not good at sciences, even if they really are, and this depresses their learning [27].

Students' SRL Strategies

Regarding the motivated strategy use, students reported higher levels of motivational beliefs than cognitive and resource management strategies. One of the most striking outcomes of the study is that, despite differences in some of the emotions, there were no significant differences on learning strategies among all four programs and on gender. These findings are contrary to the previous studies [6,14,19,28] and the theoretical assumption [14] which affirms that students with positive emotions would be more motivated to facilitate their SRL and eventually would resort to a wider range of strategy use. According to the control-value theory, male students in this study would have shown a wider range of strategy use due to their positive emotions' role on SRL strategies than

female students. An explanation to these results is that since participants of this study were 1st year students, their encounter to new college life elicited enough energy to feel motivated for the profession. Therefore, their motivation and the value toward the profession undo the effects of negative emotions that they experience due to levels of subject difficulties and other antecedents.

The Relationship between Emotions and SRL

Emotions and motivational beliefs

As expected, positive emotions of enjoyment and hope positively predicted motivation. The results suggest that students who enjoy in class and perceive that their goals can be met are also more likely to be confident and believe the course is interesting, important, and useful. Some empirical work in medical education provides support to these findings. For instance, the relationships between 2nd year medical students' motivational beliefs, academic emotions, and academic achievement were examined in a longitudinal study [7], and it was found that course-related enjoyment was positively associated with task value beliefs. In this study, it can also be concluded that students who feel being in control over their learning and believe they can accomplish their goals are more likely to enjoy classes and less likely to become bored in class. Emotions and motivation work reciprocally.

The theoretical implication that emotions do affect motivation has partly been confirmed by positive emotions in this study. Positive emotions enhance motivation [3,18,19]. Contrary to the assumption, negative emotions in this study did not significantly affect motivation. A likely explanation to such nonsignificant effect of negative emotions comes from the positive attitude toward the medical career itself. In Malawi, performance in medical and allied health fields is expected to be of particular relevance to students due to the scarcity of health personnel in the country [29-31]. The career itself triggers strong motivation on students to learn the materials, thereby reducing negative emotions' effects on their education.

Emotions and learning strategies

In line with the study's theoretical assumptions, two positive emotions (enjoyment and hope) and one negative emotion (anger) regardless of their being positive or negative, positively predicted the strategies. This implies that the more students experience enjoyment, hope, and anger, the more they use cognitive strategies of elaboration, organization, critical thinking, planning, monitoring, and regulating cognitions. For the positive emotions, findings of this study support the theoretical propositions that positive emotions are associated with deep cognitive strategies [6,14]. According to the control-value theory, feelings of enjoyment and hope may result from an evaluation of being in control of the learning activities. Enjoyment further predicted resource management proving the fact that activating positive emotions not only predict deep cognitive strategies, but also enhance flexible learning hence high levels of resource management.

The role of anger appears to show a similar pattern to that of positive emotions. As expected, the effect of negative activating emotions may be ambivalent. Despite its being negative, its activating nature made students engage into deep learning approach to deal with the negative outcomes the emotion brings along [6]. These findings are consistent with the previous studies where negative activating emotions were found to associate with deep and metacognitive strategy use [6,28]. Interestingly, all other negative emotions did not predict the four variables of value, expectancy, cognitive, and resource management. The findings are not in line with the assumption that negative emotions decrease motivation and predict the usage of less deep-processing strategies. The possible implication of these findings is that either the students' motivational beliefs or the positive emotions were perhaps "undoing" the effects of negative emotion [32].

Motivation and learning strategies

With the exception of expectancy, motivation component of value strongly predicted both cognitive learning strategy and resource management, thus suggesting that goal orientation and task value may in fact facilitate flexible, creative cognitive learning strategies. Since positive emotions improve motivation [3,18,19], which eventually enhances learning, these results suggest that students who found enough reasons to do the task, and found the task interesting, important and useful, were ready to use various ways of engaging into the task itself, hence the use of wider range of cognitive strategies. To support these finding, one study found that intrinsic motivation (intrinsic goal orientation) significantly associated with deep strategy use [7]. In line with other previous findings [7,33], this is typical of 1st year medical students who are trying many ways of dealing with the perceived overloaded and difficult basic medical subjects [21-23,34].

Contrary to the study's theoretical assumption, motivational component of expectancy (control and self-efficacy) did not predict either of the strategies. However, these results are consistent with precious studies on 1st year medical students. For instance, 1st year medical students' self-efficacy did not predict deep strategies, but rather positively associated with their performance [33]. A possible explanation for this nonsignificant relationship between expectancy and learning strategies is that students who possess high levels of control and self-efficacy do not always need a very high degree of participation to be successful in class [33]. It is rational to conclude that these students find no need for such strategies as help seeking and peer learning.

Limitations and Further Research Directions

Findings of this study were time bound, that is, it did not give information on changes in emotions or learning strategies over time. There is need to have longitudinal studies investigating changes in students' emotions over a period of time. In addition, there should also be further assessments to see if these to be observed changes would associate with changes in

their use of learning strategies. Furthermore, the population involved in this study only focused on 1st year students. Since data were drawn from the 1st year only, results might not be generalized beyond the specific population. Medical and health educators would do well to conduct empirical studies focusing on how different year groups experience emotions, and how these experienced emotions relate to their learning strategies. Finally, the study included the relationship between emotions and self-regulated strategies only without considering performance (achievement). Future research should include an investigation of the relationship between emotions and academic performance, and in addition an investigation into the relationship between self-regulated strategies and achievement.

Regardless of these limitations, the study has revealed that class-related positive emotions have a significant impact on SRL. The findings imply that there is a significant role class-related experienced emotions play on medical and allied health scientists. The findings also suggest that medical and allied health students have certain control and value beliefs that influence their perceptions of their classroom environment and their class-related emotional experiences. This is also supported by Artino *et al.* [7] who claims that there is an implicit assumption that medical students possess inherently strong motivational beliefs with which they can mitigate negative emotions. In this study, it can be deduced that the strong motivational beliefs assuaged the effect of negative emotions. Therefore, it is paramount to establish a class environment which would foster the existence of these motivational beliefs and positive emotions for the individual success in medical school and beyond the training.

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REFERENCES

1. Boekaerts M. Self-regulated learning at the junction of cognitive and motivation. Eur Psychol 1996;1:100-12.
2. Pintrich PR, Smith DA, García T, McKeachie WJ. A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ). Ann Arbor: University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning; 1991.
3. Pintrich PR. The role of goal orientation in self-regulated learning. In: Boekaerts M, Pintrich PR, Zeidner M, editors. Handbook of Self-regulation. San Diego, CA: Academic Press; 2000. p. 451-502.
4. Schutz PA, Pekrun R. Emotion in Education. San Diego, CA: Elsevier, Academic Press; 2007.
5. Boekaerts M. Understanding students' affective processes in the classroom. In: Schutz PA, Pekrun R, editors. Emotion in Education. San Diego, CA: Elsevier, Academic Press; 2007. p. 37-56.
6. 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;37:91-105.
7. Artino AR, La Rochelle JS, Durning SJ. Second-year medical students' motivational beliefs, emotions, and achievement. Med Educ 2010;44:1203-12.
8. 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:e148-60.
9. Smith CK, Peterson DF, Degenhardt BF, Johnson JC. Depression, anxiety, and perceived hassles among entering medical students. Psychol Health Med 2007;12:31-9.
10. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. And Canadian medical students. Acad Med 2006;81:354-73.
11. Barrows H, Tamblyn R. Problem-Based Learning: An Approach to Medical Education. New York, NY: Springer Publishing Company; 1980.
12. Lyndon MP, Masters T, Yu TC, Shao R, Alyami H, Henning M, *et al.* Medical student motivation and well-being: A systematic review. Educ Med J 2016;8:11-20.
13. Pekrun R, Frenzel A, Goetz T, Perry RP. The control-value theory of achievement emotions: An integrative approach to emotions in education. In: Schutz PA, Pekrun R, editors. Emotion in Education. San Diego, CA: Academic Press; 2007. p. 13-36.
14. Pekrun R. The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. Educ Psychol Rev 2006;18:315-41.
15. Frenzel A, Pekrun R, Goetz T. Girls and mathematics - A "hopeless" issue? A control-value approach to gender differences in emotions towards mathematics. Eur J Psychol Educ 2007;4:497-514.
16. Goetz T, Frenzel AC, Pekrun K, Hall NC. The domain specificity of academic emotional experiences. J Exp Educ 2006;75:5-29.
17. Postareff L, Mattsson M, Lindblom-Ylänne S, Hailikari T. The complex relationship between emotions, approaches to learning, study success and study progress during the transition to university. High Educ 2016. DOI: 10.1007/s10734-016-0096-7.
18. Bandura A. Social cognitive theory of self-regulation. Organ Behav Hum Decis Process 1991;50:248-87.
19. D'Errico F, Paciello M, Cerniglia L. When emotions enhance students' engagement in e-learning processes. J e-Learn Knowl Soc 2016;12:9-23.
20. Pekrun R, Goetz T, Perry RP. Achievement Emotions Questionnaire (AEQ): User's Manual. Munich, Germany: University of Munich, Department of Psychology; 2005.
21. Hamid S, Singaram VS. Exploring the relationship between demographic factors, performance and fortitude in a group of diverse 1st-year medical students. Afr J Health Prof Educ 2016;8:99-103.
22. Alam A. How do medical students in their clinical years perceive basic sciences courses at King Saud University? Ann Saudi Med 2011;31:58-61.
23. Ebomoyi MI, Agoreyo FD. Preclinical students' perceptions of their courses and preclinical specialty choice. J Med Biomed Res 2007;6:47-58.
24. McClure K. Student perceptions of the clinical laboratory science profession. Clin Lab Sci 2009;22:16-21.
25. Comparing the Job Satisfaction and Intention to Leave of Different Categories of Health Workers in Tanzania, Malawi, and South Africa. In: Global Health Action. Available from: http://www.dx.doi.org/10.3402/gha.v6i0.19287. [Last accessed on 2014 Jul 30].
26. Chamdimba PC. Students' attitude towards mathematics in Malawi: Can they be improved? Lilongwe, Malawi: Bunda College; 2008.
27. Gomile-Chidyaonga F. Encouraging Greater Enrollments of Women in Science and Technology: The Malawi Polytechnic Experience; 2003. Available from: http://siteresources.worldbank.org/INTAFRREGTOPTEIA/Resources/flossie_gomile.pdf.
28. Ahmed W, van der Werf G, Kuyper H, Minnaert A. Emotions, self-regulated learning, and achievement in mathematics: A growth curve analysis. J Educ Psychol 2012;105:1-12.
29. Muula A. Malawi College of Medicine-still not an ivory tower. Croat Med J 2010;51:171-2.
30. Tackling Malawi's Doctor Deficit. In: Inter Press Service News Agency. Available from: http://www.ipsnews.net/2013/04/tackling-malawis-doctor-deficit. [Last accessed on 2016 Nov 13].
31. Malawian Doctors - Are There More in Manchester than Malawi? In: BBC News. Available from: http://www.bbc.com/news/magazine-16545526. [Last accessed on 2016 Jun 15].
32. Fredrickson BL. The role of positive emotions in positive psychology. The broaden-and-build theory of positive emotions. Am Psychol 2001;56:218-26.

33. Stegers-Jager KM, Cohen-Schotanus J, Themmen AP. Motivation, learning strategies, participation and medical school performance. Med Educ 2012;46:678-88.
34. Gupta S, Gupta AK, Verma M, Kaur H, Kaur A, Singh K. The attitudes and perceptions of medical students towards basic science subjects during their clinical years: A cross-sectional survey. Int J Appl Basic Med Res 2014;4:16-9.