The Pathway to Academic Performance: The Role of Motivation, Competence and Socio-familial Risk Factors in Lebanese Medical Students

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Abstract

While cognitive abilities are known to have a certain degree of predictive value for academic performance, it is now well-established that motivation and emotion-related variables, along with environmental variables such as socio-economic status and family support, also significantly contribute to the academic success of university students. However, the specific mechanisms through which the environment influences these non-cognitive variables in predicting academic performance, particularly within the context of non-individualistic cultures, remain underexplored. In this study we examined the influence of family support, trait Emotional Intelligence (trait EI), and academic self-efficacy (ASE) on Academic Performance (AP). Additionally, we studied competence and motivation as potential mediators in the relationship between trait EI and academic self-efficacy (ASE). The study utilized structural equation models applied to two sub-samples drawn from a group of medical students. The first sub-sample, labeled the "low risk" group, consisted of students who reported minimal difficulty in paying bills and had highly educated parents. The second sub-sample, labeled the "high risk" group, included students who reported difficulty in paying bills and had less educated parents. The findings revealed that intrinsic motivation plays a more prominent role than extrinsic motivation as a mediator between trait EI, predicted by family support, and ASE, which in turn predicted AP. Among the low-risk students, both competence and intrinsic motivation fully mediated this relationship, whereas among the high-risk students, only competence acted as a mediator. These findings have significant implications for medical educational settings and are thoroughly discussed in this study.

Background

The demanding nature of medical education, which requires students to acquire advanced medical knowledge and skills while also providing care for patients during clinical duties, contributes to heightened stress levels (Kusurkar, Croiset, Galindo-Garré, & Ten Cate, 2013). Ensuring that medical students reach their full academic and professional potential is therefore a critical concern for medical educators and stakeholders (Gullo, McCarthy, Shapiro, & Miller, 2015). To this end, a substantial body of research has focused on identifying factors that influence academic achievement. While cognitive factors such as intelligence, socio-demographic factors (including gender and parental involvement), socio-economic status (SES), and traditional personality dimensions have received considerable attention (Bahar, 2010; Poropat, 2009; Salamonson & Andrew, 2006; Suárez-Álvarez, Fernández-Alonso, & Muñiz, 2014), recent research has brought non-cognitive factors to the forefront, as studies show that cognitive abilities account for no more than 23% of the variance observed in undergraduate medical education performance (Ferguson, James, & Madeley, 2002).

Notably, the impact of motivation and self-regulated learning strategies on academic performance (AP) has been extensively studied (Pérez-González, Filella, Soldevila, Faiad, & Sanchez-Ruiz, 2022). However, it is only recently that researchers have begun to examine non-cognitive factors, such as emotion-related traits, in predicting AP (Keefer, Parker, & Saklofske, 2018; M.-J. Sanchez-Ruiz, Khoury, Saadé, & Salkhanian, 2016; M.-J. Sanchez-Ruiz, Mavroveli, & Poullis, 2013). A comprehensive grasp of the underlying non-cognitive factors and their impact on AP is crucial for educators to provide effective support to students navigating the demands of medical education.

Social Cognitive Theory as a framework

In view of the multitude of factors that may contribute to AP, it is essential to adopt a theoretical framework capable of comprehensively accounting for this complexity. Such a framework should facilitate the examination of both direct and indirect effects of these factors, thereby surpassing mere correlational analyses (Hayat, Shateri, Amini, & Shokrpour, 2020). Bandura's (2012) social cognitive theory (SCT) provides such a framework. According to Bandura (2012), the theory offers a "multifaceted causal structure in which self-efficacy beliefs operate together with goals, outcome expectations, and perceived environmental impediments and facilitators in the regulation of human motivation, behavior, and well-being" (p.143) (Bandura, 2012).

Accordingly, SCT encompasses both personal and contextual/environmental elements when modeling pathways of human behavior and the achievement of goals, such as academic performance. In particular, in our study we analyze the roles of personal agency, namely academic self-efficacy, intrinsic and extrinsic motivation, self-perceived competency, and trait EI, or trait emotional self-efficacy, as well as social factors (perceived family support) and environmental factors (socio-economic status and parental education) on academic performance.

Personal agency factors involved in AP

Self-efficacy is a fundamental component of Social Cognitive Theory (SCT), which refers to an individual's belief in their ability to achieve a specific goal (Bandura, 2012). This internal belief interacts with both behavior and the environment (Artino, 2012). Self-efficacy and self-concept domains, such as competence, differ in that the former represents a future-oriented judgment of capability, while the latter is past-oriented (Klassen & Klassen, 2018) [SA1]. Moreover, academic self-efficacy refers specifically to an individual's belief in their academic competency and has been demonstrated to be a powerful predictor of academic achievement (Komarraju & Nadler, 2013; Schunk & Pajares, 2001).

In addition to self-efficacy, motivation has also been shown to be a crucial factor in learning success and academic performance (AP) among undergraduate university students (Núñez & León, 2018). Particularly for medical students engaged in intensive study courses, a high level of motivation is required for effective learning (Kusurkar et al., 2013; Kusurkar, Ten Cate, van Asperen, & Croiset, 2011; Torres-Roman et al., 2018). Motivation can generally be classified as intrinsic or extrinsic, with intrinsically motivated students being driven by their interest in the subject or intellectual challenge, while extrinsically motivated students are outcome-oriented, focusing on the potential financial rewards or reputation they may gain (Ryan & Deci, 2000). Amotivation, on the other hand, refers to a lack of motivation. Turner et al. (2009) found that while intrinsic motivation was a significant predictor of GPA, amotivation was associated with poor GPA (Turner, Chandler, & Heffer, 2009).[SA2]

Alongside motivation, medical students employ various coping skills as a means to deal with the stressors that accompany their rigorous academic demands and workload (Neufeld & Malin, 2021). Some coping skills are adaptive, such as personal engagement, extracurricular activities, and students support services (Fares et al., 2016; Sattar, Yusoff, Arifin, Yasin, & Nor, 2022) while others are maladaptive, such as venting,

withdrawal, and substance abuse (Fares et al., 2016; Neufeld & Malin, 2021; Sattar et al., 2022). The ability of individuals to deploy coping strategies that enable them to overcome difficulties and achieve success is closely related to their competence (Liem, 2022). In fact, the way medical students cope has been linked to academic performance (Fares et al., 2016; Ramkumar et al., 2011). Nevertheless, research in this area has predominantly focused on the frequency of coping behaviors, rather than exploring ways to promote perceived competence through positive coping strategies (Fares et al., 2016), which is crucial for enhancing the academic performance of medical students.

Despite the integration of non-cognitive factors, such as self-efficacy, motivation and coping into designs that predict academic performance within the SCT framework, there is still a scarcity of research that comprehensively addresses the role of emotion-related variables on academic performance (Keefer et al., 2018; M. J. Sanchez-Ruiz & El Khoury, 2019). Trait EI is defined as a constellation of emotion-related personality dispositions, assessed through self-report measures (Petrides, 2009). Adopting the trait EI approach benefits the exploration of a wide range of emotional self-efficacy indicators, such as sociability, self-control, well-being, and emotionality (M. J. Sanchez-Ruiz & El Khoury, 2019). Several studies have explored the relationship between trait EI and academic performance among university students, indicating a significant association (Austin, Evans, Goldwater, & Potter, 2005; H, 2011; Parker, Summerfeldt, Hogan, & Majeski, 2004). The present study aims to overcome some limitations of these studies by adopting the trait EI approach and employing a measure that has demonstrated excellent psychometric properties.

Social and environmental factors involved in AP

Prior research focusing on social support, including parental support, as an indicator of parental influence on AP revealed that perceived social support plays a key role in establishing premedical students' confidence in their ability to cope with the challenges of academic life (Klink, Byars-Winston, & Bakken, 2008) and predicted AP among undergraduate university students (Bahar, 2010). More specifically, among various social support facets, perceived family support was the only significant predictor of AP, whereas perceived friend support and perceived support from someone special were not significant predictors (Bahar, 2010). A recent study also found a positive association between perceived social support and AP (Li, Han, Wang, Sun, & Cheng, 2018). Although the influence of family support on student motivation has been widely investigated in elementary, high school, and premedical students, little research has addressed its role in medical students' academic performance (Dube, 2019; Kunanitthaworn et al., 2018). In collectivist societies, where interrelationships among family and society hold a prominent role in shaping an individual's character and identity, social determinants may have a greater impact on academic performance (Hayashi, Karouji, & Nishiya, 2022). Notably, Lebanon, unlike most Western countries, falls in between Syria and Jordan, which are considered collectivist societies, and England, which is viewed as an individualistic society, on a self-construal scale measuring levels of collectivism (Harb & Smith, 2008).

The environmental factors that we focus on in this study relate to socioeconomics and parental education. Considerable research examines the role of socio-familial factors along with personality dimensions in predicting academic performance (Acacio-Claro, Koivusilta, Borja, & Rimpelä, 2017; Bahar, 2010; Cheng & Kaplowitz, 2016; Poropat, 2009). One study found that socio-economic status, rather than age and gender, played an important role in motivating high school students to pursue medicine as a career. High socio-

economic status medical students relied on intrinsic motivation (Greenhalgh et al., 2006), whereas students of lower socio-economic status tended to focus on rewards and extrinsic motivation (Greenhalgh et al., 2006).

Similarly, research has shown that school children of more educated parents tend to outperform those from less educated households (Idris et al., 2020). In secondary schools, low parental education levels are deemed a risk factor for students' academic performance (Rodríguez-Rodríguez & Guzmán, 2019). While an individual's career choice is highly influenced by their interest in science, flexibility and independence, their parents' desire for educational or financial advancement may also influence their decision (Goel, Angeli, Dhirar, Singla, & Ruwaard, 2018). Despite the extensive research conducted in this field, the role of society, economic status, and family in medical education in Lebanon remains underexplored. In fact, only a few publications in the area of educational research exist (M. J. Sanchez-Ruiz & El Khoury, 2019; Sarkis et al., 2020).

The present study

Empirical evidence posits that non-cognitive variables impact the AP of medical students. However, it remains unclear how these variables are affected by external environmental risks, specifically parental education and income. Thus, the current study aims to investigate the pathway to academic achievement among undergraduate medical students while accounting for environmental risks as moderators. In particular, our model incorporates motivation and competence as mediators in the relationship between perceived family support, trait emotional intelligence, academic self-efficacy, and AP.

(Fig. 1 goes here)

Motivation and Competence as Mediators

The hypotheses proposed for this research are as follows:

1. Perceived family support has an effect on trait EI, which in turn has an effect on academic self-efficacy driving AP.
2. Extrinsic motivation and intrinsic motivation have differential effects in mediating the relationship between trait EI and academic self-efficacy, which in turn has an effect on AP.
3. Competence serves as a mediator between trait EI and academic self-efficacy, driving AP.
4. Environmental risk moderates the effects of motivation and competence on academic self-efficacy, exhibiting variations between students in low and high-risk environments.

Methods

Participants

A total of 235 students (114 female) within the age range of 20 to 28 years old ($M = 23.0$, $SD = 1.4$) were selected as participants for this study. They were recruited from two Lebanese medical schools that follow the American model, which requires students to obtain a bachelor's degree before entering the MD program.

Both medical schools follow a similar structure in their curriculum, comprising of a two-year preclinical phase conducted on campus, followed by a two-year clinical clerkship offered at the hospital. It is worth noting that out of the total sample, 24 respondents had missing data regarding their GPA, resulting in their exclusion from the SEM analyses. Table 1 provides descriptive statistics pertaining to various demographic variables, such as age, gender, yearly income, living status, parental education, and satisfaction with their chosen major.

Table 1
Summary of study participants.

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Age			**Father's Level of Education**		
20–21	25	12%	NA	0	0%
22	59	28%	No Schooling	14	7%
23	51	24%	Primary	27	13%
24	41	19%	Secondary	55	26%
25	25	12%	Undergraduate	87	41%
> 25	8	4%	Postgraduate	28	13%
NA	2	1%	**Mother's Level of Education**		
Gender			NA	1	0%
Female	106	50%	No Schooling	6	3%
Male	105	50%	Primary	28	13%
Yearly Income			Secondary	82	39%
< $20,000	38	18%	Undergraduate	79	37%
~$35,000	33	16%	Postgraduate	15	7%
~$75,000	23	11%	**Living Status**		
~$100,000	30	14%	NA	74	35%
>$100,000	7	3%	Both Father and Mother	26	12%
NA	80	38%	Father Only	8	4%
Difficulty Paying Bills			Mother Only	55	26%
Too much difficulty	19	9%	Alone	32	15%
Some difficulty	43	20%	Roommate	14	7%
Average	81	38%	Other	2	1%
Little difficulty	34	16%	**Major Satisfaction**		
No Difficulty	35	17%	Not at all satisfied	3	1%

Note. The measures used in this study can be divided into three primary categories – personal agency, environmental, and academic performance. The following subsections describe the measures within each category.

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Age			Father's Level of Education		
			Somewhat not satisfied	9	4%
			Neutral	20	9%
			Somewhat satisfied	70	33%
			Completely satisfied	106	50%
			NA	3	1%

Note. The measures used in this study can be divided into three primary categories – personal agency, environmental, and academic performance. The following subsections describe the measures within each category.

Procedure

Medical students from two university medical schools were invited via email to participate in the study. The study was approved by the Institutional Review Board committees, with the reference number LAU.SOM.RC1.2015.R1.28/June/2016. Upon obtaining written consent from the participants, they were asked to complete demographic questions encompassing variables such as gender, year of training, living status, educational attainment of both parents, average yearly income of the family, and parents' ability to meet financial obligations (difficulty paying bills). These questions were followed by the Perceived Social Support from Family Scale, the TEIQue Questionnaire, Perceived Medical School Stress Scale, Student Coping Instrument, Academic Motivation Scale, Academic Self-Efficacy Scale, Performance Failure Appraisal Inventory and the Perfectionism Scale. To ensure data linkage with academic performance, participants were requested to provide their student IDs, which were later used by the Dean's office of each participating school to access their MCAT scores and GPA data. It is crucial to emphasize that all the information shared by participants, including their students' IDs, was treated with utmost confidentiality. Once the GPA and MCAT scores were matched based on the student IDs, the IDs were removed from the dataset and replaced with anonymous IDs, preserving both anonymity and confidentiality throughout the study.

Measures

The measures used in this study can be divided into three primary categories – personal agency, environmental, and academic performance. The following subsections provide detailed descriptions of the measures within each category.

Academic Performance

Data on GPA and MCAT scores were retrieved from the databases of the respective medical schools. GPA scores were reported out of a total of 100 points. As for the MCAT scores, the total scores were derived by averaging the scores obtained in physics and biology sections, each assessed on a numeric scale ranging from 1 to 15 (according to the previous MCAT scoring scale). For the model assessed in this study, we relied

only on the GPA as it reflects academic performance as a result of the medical school experience. In contrast, the MCAT scores primarily reflect academic performance prior to enrolment in medical school. Within this sample, the minimum GPA recorded was 52.8, the mean GPA was 75.7, the median GPA was 76.6, and the maximum GPA observed was 91.82.

Personal Agency Constructs

Academic Self-Efficacy Scale (ASE)

The ASE (McIlroy et al., 2000) measures an individual's self-efficacy in terms of initial decision to act, the effort they put into their actions, and their perseverance in the face of obstacles. The ASE consists of 10 items, each rated on a five-point Likert scale ranging from (1) 'Strongly disagree' to (5) 'Strongly agree.' A sample item is: "I am confident that I can achieve good results if I really put my mind to it." In this study, the internal consistency of the ASE scores was found to be 0.75.

Academic Motivation Scale (AMS)

The AMS (Vallerand et al., 1992) was developed on the basis of the self-determination theory and aims to assess various motivational styles. This scale comprises 28 items organized into seven subscales. Among these subscales, three measure extrinsic motivation (external, introjected, and identified regulation), three assess distinct types of intrinsic motivation (knowledge, accomplishment, and stimulation), and one measures amotivation. Participants responded to each item using a seven-point Likert scale ranging from (1) 'Completely disagree' to (7) 'Completely agree'. In our sample, four respondents failed to complete all scale items, with each missing one item. To address these missing values, a machine learning imputation process based on random forests was employed. The internal consistencies of the subscales in this study were found to be 0.88 for external motivation, 0.87 for internal motivation, and 0.91 for overall motivation. It is important to note that the amotivation items were excluded from analysis in this study.

Student Coping Instrument

The SCOPE (Struthers et al., 2000) is a 30-item measure assessing both emotion-focused coping (EFC) and problem-focused coping (PFC), along with their respective subscales. The EFC subscales include general emotional support, denial, emotional venting, and academic disengagement. The PFC subscales comprise academic planning, general active coping, efficacy, and active study coping. Participants rank their responses to each item on a 10-point Likert scale, ranging from (1) 'Extremely Uncharacteristic' to (10) 'Extremely Characteristic.' Sample items include "I think about how I might best handle the problem" from the PFC factor and "I act as though it hasn't happened" from the EFC factor. In this study, only the subscale related to competence was utilized, encompassing statements such as "I feel competent."; "I feel confident.", "I feel hopeful." and "I feel motivated." The internal reliability within this competence subscale was found to be 0.87.

Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF)

The TEIQue-SF (Petrides, 2009) is a 30-item test that measures global trait EI and four specific factors: well-being, self-control, emotionality and sociability. Participants provide responses to each item using a seven-point Likert scale, ranging from (1) 'Completely disagree' to (7) 'Completely agree.' A sample item for the emotionality factor is "Expressing my emotions with words is not a problem for me." In this study, only the full construct was used. It is important to note that the long form of this test has been validated in Lebanon (Sanchez-Ruiz et al., 2020), and the short form has demonstrated good reliability in previous applications (e.g., Sanchez-Ruiz et al., 2019). The internal consistency score of the TEIQue-SF in this particular sample was found to be 0.87.

Environmental Constructs

Socio-demographic questions

The study incorporated socio-demographic questions to gather information on key factors. These included *yearly income*, which was assessed using a single question: "What is your/your family's average yearly income?" Respondents were presented with five response options, ranging from "Less than $20,000" to "More than $100,000". Instructions with this question advised participants to leave the question blank if they were unsure of the answer. Consequently, nearly 38% of the sample did not provide a response to this income question. To indirectly assess the economic status of the students, another question was included, which inquired about their *family's difficulty paying bills*. Specifically, the question was phrased as follows: "How much difficulty do you/your parents have in meeting the payment of bills?" Response options ranged from 1 – Too much difficulty to 5 - No difficulty. This measure of economic status was chosen as a supplementary indicator alongside income because of the substantial proportion of participants (nearly 38%) who left the income question unanswered, while no such omissions occurred for the bill payment difficulty question. Lastly, *parental education* was also captured through two direct questions: one regarding the educational attainment of the father and the other concerning the educational attainment of the mother. A summary of response frequencies for these questions is presented in Table I. These variables were used as part of a Ward's hierarchical agglomerative cluster analysis, which resulted in the identification of two distinct student groups. The first group consisted of 131 students whose fathers had a high level of education, mothers had above-average education levels, and minimal difficulty in paying bills. The second group consisted of 80 students whose fathers had a low level of education, mothers had a moderate level of education, and experienced difficulty paying bills.

Perceived Social Support from Family Scale (PSS-Fa)

The PSS-Fa, developed by Procidano and Heller in 1983, was employed in this study to assess individuals' perceptions regarding the extent to which their family meets their needs. The scale consists of 20 items, and participants responded to each item using a seven-point Likert scale ranging from (1) 'Completely disagree' to (7) 'Completely agree.' Sample items include statements such as "My family gives me the moral support I need" and "Members of my family are good at helping me solve my problems." The internal consistency of the scale in this particular sample was found to be 0.92, indicating a high level of reliability.

Statistical Analysis and Results

All statistical analyses performed in support of this study were performed using R (R Development Core Team, 2010). Scripts supporting the analyses are available and can be obtained from the corresponding author upon request. The analysis centers on two primary techniques: structural equation modeling (SEM) and clustering. SEM was employed to assess the fit of the proposed models, using the Lavaan package in R (Rosseel, 2012). Clustering was undertaken to identify distinct groups among the students based on environmental factors, specifically yearly income, difficulty paying bills, and both mother's and father's level of education. Ward's agglomerative hierarchical clustering, implemented through the cluster package in R (Maechler et al., 2019) resulted in two clusters. One cluster comprised individuals facing more difficulty paying bills and having less educated parents and the other cluster consisted of individuals experiencing less difficulty paying bills and having more educated parents.

Prior to conducting the structural equation modeling analysis, a preliminary step involved summarizing key variables of competence, academic self-efficacy, trait emotional intelligence, perceived family support, and intrinsic and extrinsic motivation. The mean, standard deviation, and Cronbach's Alpha coefficients were computed and presented in Table 2. All variables, except competence (measured on a ten-point scale) and academic self-efficacy (measured on a five-point scale), were assessed using a seven-point Likert scale. Additionally, it is worth noting that the GPA was scored out of 100. The Cronbach's Alpha coefficients for all variables ranged from 0.75 to 0.92, indicating a good level of internal reliability for the key variables examined in this study.

Table 2
Descriptive statistics for variables used in the model (n = 211)

Variable	Mean	SD	Cronbach's Alpha
Competence	7.47	1.6	0.87
Academic Self-Efficacy (ASE)	3.82	0.58	0.75
Trait Emotional Intelligence (Trait EI)	5.15	0.71	0.87
Family Support	5.64	0.94	0.92
Motivation	5.08	0.91	0.91
Intrinsic Motivation (IM)	5.26	0.98	0.88
Extrinsic Motivation (EM)	4.89	1.07	0.87
GPA	75.7	7.13	–

Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA), Standard Deviation (SD).

Upon examining the correlation between these variables, as depicted in Table 3, it becomes evident that competence is positively correlated with all variables. Similarly, academic self-efficacy demonstrates positive correlations with all variables, except for extrinsic motivation. Furthermore, extrinsic motivation only exhibits significant correlations with competence, intrinsic motivation, and motivation. Notably, despite the significant correlation observed with intrinsic motivation, extrinsic motivation as a scale does not display the

same pattern of correlation with the variables of ASE, Trait EI and Family Support in the way that intrinsic motivation does. This distinct behavior between EM and IM prompts further analysis focused on modeling the different roles of EM and IM within the proposed model.

Table 3
Correlation of variables (n = 211)

Variable	1	2	3	4	5	6	7
1. Competence							
2. ASE	0.63****						
3. Trait EI	0.59****	0.47****					
4. Family Support	0.40****	0.31****	0.44****				
5. EM	0.24***	0.13	0.02	0.03			
6. IM	0.49****	0.45****	0.24***	0.20**	0.57****		
7. Motivation	0.40****	0.31****	0.14*	0.13	0.90****	0.88****	
8. GPA	0.19**	0.34****	0.17*	0.13	0.04	0.18**	0.12

Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA). $p < .0001$ '****'; $p < .001$ '***', $p < .01$ '**', $p < .05$ '*'. Data are considered significant with a $p < .05$.

Table 4 displays the findings obtained from the structural equation models conducted on the complete dataset. One model incorporated Intrinsic Motivation as the mediator, while the second model employed Extrinsic Motivation as the mediator. In these results, we see that the fit metrics of RMSEA, CFI, and TLI indicate acceptable model fit for both models. When examining the path values, we find that all paths, with the exception of the Trait EI to Academic Self Efficacy path, are significant in the model with intrinsic motivation. This suggests that intrinsic motivation and competence serve as complete mediators in the relationship between Trait EI and ASE. In contrast, the model incorporating extrinsic motivation as the mediator reveals that extrinsic motivation has no bearing on the relationship between Trait EI and ASE with only competence fully mediating the relationship. (Table 4 goes here)

Table 4

Model fit and path variables for SEM. Path values reported are the Beta values with p-values in parentheses (n = 211)

Path	Intrinsic Motivation Model	Extrinsic Motivation Model
Family Support → Trait EI	0.440 (0.000)	0.441 (0.000)
Trait EI→Motivation	0.507 (0.000)	0.071 (0.499)
(IM or EM)		
Trait EI→Competence	1.635 (0.000)	1.582 (0.000)
Trait EI→ASE	-0.004 (0.935)	-0.008 (0.871)
Motivation (IM or EM)	0.097 (0.001)	0.021 (0.331)
→ASE		
Competence→ASE	0.149 (0.000)	0.178 (0.000)
ASE→GPA	6.841 (0.000)	6.795 (0.000)
RMSEA	0.066	0.067
CFI	0.641	0.631
TLI	0.631	0.62

Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA), Root Mean Square Error of Approximation (RMSEA), Comparative Fixed Index (CFI), Tucker-Lewis Index (TLI)

Table 5 provides an examination of the differential effect of intrinsic motivation on students categorized into two groups based on their environmental risk level. The first group comprises students from low-risk environments characterized by minimal or no difficulty in paying bills and moderately to highly educated parents. The second group consists of students from high-risk environments characterized by difficulties in paying bills and moderately to minimally educated parents. Initially, a comparison was conducted to assess the difference between the variables across these two groups. The results in Table 5 reveal significant difference, at a level of 0.05 or less, between the two groups in terms of Competence, Motivation as a full scale, and Intrinsic Motivation as a sub-scale. Additionally, Extrinsic motivation exhibits a significant difference at a significance level of 0.06. (Table 5 goes here)

Table 5

Descriptive statistics of variables by risk status and t-tests comparing groups. ** significant at < 0.05; * significant at < 0.10

	Low Risk (n = 131)		High Risk (n = 80)		
Variable	Mean	SD	Mean	SD	t
Competence	7.68	1.51	7.13	1.71	2.42**
ASE	3.85	0.58	3.77	0.58	1.02
Trait EI	5.2	0.65	5.07	0.78	1.28
Family Support	5.71	0.99	5.52	0.84	1.38
Motivation	5.19	0.88	4.89	0.93	2.36**
IM	5.39	0.96	5.06	0.98	2.35**
EM	5	1.05	4.72	1.09	1.86*
GPA	75.55	7.27	75.93	6.96	-0.38

Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA), Standard Deviation (SD).

While it is intriguing to observe that only competence and the motivation related variable demonstrate a difference across groups, it is even more noteworthy to see the contrasting pattern of correlations among these variables observed in each group. Specifically, in the low-risk group, the GPA demonstrates positive correlations with competence, ASE, Trait EI, and IM along with motivation as a full scale (Table 6 below the diagonal). In contrast, in the high-risk group, the GPA correlates only with ASE (Table 6 above the diagonal).

Table 6

Correlations of variables for the low-risk group below the axis and high-risk group above the axis, n = 130.

	1	2	3	4	5	6	7	8
1. Competence		0.63****	0.72****	0.34**	0.22*	0.51****	0.40***	0.17
2. ASE	0.64****		0.56****	0.21	0.10	0.41***	0.27*	0.36***
3. Trait EI	0.48****	0.40****		0.36***	-0.08	0.27*	0.10	0.13
4. Family Support	0.42****	0.35****	0.48****		0.01	0.21	0.12	0.1
5. EM	0.22*	0.13	0.07	0.03		0.61****	0.91****	-0.09
6. IM	0.46****	0.46****	0.20*	0.18*	0.53****		0.89****	0.11
7. Motivation	0.38****	0.33***	0.15	0.12	0.89****	0.86****		0.00
8. GPA	0.21*	0.33***	0.21*	0.15	0.12	0.23**	0.20*	

Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA). $p < .0001$ '****'; $p < .001$ '***', $p < .01$ '**', $p < .05$ '*'. Data are considered significant with a $p < .05$.

To further investigate these differences between the Low-risk and High-risk groups, we build the SEM with intrinsic motivation as a mediator for both groups. While the model fit metrics for these groups did not meet commonly accepted benchmarks, they align with expectations for small sample sizes (Shi, Lee, and Maydeu-Olivares, 2019). Considering the resulting path values as summarized in Table 7, it is observed that competence acts as a complete mediator in the relationship between Trait EI and ASE for both groups. However, in terms of Intrinsic Motivation as a mediator, a notable distinction emerges between the high-risk and low-risk groups. In the low-risk group, intrinsic motivation appears to fully mediate the relationship with stronger significance. In contrast, for the high-risk group, intrinsic motivation serves as a weaker mediator. Furthermore, the influence of family support on Trait EI exhibits contrasting results between the two groups. In the high-risk group, family support only demonstrates borderline significance, whereas in the low-risk group it exhibits significance at a level of < 0.001 (Table 7 goes here).

Table 7

Model fit and path variables for SEM. Path values reported are the Beta values with p-values in parentheses.

Path	Low-Risk (n = 131)	High-Risk (n = 80)
Family Support → Trait EI	0.452 (0.000)	0.476 (0.049)
Trait EI→Intrinsic Motivation	0.434 (0.005)	0.568 (0.016)
Trait EI→Competence	1.196 (0.000)	2.246 (0.001)
Trait EI→ASE	0.013 (0.836)	-0.017 (0.861)
Intrinsic Motivation→ASE	0.117 (0.004)	0.070 (0.100)
Competence→ASE	0.190 (0.000)	0.123 (0.009)
ASE→GPA	6.455 (0.001)	7.724 (0.015)
RMSEA	0.081	0.133
CFI	0.54	0.315
TLI	0.527	0.295
Note. Academic Self-Efficacy (ASE), Trait Emotional Intelligence (Trait EI), Intrinsic Motivation (IM), Extrinsic Motivation (EM), Grade Point Average (GPA).		

Discussion

Non-cognitive variables play a significant role in the academic performance of medical students, yet the exact mechanism of this relationship, particularly in the context of non-individualistic cultures has not been fully elucidated. The role of family support in academic performance is culture-specific, as evidenced by previous research. For instance, a study on university students in California found that family support was a significant resource for self-efficacy among Asian-American students but not among European-American students (Yuan, 2016). This current study aims to contribute to the existing literature by investigating the impact of environmental risks, such as limited parental education and difficulty paying bills, on the performance of Lebanese medical students.

Findings showed that perceived family support significantly predicts trait EI across the entire student sample. However, the path between trait EI and academic self-efficacy (ASE) was not significant in either group of students, suggesting that the relationship between trait EI and ASE may not be driving academic performance (AP) as hypothesized. Thus, H1 is partially supported.

Regarding H2, the study reveals a differential impact of intrinsic motivation (IM) on ASE depending on the environmental group. In students from low-risk backgrounds, there is a significant positive relationship between IM and ASE, while students from high-risk backgrounds show no relationship with these variables. This finding demonstrates that intrinsic motivation mediates the relationship between trait EI and ASE differently based on the environmental risk level, which supports our second hypothesis.

Moreover, findings provide comprehensive support for H3, as they establish the mediating role of competence in the association between trait EI and ASE across both low-risk and high-risk groups of students. This indicates that competence plays a significant function in bridging the gap between trait EI and ASE, thereby exerting an influence on AP.

Additionally, we found that environmental risk influences the relationship between motivation, competence, and ASE differently for low-risk and high-risk students. In the low-risk group, both intrinsic motivation and competence fully mediate the relationship between trait EI and ASE, whereas in the high-risk group, only competence mediates this relationship. This demonstrates that the effects of motivation and competence on ASE vary based on the environmental risk level. Therefore, H4 was fully supported.

The study findings lend support to three out of the four hypotheses proposed, with partial support for the first hypothesis. The results underscore the significance of perceived family support, motivation (specifically intrinsic motivation), trait EI, and competence in comprehending the factors that influence academic performance in Lebanese medical students, with notable variations contingent upon the level of environmental risk. Furthermore, tthe current study's finding that perceived family support serves as a predictor of trait EI is in agreement with previous research indicating that family factors, including family support and family functioning, predict EI. While some studies have shown the impact of family economic situations on EI, with the lowest EI found in those who perceive their economic situation worse than that of their peers (Lekaviciene, 2016), in our study this was not the case as family support predicted trait EI in both low- and high-risk subgroups.

ASE is the "central tenet" of Bandura's social cognitive theory, which served as the conceptual framework for our study (Schunk, 2012). This theory states that learning and academic performance occur within a social context, particularly relevant for medical students in the Lebanese culture, where there is a dynamic and reciprocal interaction among personal factors (motivational and emotion-related variables), environmental factors (SES, parental education, parental support), and behavior. The theory posits that "people seek to develop a sense of agency and exert control over the important events in their lives. This sense of agency and control is affected by factors such as self-efficacy, outcome expectations, goals and self-evaluation" (Schunk, 2012). In line with previous research on Lebanese (Sanchez-Ruiz & El Khoury, 2019) and non-Lebanese students (Rodríguez-Rodríguez & Guzmán, 2021) which identified ASE and academic self-concept to be the non-cognitive variables most predictive of academic performance, our results also support this relationship among Lebanese medical students.

Building upon existing literature, where students' awareness of their low family income motivated them to work hard (Cheang, 2018), our study provides insight into one potential pathway through which this occurs – via competence, rather than motivation, in mediating the relationship between trait EI and ASE among high-risk students. This phenomenon may be partially explained by cultural factors. Students from low-risk environments may strive to meet parents' expectations or those of the society, thus developing a stronger motivation to succeed (Li, 2019). Additionally, parents with higher educational levels may better exemplify behaviors in their children that allow intrinsic motivation to translate into academic self-efficacy.

Limitations and Recommendations for Future Research

It is important to acknowledge several limitations of this study that should be considered when interpreting the findings. Firstly, the sample used in this study consisted solely of students from private medical schools, which may limit the generalizability of the findings. With regard to SES and other socio-demographic variables, it would be beneficial to examine a wider and more diverse sample in future studies. Moreover, the reliance on self-report measures in this study introduces the possibility of mono-method bias. The study's cross-sectional design, which prevents us from establishing causal relationships between variables, thus longitudinal and experimental designs would be advisable in future studies. Additionally, future studies may also benefit from the use of mixed method designs as well as objective measures other than official GPAs as indicators of AP, strengthening the validity of the findings.

Implications and Conclusions

This study contributes to the field by proposing a model along the SCT, which depicts how environmental risks, namely parental education and socioeconomic factors, interact with and influence the role of various non-cognitive variables in predicting AP in Lebanese medical students, throughout their four years of medical school. The findings may be useful to medical educators in understanding the non-cognitive factors that affect medical students' AP, and in better assessing and monitoring such factors in educational settings. High-risk students exhibited a unique pattern, with their GPA correlating solely with ASE. The mediating role of competence in the relationship between trait EI and ASE was evident only in high-risk students, while both competence and motivation mediated this relationship in their low-risk counterparts. These mediating factors may be considered when designing interventions. For low-risk students, interventions can focus on enhancing both competence and motivation. For high-risk students, interventions can focus on building competence as a mediating factor to improve the relationship between trait EI and ASE. With these findings in mind, educators may opt to offer tailored educational and social interventions that could help increase motivation and trait EI such as mindfulness practices to manage negative emotions (Mestre, 2019), cognitive behavioral therapy and social reinforcement. Nevertheless, adapting interventions to different cultural contexts can be a challenge for professionals. Understanding the cultural nuances and tailoring interventions accordingly is essential for their successful implementation. Overall, the findings of this study shed light on the external factors beyond the medical curriculum that can support students' AP, allowing them to integrate these factors into their lifestyles for enhanced success and well-being.

Declarations

Authors' contributions

Rajaa F Chatila and Wissam Faour conceived the study; Maria-Jose Sanchez-Ruiz, Rajaa F Chatila, Jamil El Khoury and Wissam Faour designed the study; Jamil El Khoury and Maria-Jose Sanchez-Ruiz chose the measurement scales and instruments and prepared the questionnaire; Hani Dimassi coded and cleaned the data; F. Jordan Srour conducted and reported all statistical analysis with the data; Sola Bahous and Marie Choukair contributed to data analysis and discussions; Ali Nasser, Sarah Abdul Nabi, Marie Choukair and

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Figures
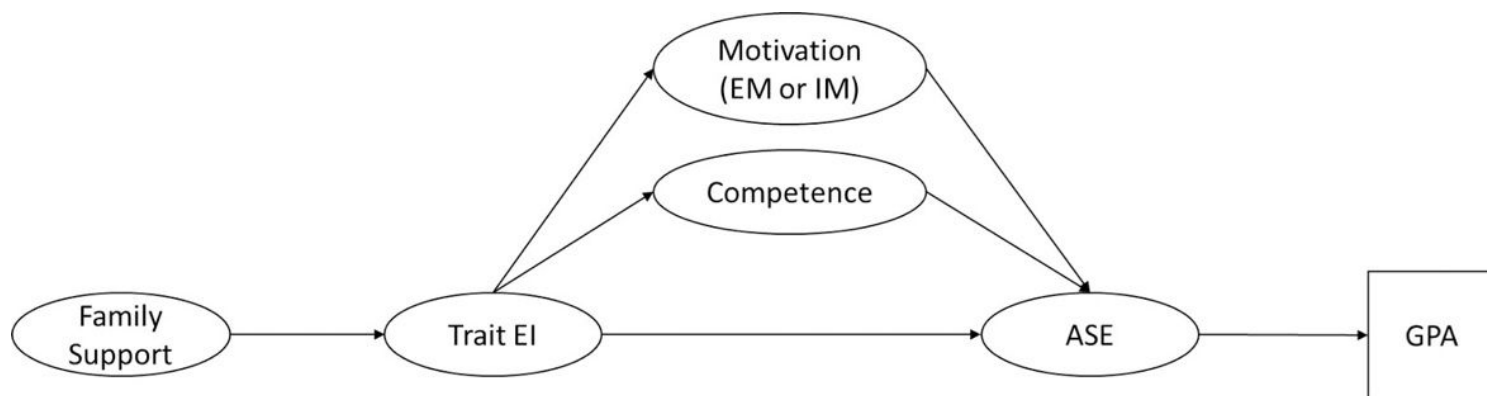
Figure 1

SEM showing path relationships

Note. EM = External Motivation, IM = Internal Motivation, trait EI = trait Emotional Intelligence, ASE = Academic Self-efficacy, and GPA = Grade Point Average.