



Medical students' resilience level and its associated factors: A Tunisian study

Le niveau de résilience des étudiants en médecine et ses facteurs associés: Une étude Tunisienne

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ABSTRACT

Introduction: Resilience is one's ability to adapt to internal and external stressors and cope with challenges encountered throughout life.

Aim: Our work aimed to determine resilience levels at the Medical University of Ibn El Jazzar-Sousse (Faculty of Medicine of Sousse) Tunisia and to identify the key factors influencing resilience in order to help students improve their college experience, as well as their future career and eventually their quality of life.

Methods: It's a cross-sectional study conducted during October and November 2021 at the FMS including all undergraduate medical students using a questionnaire elaborated in French language and composed of 02 major parts Socio-demographic and general health data and The Connor-Davidson Resilience Scale (CD-RISC). Data were collected using Google Forms platform via social networks (Facebook students' groups).

Results: A total of 225 participants filled the questionnaire; the mean age was 21±5 years. Among them 75.1% were females (sex ratio=0.33). The total resilience mean score was 56.36±12.43.

Comparison of resilience scores according to different covariates showed that resilience was positively associated with male gender, extracurricular activities, relationships with both colleagues and teachers and physical exercise, but negatively associated with imposed course of study and perception of both study difficulties and personal academic results. No correlation was found between resilience score and age.

Conclusions: This work encourages university administrators to devote more resources to promote resilience, and it emphasizes the importance of implementing new educational and entertaining interventions to improve students' ability to deal with academic challenges.

Key words: Resilience, Medical students, Medical University.

RÉSUMÉ

Introduction: La résilience est la capacité d'une personne à s'adapter aux facteurs de stress internes et externes et à faire face aux défis rencontrés tout au long de la vie.

Objectif: Notre travail visait à déterminer le niveau de résilience à la faculté de Médecine Ibn El Jazzar-Sousse (FMS) en Tunisie et à identifier les facteurs clés influençant la résilience afin d'aider les étudiants à améliorer leur expérience universitaire, ainsi que leur future carrière et finalement leur qualité de vie.

Méthodes: Il s'agit d'une étude transversale menée durant les mois d'octobre et novembre 2021 à la FMS auprès des étudiants en médecine à l'aide d'un questionnaire élaboré en langue française et composé de 02 parties principales : les données sociodémographiques et de santé générale et l'échelle de résilience de Connor-Davidson (CD-RISC). Les données ont été collectées à l'aide de la plateforme Google Forms via les réseaux sociaux.

Résultats: Au total, 225 participants ont rempli le questionnaire; l'âge moyen était de 21±5 ans. Parmi eux, 75,1 % étaient des femmes (sex-ratio = 0,33). Le score moyen de résilience totale était de 56,36 +/-12,43. La comparaison des scores de résilience en fonction de différentes covariables a montré que la résilience était positivement associée au sexe masculin, aux activités extrascolaires, aux relations avec les collègues et les enseignants et à l'exercice physique, mais négativement associée aux études imposées et à la perception des difficultés d'étude et des résultats académiques personnels.

Conclusion: Ce travail encourage les administrateurs universitaires à consacrer davantage de ressources à la promotion de la résilience et souligne l'importance de mettre en œuvre de nouvelles interventions éducatives et ludiques pour améliorer la capacité des étudiants à faire face aux défis académiques.

Mots clés: résilience, étudiants en médecine, faculté de médecine.

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INTRODUCTION

Resilience is a relatively modern concept. It can be defined as one's ability to adapt to internal and external stressors and cope with challenges encountered throughout life (1). This concept was found to be dependent on a wide range of aspects including type and intensity of the negative event in question, mental health (2), environmental factors (3), and more recently biological factors including genetics, epigenetics, endocrinology, and neurobiology (4,5). Initially, resilience research was limited to tragic and life-threatening events like post-traumatic stress disorder (1), pandemics (6), natural disasters (7), refugees (8) and so on. However, researchers gradually expanded their focus to include the pressures and hardships of everyday life, chronic illnesses (9), addictive behaviors (10), college studies (11), depression and anxiety (12), elderly people with disorders (13). It has already been proven that constant exposure to these daily life stressors has deeply distressing effects and that resilience is a great protector from its various painful outcomes (14,15). Previous studies have established substantial evidence that stress is common in college, especially among medical students, and that its manifestations including burnout and depression, are negatively correlated with resilience (3,13,15,16). These students find it extremely hard to shield themselves from physical and psychological distress due to the excess number of adverse circumstances, heavy workloads, and challenging evaluation scales, not to mention the lack of adequate recovery time (17). Resilience has been recognized as an important aspect of wellbeing among medical students that enables students to recover from adversities and challenges (18,19). However, despite the importance of tackling this aspect, there is currently no information available about the resilience levels of Tunisian medical students.

Our work aimed to determine resilience levels in students at the Medical University of Ibn El Jazzar-Sousse Tunisia and to identify the key factors influencing resilience in order to help them improve their college experience, as well as their future career and eventually their quality of life.

METHODS

Study design and participants:

It is a cross-sectional study conducted during October and November 2021 at the University of Medicine of Sousse (FMS) (Tunisia). The target population included all undergraduate medical students enrolled at FMS for the academic year of 2021/2022 from first to fifth year of university studies.

Measures:

The questionnaire was elaborated in French language and composed of 02 major parts

- Socio-demographic and general health data

We used 22 self-report questions about respondents' sociodemographic characteristics, academics and individual environmental interactions. The sociodemographic variables included sex, age, civil status, nationality, living situation, socio-economic level, social integration and associative activity, extra-universal activities. The health-related aspects included smoking habits, drug use, alcohol consumption, sport practice, health problems, doctor visits, psychological consultation. In addition, the questions related to the students' interactions with colleagues and teachers, course year,

previous failing experiences at university, self-assessment of study difficulty and current academic results.

- The Connor-Davidson Resilience Scale (CD-RISC)

The CD-RISC consists of a 25-item questionnaire, the overall score of which being proportionally representative of resilience propensity (1). The original version, written in English, is reported to have good reliability and validity and is structured as a 5-factor construct, which includes:

Personal competences, high standards and tenacity items: 10, 11, 12, 16, 17, 23, 24, 25

Trust in one's instincts, tolerance of negative effect, and strengthening effects of stress; items: 6, 7, 14, 15, 18, 19, 20

Positive acceptance of change, and secure relationships; items: 1, 2, 4, 5, 8

Control; items: 13, 21, 22

Spirituality items: 3 and 9

A five-point Likert scale was used to answer each of the 25-items; with values ranging from 0 to 4, where 0 means "Not true at all" and 4 means "True nearly all the time". Therefore, the final scores can vary between 0 and 100. Students with higher sums of all items are said to have higher resilience. The CD-RISC has been translated into several languages and psychometrically validated for countries such as Iran (13), Mexico (17), Brazil (18), The Russian Federation (19), China (7), Portugal (20), Korea (21) and Spain (22). In our survey, we used the French version, which was developed and validated in 2018 (11). It has been reported that it has good internal consistency (GLB and Ω coefficients > 0.80) and that it is a reliable and accurate tool. Four items (2,3,9,20) did not reach acceptance thresholds for reliability and were discarded from the French-CD RISC. Therefore, resilience factors included "tolerance to negative affects" (1,2,4,5,6,11,13,14,15,16,19), "tenacity" (7,8,9,10,12,20) and "self-confidence" (3,17,18,21). All factors displayed acceptable to good internal consistency. They were characterized by positive medium to strong correlations with the overall 21-item f-CD RISC Scale.

Data collection: Data were collected using Google Forms platform via social networks (Facebook students' groups).

Statistical analysis:

The collected data was analyzed using SPSS 20.0. In the descriptive part, we characterized our study population by using frequency (percentage) and mean (standard deviation, SD) were used to present the socio-demographic and general information about the sample. To compare any differences in resilience, bivariate analyses by means of Pearson correlation, independent t-test, and independent Anova test as appropriate, were performed to examine the associations between self-report resilience and the background characteristics of university students. The factors that showed significance ($p < 0.05$) in univariate analyses were considered significantly associated with resilience. Potential factors influencing resilience were analyzed using multiple linear regression. For all tests, the level of significance was set at $p < 0.05$.

Ethical considerations:

Access was granted following the electronic validation of an informed consent form in which the study's means and aims were described. Participation in this study was entirely voluntary, and was automatically interpreted as consent. Furthermore, participant identities were kept anonymous, and recruits were provided with an explanation of the study's goal and main aspects, as well as a clarification

on their right to withdraw at any time. Personal information collected would be kept strictly confidential and used solely for the purposes of this study.

RESULTS

General characteristics of the respondents

The total number of registered students of the FMS in 2021 was 1317, with 900 (68.3%) females and 417 (31.7%) males, distributed by university level as follows: 1st year (21.7%), 2nd year (21.03%), 3rd year (19.8%), 4th year (20.5%), 5th year (16.8%).

A total of 225 participants responded and filled the study questionnaire; the mean age of the participants was approximately 21±5 years. Among them 75.1% were females (sex-ratio=0.33).

Almost 88% of the population did not have any health issues. In addition, only one third didn't visit any doctor during the month prior to the survey. Concerning mental health, only one fifth of the students revealed having consulted a psychiatrist/psychologist.

More details are summarized in table1 and 2

Table 1. Participants' socio-demographic, academic and lifestyle characteristics (N = 225)

Variables	(Mean±SD) / n (%)
Socio-demographic and academic characteristics	
Age (years)	21±5
Gender	
Male	56(24.9)
Female	169(75.1)
Nationality	
Tunisian	207(92)
other	18(8)
Marital status	
Single	224(99.6)
other	1(0.4)
Socio-economic level	
Low	3(1.3)
medium	189(84.0)
High	33(14.7)
Living situation	
with the family	90(40.0)
with room-mates	71(31.6)
Alone	42(18.7)
in a dorm	22(9.8)
Study level	
1 st year	50(22.2)
2 nd year	48(21.3)
3 rd year	34(15.1)
4 th year	38(16.9)
5 th year	55(24.4)
Previous academic failure	
No	205(91.1)
Yes	20(8.9)
Imposed medical career choice	
No	199(88.4)
Yes	26(11.6)
Lifestyle habits	
Smoking tobacco	
No	213(94.7)
Yes	12(5.3)
Alcohol consumption	
No	202(89.78)
Yes	23(10.22)
Illegal drug use	
No	223(99.1)
Yes	2(0.9)
Physical exercise	
No	146(64.9)
Yes	79(35.1)

Table 2. Perception of academic features and social life (n=225)

Variables	n(%)
Perception of study difficulties	
No	69(30.7)
Yes	156(69.3)
Perception of personal academic performance	
Medium	104(46.2)
Good	94(41.8)
Very good	18(8.0)
Low	9(4.0)
Extracurricular activities	
No	161(71.6)
Yes	64(28.4)
Membership in an association	
No	175(77.8)
Yes	50(22.2)
Relationship with colleagues	
Acceptable	132(58.7)
Good	80(35.6)
Bad	13(5.8)
Relationship with teachers	
Acceptable	175(77.8)
Good	41(18.2)
Bad	9(4.0)

Resilience levels

The total resilience mean score is 56.36 +/-12.43. Median score of resilience was 57, first quartile (Q1) =47.5 and last quartile (Q3) =65.

Factors 1, 2, and 3 scored 27.25 (SD=7.13), 17.60 (SD=3.86), and 11.51 (SD=2.95), respectively indicating «tolerance to negative effects,» «tenacity,» and «self-confidence.»

Analytic results

Comparison of resilience scores according to different covariates showed that resilience was positively associated with male gender, extracurricular activities, relationships with both colleagues and teachers and physical exercise, but negatively associated with imposed course of study and perception of both study difficulties and personal academic results.

Multiple regression analysis showed that resilience correlated positively with male gender and practicing extracurricular activities and negatively with previous academic failure, imposed medical career choice, perception of study difficulties and smoking tobacco. Further information is detailed in table 3.

Table 3. Univariate and multivariate analysis of associated factors to resilience

Variables		Resilience mean score±SD	p value β	p value	CI _{95%}
Gender	Men	60.80±12.19	0.002*	0.21	[0.10, 0.4]
	Women (ref)	54.9±12.19			
Nationality	Tunisian	56.32±12.70	0.88		
	other	56.77±9.05			
Study level	Year 1	56.48±13.05			
	Year 2	58.08±12.61			
	Year 3	54.41±11.48			
	Year 4	55.71±14.48	0.76		
	Year 5	56.41±10.89			
Previous academic failure	No(ref)	56.83±11.93			
	Yes	51.50±16.35	0.17	-0.13	0.02 [-0.60,-0.08]

Table 3. (continued) Univariate and multivariate analysis of associated factors to resilience

Variables		Resilience mean score±SD	p value	β	p value	CI _{95%}
Imposed medical career choice	Not imposed (ref)	57.07±11.81	0.02*			
	Imposed	50.96±15.67		-0.17	0.006	[-0.5, -0.08]
Perception of Study difficulties	No(ref)	60.98±11.83				
	Yes	54.32±12.17	10 ^{-3*}	-0.18	0.005	[-0.6, -0.12]
Perception of personal academic results	Low	50.66±12.19				
	Medium	53.96±13.71				
	Good	59.30±9.98	0.01*			
	Very good	57.72±13.44				
Marital status	single	56.28±12.40	0.13			
	other	75.0				
Socio-economic level	low	55.0±4.0				
	medium	56.7±12.66				
	high	54.60±11.60	0.66			
Living situation	With family	55.53±12.54	0.22			
	Alone	57.61±12.22				
Extra curricular activities	No(ref)	55.08±12.70	0.01*			
	Yes	59.59±11.18		0.14	0.021	[0.13,0.17]
Membership in an association	No	56.26±12.02	0.81			
	Yes	56.7±13.89				
Relationship with colleagues	Acceptable	54,84±11.49				
	good	60.03±12.97	0.001*			
	bad	49.23±12.88				
Relationship with teachers	Acceptable	56.40±12.13	0.02*			
	Good	58.41±11.99				
	Bad	46.22±16.39				
Smoking tobacco	No(ref)	56.68±12.38	0.10			
	Yes	50.66±12.43		-0.17	0.008	[-0.4, -0.06]
Illegal drug use	No	56.40±12.48	0.61			
	Yes	52.0±4.24				
Alcohol consumption	No	56.31±12.04	0.86			
	Yes	56.78±15.8				
Physical exercise	No	55.06±12.48	0.03*			
	Yes	58.75±12.05				
Suffering from health issues	No	56.68±12.57	0.30			
	Yes	54.03±11.34				
Doctor visits during last month	No	56.92±12.52	0.23			
	Yes	54.66±12.12				
Psychological counseling during last month	No	56.71±12.39	0.34			
	Yes	54.63±12.65				

DISCUSSION

Resilience is the capacity to cope with anxiety and stress. It is a reflection of one's personal qualities that allow them to rise in the face of adversity (1). When it comes to being constantly exposed to stress and hardships, medical students are not an exception. Therefore, promoting resilience is essential to help them to deal with problems, and being aware of its major aspects would help them develop their resilience-building skills more effectively. Within this framework, we conducted this cross-sectional study to determine the level of resilience among medical

students at the FMS (Sousse Tunisia), and to explore the personal, environmental and socio-demographic factors that can affect it.

In our study, respondents showed a moderate level of resilience considering our sample with a mean score of 56.36±12.43 which is consistent with earlier studies carried out in the UK. Furthermore, Sahu et al., 2019 (14) found a moderate score of resilience while investigating the relationship between perceived stress, resilience, and mobile phone use in nursing students from different nursing universities in India.

Results showed a significant association between resilience and gender, extracurricular activities, smoking habits, imposed career path, previous academic failure and perceived study difficulties.

In terms of gender differences, male participants had considerably higher resilience ratings, which corroborate with earlier research on medical students (3,15,25) and other groups, such as a sample from the Tunisian general population and South Korean college students (4,6).

Our findings, however, are different from those of Sull et al., 2015 (26) conducted among health professionals reporting that women had higher levels of resilience. Additionally, in a study conducted in China on nursing students, no significant difference in resilience was found between men and women ($p = 0.717$) (27).

Our results might be explained by higher levels of perceived stress, anxiety and depression in females based on the work of Rahimi et al., 2014 (15) and Brenneisen Mayer et al., 2016 (28). Prior studies demonstrated that neurological, hormonal, and genetic variables may play a role in the increased frequency of anxiety and low resilience in women (4,5,29). Russo et al., 2012 (5), claimed that testosterone may promote resilience to deficits on emotional domains, while estrogen or progesterone may promote stress resilience. Hence, females cope better with chronic forms of stress, whereas males tend to handle acute stress.

In the present survey, we looked into three major unhealthy habits: smoking tobacco, alcohol consumption and illegal drug use. A significant negative correlation between tobacco use and resilience was found ($\beta = -0.17$, $p = 0.008$). In these days prevalence of tobacco use has increased significantly among young population, a study conducted showed that the prevalence of smoking was 9.7% in a sample of 330 adolescents in a Tunisian region (30).

Hodder et al., 2016 (31) found that among adolescents, smoking had a negative relationship with resilience factors. In the same context, EunJin Lee, 2019 (32) study results showed that giving up smoking increased resilience by 37.5%. The same author proved the reciprocal effect in another study stating that the likelihood of successfully giving up smoking increased with higher levels of resilience.

Furthermore, Gomathi et al., 2012 (33) observed that while academic stress was significantly related to psychological morbidity, no such correlation was found for psychosocial or health-related stress. This is consistent with our study which revealed a strong negative association between resilience and perceived study difficulties, especially given the prior works demonstrating an undeniable negative relationship between stress and resilience (14,15).

Our study, uncovered a significant negative correlation between resilience and an imposed career choice. These findings align with those of Behera Sanat Kumar (34) who reported that, when compared to students who chose their own career paths; those who had their parents choose for them develop lower self-confidence and self-esteem as well as poor academic performance, leading to higher rates of depression. Most of these outcomes were justified by

the lack of interest, and thus a lack of knowledge and control over the subject at hand, making it even harder to persevere and properly deal with stressful situations, notably failure (34,35).

Another relationship that has previously been validated is previous academic failure ($\beta = -0.13, p=0.02$) (37,38). In a study conducted at the University of Malaya in Malaysia, Foong et al., 2022 (36) came to the conclusion that high-achieving students were more motivated and made adjustments to get around obstacles. Low-achieving students, on the other hand, tended to be less resilient and displayed avoidant coping mechanisms.

To be able to study efficiently, it is very important to create a balanced cycle between hard work and rest. Our survey, revealed a statistically significant correlation between extracurricular activities and resilience. We explained that these activities could range from personal and/or social hobbies to simple self-care practices like mindfulness and yoga. These two components have already been shown to increase resilience levels (37,38). Pidgeon et Keye, 2014 (39) looked into the relationships between psychological well-being, resilience, and mindfulness. A strong positive association was found between all three variables. Physical exercise and social relationships were proved to be resilience-enhancing factors (3,12,16,25,40,41). Exercising has been shown to promote academic and personal life success through increasing central nervous system plasticity, as well as emotional intelligence, perseverance, and psychological well-being (42,43).

According to a study conducted on third year medical students during clinical rotations in New York (USA) (44), support from team members specifically helped enhance students' resilience, allowing them to better recover from clinical associated traumatic events.

This study indicated that compared to other study levels, third-year medical students had a remarkable drop in resilience scores, which is aligned with our findings. In fact, in the Tunisian medical curriculum, third year marks the beginning of students' integration in practical training at the hospitals, while undergoing the same volume and pace of work at the university. Houpy et al., 2017 (26) discussed that, as much as coping with illness and bad patient outcomes such as death and dark prognosis are high-impact stressors, it wasn't considered as clinical students' main concern, since they don't have a direct role in patient care or decision making. Actually, evaluation tests, bad team relationships, tense interactions with staff members, and dealing with their vulnerable status in the medical hierarchy were actually more troubling to them. Struggles with adapting to new challenges, especially with the integration in hospital practice, may be minimized by introducing mentorship programs for junior medical students, such as partnering with senior peers, interns, and residents (45).

Strengths and limitations

This is the first study to examine resilience levels in Tunisian medical students along with various individual and environmental characteristics. Furthermore, we used an internationally standardized Resilience Scale (CD-RISC), a measure that has been used in a variety of populations. In addition, we used the French version of this questionnaire, which was validated among a similar population (medical students). Nonetheless, the current survey is not without limitations. First, because the only tools implemented were online self-reporting questionnaires, survey results might be influenced by poor recall. It is also important to highlight that the CD-RISC essentially measures self-perceived resilience features and it exposes the information bias. To acquire more accurate results, future work should incorporate more questionnaires to estimate stress levels,

emotional wellbeing, and coping mechanisms. Another potential weakness is that our sample was drawn from only one of Tunisian four medical schools, the findings may not be applicable to the country's other medical students. They are, however, indicative of the Medical University of Sousse. To get a better understanding of resilience variables among Tunisian medical students, additional research with larger, more representative and diverse samples is needed.

CONCLUSION

The current study added to our understanding of the various characteristics of Ibn El Jazzar -Sousse (Tunisia) medical university students. Which is known to face significant physical and mental challenges on a regular basis? We found that students have a moderate level of resilience. The only significant resilience-promoting factor identified by multiple regression analysis was extracurricular activities, while characteristics that indicated a negative correlation were mainly smoking tobacco, imposed course of study, previous academic failure and perceived study difficulties. In addition, male students showed significantly higher resilience scores than females. This work encourages university administrators in charge of academic reform and student well-being to devote more resources to promote resilience, as it emphasizes the importance of implementing new educational and entertaining interventions to improve students' ability to deal with academic challenges.

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