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RESEARCH ARTICLE

The Strength of Motivation for Dental Students

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Abstract

Context: Motivation plays a key role in academic success. It is a dynamic process that maintains perseverance and tenacity in the face of difficulty. The purpose of our study was to measure and compare the strength of dental students' motivation at the beginning and the end of their training.

Material and methods: an anonymous self-administered voluntary questionnaire was distributed to 1st and 6th year students at the Faculty of Dentistry in Casablanca.

This questionnaire consisted of 30 closed questions divided into 3 sections, the first of which provided information on socio-demographic data, the second is devoted to measuring the strength of motivation through a validated questionnaire: "Strength of Motivation for Medical School" rated from 1 to 5 on the Likert scale, the third section was for the factors of choice of dentistry. Statistical analysis was performed using SPSS software version 25.0. The significance level was retained for a $p < 0.05$.

Results: We collected 215 questionnaires and the response rate of more than 94%. The majority of the respondents were female. The overall motivation score was 52.02 with no significant difference by grade level. Female students were significantly more motivated than male students. Our students' dental choice factors did not significantly influence the strength of motivation.

Conclusion: Supporting students' motivation requires their active and autonomous involvement in the learning process.

Keywords: Strength, Motivation, Dental students, Career choice

1. Introduction

Motivation is a cornerstone in medical pedagogy; it is a complex variable, influenced by several internal and external parameters. It represents an important predictor of learning, academic success and student well-being [1,2].

Viau defined motivation in school and university settings as "a dynamic state that has its origins in a learner's perception of himself or herself and his or her environment, which prompts the learner to choose an activity, to engage in it, and to persevere in its accomplishment in order to achieve a goal" [3,4]. This motivational dynamic is determined by the students' perception of the interest and usefulness of the proposed educational activities, their own competence and ability to perform these tasks

properly, and their sense of control over the conduct of these activities [5,6]. Motivation is thus positively correlated with learners' engagement, perseverance and performance [7]. Thus, highly motivated students were found to be more capable of planning and controlling their learning processes independently [8].

In addition, researchers from several disciplines have also found that students with high levels of motivation have a higher learning outcome than their peers with lower levels of motivation [9]. According to Viau, the low motivation of university students has a significant impact on their performance and can lead some of them to drop out of their studies as early as the undergraduate level [10,11].

The knowledge of the evolution of motivation could thus provide teachers with concrete means to

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reinforce it [12,13]. Thus was born the need for teachers to assess the motivation of their students in medical education through consistent and valid instruments. These tools have been inspired for a certain number of them by the theory of self-determination and assess the types of motivation: “extrinsic motivation” which looks at factors external to the individual and “intrinsic motivation” which concerns factors internal to the individual. These instruments include the Self-Regulation Questionnaire (SRQ) and the Academic Motivation Scale (AMS) [14]. The Strength of Motivation for Medical School (SMMS) questionnaire was developed in the early 2000s by Nieuwhof at the University of Utrecht in the Netherlands. It's probably the only instrument that assesses and quantifies the motivational strength. It is defined as “the student's willingness to start and continue medical training, regardless of sacrifices, failures, misfortunes, or disappointing prospects [1,14].

The objective of this study is to measure and compare the strength of motivation among 1st and 6th year students at the Faculty of Dentistry at the Mohamed 6 University of Science and Health (UM6SS) and to verify the correlation between the strength of motivation and the factors that encouraged these students to choose dentistry.

2. Material and methods

This is an exhaustive descriptive cross-sectional study that measures and compares the strength of motivation based on an anonymous self-administered and voluntary questionnaire hand-delivered to all 1st and 6th grade students in the faculty of Dentistry at UM6SS in the 2021-22 academic year excluding all students in other levels. The number and list of students were provided by the faculty's tuition service, the questionnaires were distributed and collected on the spot for the 1st years at the end of the practical work sessions and for the 6th years at the end of the sessions clinics. The questionnaire was tested with the interns to ensure that all items were understood and to assess the average time required to complete it, which was 15 min. The questionnaire was in French, based on a literature review, and included 30 closed questions with 5 Likert scale responses (1 = Not important at all 5 = Very important). Thus, the first part was devoted to the socio-demographic characteristics of the population studied, namely age, sex, year of study, secondary school sector, parents' level of education, the presence or absence of family members practicing in the health field, the time of choice of dental studies and whether dentistry was the first

choice. The second part was devoted to the Strength of Motivation for Dental Studies through the validated French version of the “Strength of Motivation for Medical School” (SMMS), which is available in the scientific literature. This section included 16 items rated by a five-modality Likert scale. The motivation score was calculated by the sum of the responses to the items, by inverting the responses of the negative items (Items: 2, 4, 8, 9, 11, 13, 14). This score varies from 16 to 80. The higher the score, the greater the strength of motivation. The third part consisted of 4 closed questions that provided information on the factors that led students to choose dentistry: attraction to science, altruism, status, influence of the environment.

The ethical aspect was taken into account by respecting anonymity, privacy and confidentiality of data, participation was voluntary and informed consent was obtained from the participants and the approval of the ethics committee was also obtained.

The statistical analysis of the collected data was carried out using SPSS software version 25. Thus, the internal reliability of the questionnaire was calculated by Cronbach's index. The descriptive analysis consisted in the calculation of frequencies of the qualitative variables, and of the parameters of positioning and dispersion for the quantitative variables (mean, standard deviation). The normality of the data was verified by the boxplot and the Kolmogorov -Smirnov and Shapiro–Wilk test ($P > 0.05$). For the dummy variable, gender, Pearson's Chi-square test was used to determine if the distribution of student gender varied by grade level. For the continuous variable “SMMS score”, Student's t-test was used to study the differences of this score between the two levels of study and between the two sexes. To test the difference between SMSS score and the four main causes of the choice of dentistry, the Anova test was used. The significance threshold was retained for a $p < 0.05$.

3. Results

Our study involved all students enrolled in the first and sixth year at the Faculty of Dentistry during the academic year 2021–2022. The questionnaire was distributed to 228 students; 215 questionnaires were returned, i.e., a response rate of 94.29% (98.47% in the first year and 88.65% in the sixth year). The average age of the respondents was 20.15 ± 2.634 years; Thus, 67.9% of the students had attended private Moroccan high schools. 79.1% of students' fathers and 70.2% of their mothers had higher education, but only 29.8% worked in the medical field. 79.1% of students had chosen

dentistry before obtaining their baccalaureate, and 54.4% of respondents had considered dentistry as their first choice. The socio-demographic data are summarized in [Table 1](#).

The distribution of students according to gender showed a predominance of females in the order of 65.1% of all students surveyed, while males represented 38% of students in the first year and 30% in the sixth year. Nevertheless, there was no significant difference in the distribution of students according to gender between the first and the sixth year and Chi-square test (0.243) is not significant for a $p < 0.05$ ([Table 2](#)).

Students were moderately motivated with a mean SMMS score of 52.02 with a minimum of 22.0 and a maximum of 69, for a score of 65 on a scale of 100. When comparing SMMS scores, first-year students were more motivated than graduating students but there was no significant difference in motivation score between years 1 and 6 with a mean score of 52.64 in year 1 versus 51.09 ($t = 0.188$ for $p < 0.05$) ([Fig. 1](#) and [Table 3](#)).

Girls were more motivated than boys with a mean score of 52.27 for girls and 51.5 for boys; there was a significant difference between the degree of motivation by gender ($t = -0.621$ for a $p < 0.05$) ([Fig. 2](#) and [Table 4](#)).

Regarding the motivating factors for choosing dentistry; the status of the profession attracted the most students with a mean of 4.05/5 followed by the attraction to science 3.92 ([Table 5](#)). We compared the SMSS score according to the 4 main factors of choice of dentistry, namely the attraction to science, altruism, status, influence of the entourage; the

Table 1. Socio-demographic data.

	Number	Percentage %
SEX		
Female	140	65,1
Male	75	34,9
Level of study		
1 year	129	60
6 year	86	40
Secondary education		
Public school	20	9,3
Private school	146	67,9
Mission of foreign cooperation	49	22,8
One parent is in the medical field	64	29,8
A family member is in the medical field of dentistry	90	41,9
Higher level of education		
Father	170	79,1
Mother	151	70,2
the time to choose dentistry		
before obtaining the baccalaureate	170	79,1
After obtaining the baccalaureate	45	20,9
Dentistry is my first choice	117	54,4

Table 2. Distribution of students by gender and level of study

	Male	Female	pvalue
First year	49 (38%)	80 (62%)	0,243
Sixth year	26 (30%)	60 (69,8%)	

Anova test reveals that there is no significant difference in the score of the strength of motivation and the factors that pushed the student to choose dentistry ([Fig. 3](#)).

4. Discussion

University teaching involves two protagonists: the teacher and the student. If the teacher must provide quality teaching, the student must be involved, motivated and engaged in the learning process. Motivation is therefore an important topic of research in pedagogy. It is an internal process that energizes, directs and supports behavior [14]. It conditions the acquisition of knowledge and skills and promotes academic performance [15,16]. This motivation can continue even after graduation and drive students to excel in their careers and become lifelong learners [17]. Knowing the factors that influence motivation could provide teachers with concrete ways to enhance it.

Several studies have attested to the validity of the SMMS as a tool for measuring, quantifying and monitoring motivation in health science students throughout their academic careers [7,16]. However, according to Nieuwhof, the SMMS cannot be used for medical student selection, because of the possibility of socially desirable responses in high-stakes situations [16].

In our study, the distribution according to sex shows a clear female predominance of about 65.1%, but without any statistically significant difference. This trend of feminization of medical professionals is universal and is confirmed by studies in many countries [3,12,15,18–20]. The increasing access of women to the medical-dental profession can be explained by the emancipation of women, their desire for higher education and their growing interest in financial independence.

Students in this survey were moderately motivated with a mean SMMS motivational strength score of 52.02 or a score of 65 on a scale of 100. In the study conducted by Badre in 2016 among 1st and 6th year students at the faculty of dentistry at Hassan II university in Casablanca in Morocco, the mean SMMS score was lower than our study in the order of 55.2 on a scale of 100 and even lower around 50 at the level of Aitmouden's study conducted in 2014 among students at the end of training at the faculty

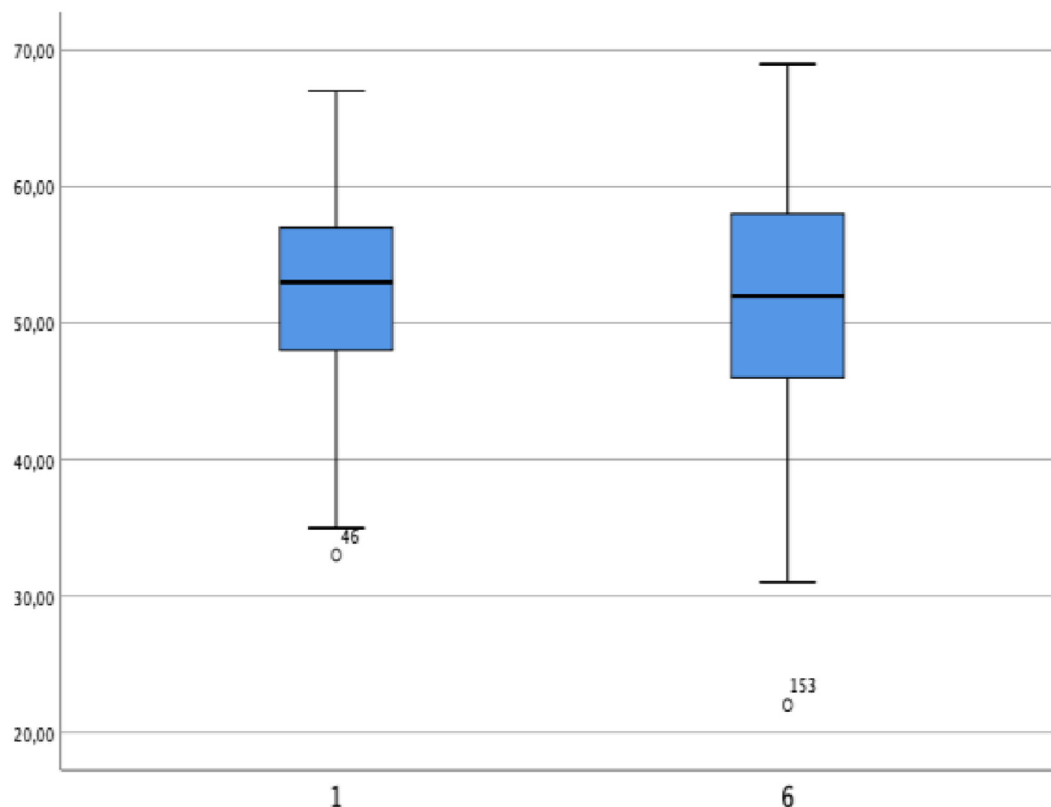


Fig. 1. Level of motivation by year of study.

of medicine in Casablanca at Hassan II university, and Hachimi's study published in 2020 revealed an SMMS score of around 59.58/100 among undergraduate students at the faculty of medicine of Marrakech at Alkadi Ayad university in Morocco also [3,12,21]. This superiority of the motivation score of the students of our faculty compared to the motivation score of the faculties could be explained by the efforts made by all the faculty and administrative staff of our university to create a healthy and constructive educational climate. However, the study of Ahmed in 2021 in Pakistan, had not revealed any significant difference in the SMMS score between public and private dental faculties [22].

Our study revealed a significant difference in motivational strength in favor of female gender which agrees with Badre's study in 2016, Abbiati's study in 2019 and Orsini's systematic review in 2016 [3,16,23]. Other studies have not found significant

differences in motivation scores between the two sexes [24,25]. This difference in motivation could be explained on the one hand by the brain maturation of men, which would be 3 years later than the brain of women at the corresponding age, which would lead to a gap in emotional maturation, and on the other hand by the fact that female medical students obtain better results than male students, which reinforces their motivation [1].

In our survey, first-year students were more motivated than graduating students, which is consistent with Badre's study in 2016 [3], Almalki's study in 2019 [26] and Ann's study in 2021 [27]. Indeed, if health sciences students are known to be highly motivated, due to their low dropout rates and their significant investment of time compared to other students in higher education, the strength of motivation seems to be a dynamic entity that can increase, decrease or remain stable over time [1]. The decline in their motivation over time could be explained by the possible discrepancy between students' expectations and their actual learning experiences, their perceptions of dentistry as they study, personal changes, financial difficulties as well as possible difficulties in integrating within their universities [6,28].

Table 3. Comparison of the degree of motivation by year of study.

	N	Average	Standard deviation	p
First year	129	52,64	7,03	0,188
Sixth year	86	51,09	9,21	

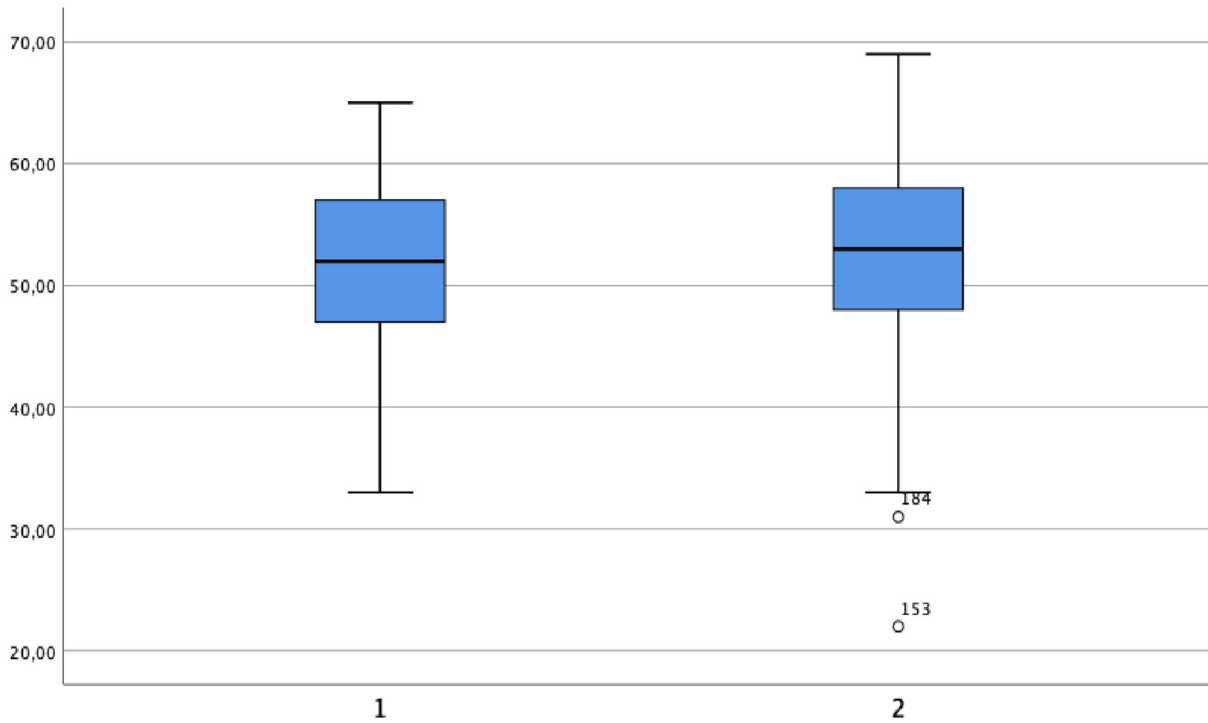


Fig. 2. Level of motivation by gender,

Table 4. Comparison of the degree of motivation by gender.

	N	Average	Standard deviation	p
Male	75	51,56	7,34	-0,621
Female	140	52,27	8,33	

According to Viau several factors influence the motivation of students. Thus, factors related to the individual's personal life (the influence of friends and family), factors related to society (culture, values, employability), factors related to the institution providing education (regulations and schedules) and factors related to the learning environment are the main vectors of the student's motivational dynamics [6]. If it is difficult to act on the first three factors, each teacher can improve the learning environment of his or her students by acting on the 3 main levers which are the pedagogical activities, the evaluation and the climate in class.

Thus, the teaching activities must be clear, organized, updated and not redundant; they must also promote the autonomy of the student through an

Table 5. Factors for choosing dentistry

	Average	Standard deviation
Interest in science	3952	0,94
Altruism	3787	0,72
Status of the profession	4,08	0,73
Influence of the environment	2,34	0,83

active pedagogy conveyed by learning by flipped classroom, by problem solving and by clinical reasoning [22]. Also, the Faculty of Dentistry at UM6SS has instituted active student-centered teaching that promotes self-directed learning, which further enhances intrinsic motivation and may explain the high SMSS motivational force score compared to other Moroccan faculties of medicine and dentistry.

Evaluation is the second lever for reinforcing motivation; it should not be considered as a means of punishment, but as a formative activity which, by setting objectives of average difficulty, informs students of the progress made and the learning not yet acquired, through portfolios, personal interviews and regular formative evaluations [2,5]. This feedback is also essential to evaluate the relevance of the students' working methods and to lead them to make effective use of different learning strategies, particularly metacognitive ones [19,25].

	F	Sig
Interest in science	1,924	0,441
Altruism	0,971	0,522
Status of the profession	0,643	0,941
Influence of the environment	1,203	0,216

Fig. 3. Comparison of the strength of motivation as a function of the choice factor of dentistry (Anova test).

The last motivational lever is the classroom climate which should be benevolent and welcoming, each student should be accepted with his differences and singularities and the teacher should encourage collaboration between students rather than competition and rivalry. Small group pedagogical activities should be introduced in order to teach students to know each other, to weave links between them and to create a work network which reinforces the feeling of belonging of the student to his university and improves his perseverance during his learning process and consequently his motivation [5].

In order to promote student motivation and commitment, we have strengthened pre-existing teaching activities, in particular active learning, clinical immersion placements for 3rd year students and professional placements for 6th year students; we also encouraged students to take part in sporting activities and organized sports tournaments to channel their stresses and strengthen cohesion and team spirit; we also consolidated communication between student teaching and administrative staff. Secondly, the Faculty of Dentistry has introduced new measures, such as the inauguration of a dental simulation center to reinforce practical skills in a fun way, and the organization of preventive oral health campaigns involving students in schools, orphanages and prisons. Finally, the opening teaching have been introduced into the university curriculum, highlighting the role of dentists as active players in community health, as well as pathways to excellence for referring dentists to reinforce leadership among students.

Our study has certain strengths, it is exhaustive with a high response rate, and it undoubtedly transcribes accurately the motivational strength of our students according to gender, level of study and factors of choice of dentistry. Its limitations lie in the use of a self-reporting questionnaire “the SMMS which has certainly been validated by international studies but which exposes our study to a self-evaluation bias. In order to test our results, we plan to carry out a future qualitative study through a focus group or directive or semi-directive interviews that will also explore the qualitative aspect of our students' motivation.

5. Conclusion

Motivation is an important predictor of learning, academic success and student well-being. The study of dentistry requires continuous effort, unwavering diligence and tenacity. The role of the teachers is to constantly stimulate the motivation of the students,

to arouse their vocations and to lead them to a regular and autonomous learning work.

Authors' contributions

The participation of each author corresponds to the criteria of authorship and contributor ship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

Conflicts of interest

The authors declare no competing interests.

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