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Quality of life of medical students at the State University of Rio de Janeiro (UERJ), measured using Whoqol-bref: a multivariate analysis

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Abstract *UERJ allocates 45% of places as scholarships to socioeconomically-challenged students. Whoqol-bref was used to assess to what extent sociodemographic and health variables, the admission process and year of graduation simultaneously influence the quality of life (QOL) domains of medical students. 394 students with a mean age of 23 years participated in the study: 61% females, 43% scholarship holders and 20% with referred chronic morbidity (RCM). The lowest QOL scores were observed among women, with RCM, scholarship holders, economic class C and students in the 3rd and 6th years. Multiple linear regression analysis showed that all the independent variables analyzed had a negative association with QOL domains, and when assessed jointly contributed partly to its explanation, achieving 22% in the "environment" domain, influenced by their social class and the admission process. The presence of RCM had a negative influence on the physical, psychological and social relations domains. The last two domains were also influenced by the year of graduation. Variables with a positive influence on QOL need to be explored further. The data obtained are enough to serve as the base for care strategies for the most vulnerable students during medical training, giving special attention to scholarship students.*

Key words *Quality of life, Medical student, Multivariate analysis*

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Introduction

Admission into the State University of Rio de Janeiro (UERJ) is controlled by means of an entrance exam. In the case of the Faculty of Medicine, the candidate/place ratio is around 60 to 1. The workload at this faculty requires that the student study on a full-time basis. As for other traditional medical schools, the curriculum is still very focused on the biomedical model and the teaching method adopted is predominantly the transmission style[1]. To achieve a high standard of academic performance students must be totally dedicated to their studies, which has repercussions on their lifestyles, social relations and sleep patterns[2,3]. To a lesser or greater degree, adaptation crises are experienced during the years of study. Stress and mental problems, such as anxiety and depression, are prevalent in this student population[1,4].

In the early 2000s, UERJ was one of the first Brazilian universities to adopt a policy of quotas for students with lower purchasing power, aimed at reducing ethnic, social and economic inequalities. The legislation governing its quota system[5] established that 45% of places be reserved for the admission of students from socially disadvantaged sections of the population, using the criterion of a maximum average gross family income of R $ 960.00 since 2009[6].

Evaluations of the level of student dropouts at UERJ, revealed that the level of dropouts for the students admitted under quotas was lower than for the non-quota students (20% vs 33%), and among the former, the students least likely to dropout were those admitted under the specific quota for race. In relation to academic achievement, no significant differences were observed in the performance (measured by their marks) of quota and non-quota students[7,8].

Despite the institutional arrangements to retain the quota students that performed well at the university[9], there was no information available on the quality of life of medical students at UERJ.

A well-known reference for quality of life is the definition proposed by the World Health Organization, namely '*individuals*' *perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns* (World Health Organization Quality of Life Group)[10]. This study used the Whoqol-bref, a cross-cultural instrument, which had already been translated and validated in our type of environment[11], and applied it to a population of medical students at UERJ. This instrument has been shown to have good internal consistency, discriminant validity, concurrent validity, content validity and test-retest reliability[12] and has been applied on a number of samples of medical students in Brazil[13-16] and internationally[17-20].

The objective of this study was to understand how social and demographic variables, related to health and to the medical course (form of admission and year of study), simultaneously influence the quality of life of these students. The intention was to understand the magnitude of the relation - represented by the strength of association between the aspects investigated and the outcome in terms of quality of life, in its multiple dimensions - as well as its direction, that is, if such aspects improve or worsen the QOL of students.

Material and methods

Subjects and Instrument

Between April and May 2010, 394 students participated in the research - 72% of those that were enrolled in the Faculty of Medical Sciences at UERJ in that year - making up a proportional sample, stratified by year of study, with an error of 6.5%.

Students from the first to the fifth years of study were interviewed in the lecture halls and those in the sixth year in a common room for those on general duty, on different days during the week. The Whoqol-bref instrument was applied with some adaptations to its expressions and terms[21]. It contains 26 questions, of which the first two relate to the respondent's self-assessment of his/her QOL and level of satisfaction with own health. The remaining 24 questions are divided into four domains: physical (seven questions about pain and discomfort, energy and fatigue, sleep and rest, mobility, day-to-day activities, use of medication and ability to work); psychological (six questions about feelings, positive and negative, thinking and learning, memory and concentration, bodily image and spirituality); social relations (three questions about personal relationships, social support and sexual activity); environmental (eight questions about physical safety and protection, home environment, financial resources, availability and quality of health care and social assistance, opportunities for acquiring new information and skills, leisure activities, physical environment and transportation.). Each question has five choices of responses, of the Likert type, and should relate to the fifteen days prior to the time of the self-completion of the instrument, which takes around ten to fifteen minutes[12].

Ciência & Saúde Coletiva, 20(2):547-556, 2015

The scores obtained were transformed into a linear scale varying from 0 to 100, which are respectively the least and most favorable values of QOL, as proposed by the Whoqol-bref group syntax[22].

Questions were added to the instrument to identify sex, age (in years), year of study, form of admission (under a quota or not) and an economic classification using the Brazil 2008 criteria[23]. In addition, the presence of referred chronic morbidity (RCM) was investigated through two questions: "Are you having ongoing treatment for any disease? If so, what disease?"

This study was approved by the Ethics Committee of the Pedro Ernesto University Hospital and the instrument was applied by one of the authors, after the student had read it and and signed a declaration that consent was being given in a free and informed manner.

Statistical analysis

The data were analyzed using SPSS V.17. A bi-variate analysis was performed using the T-test and ANOVA/Bonferroni post hoc methods to detect differences in the average QOL values (p-value of 5%), between the strata: sex (male/female), RCM (Yes/No), admission by quota (Yes/No), economic class using the Brazil 2008 criterion (A, B and C Classes), year of study (third and sixth years/other years), according to the four Whoqol-bref domains: physical (D1), psychological (D2), social relations (D3) and environment (D4).

In relation to the "year of study" variable, a prior bi-variate analysis, which evaluated each year of study individually for each QOL category, found that there was no statistically significant difference for any year; except for the third and sixth years which were borderline cases. Considering that during these years there were changes to the curricula that generated tension among the students, we chose to dichotomize the variable between the third/sixth years of study and the other years of study.

The analysis was performed using the "enter" method (saturated model) of multiple linear regression to examine the simultaneous effect of statistically significant variables in the bi-variate analysis ($p < 0.10$), and the contribution of this set of variables to explain the QOL of UERJ medical students, according to the four Whoqol-bref domains (outcomes).

The results of the final four linear regression models will be presented by the coefficient of determination (R^2), the model coefficients (β for each exposure variable and its corresponding p-value. The residual values of each model were analyzed in relation to their normal properties.

Results

The average age of the 394 students participating in the survey was 23 years (16-43 years), of which 240 (61%) were female and 154 (39%) male. Of the total, 170 (43%) were admitted under quotas and 80 (20%) referred to chronic morbidity. The percentages of participants by economic class (A, B and C) were respectively 32%, 47% and 21% and for year of study (first to sixth) were 87.5%, 76.6%, 67.9 %, 67.4%, 74.1% and 62%. The probability that the head of the student's family household did not have a university degree was five times greater for quota students (OR = 5.2, IC = 3.4 to 8.1). The per capita income declared by quota students was on average three times lower than that declared by non-quota students (R $ 831.10 *vs* R $ 2,323.60; p-value < 0.001).

The average QOL scores for the four Whoqol-bref domains for the total sample of students was 66.0 for D1, 63.5 for D2, 68.9 for D3, and 58.0 for D4.

The bi-variate analysis between the economic class and the form of admission strata revealed a statistically significant difference in the scores of the four Whoqol-bref QOL domains, being lower for those in economic class C and for quota students. The students having referred chronic morbidity had lower scores ($p < 0.05$) in D1, D2 and D3. Females had lower scores in D1 and D2 ($p < 0.05$) (Figure 1). In relation to the year of study, the lowest QOL scores were observed for students in the third and sixth years of study group, with $p < 0.05$ for D2 and D3 and $p < 0.10$ for D1 (Figure 2).

By means of the multivariate analysis, it was possible to observe that the set of selected variables was capable of partially explaining the variability (R^2) of the four domains, respectively 18%, 13%, 9% and 22%. The average scores of these domains, controlled by the variables analyzed, were: D1 = 81.4; D2 = 77.4; D3 = 79.9 and D4 = 77.1. All of the independent variables investigated showed a negative association with the domains for which they were tested, that is, the coefficient (β) shows how much its presence reduces the predicted QOL score for each domain (Table 1).

In the physical domain, the variables that had the greatest influence were being female ($\beta = -6.2$ and p-value < 0.001) and having RCM ($\beta = -9.8$ and p-value < 0.001). In the psychological and

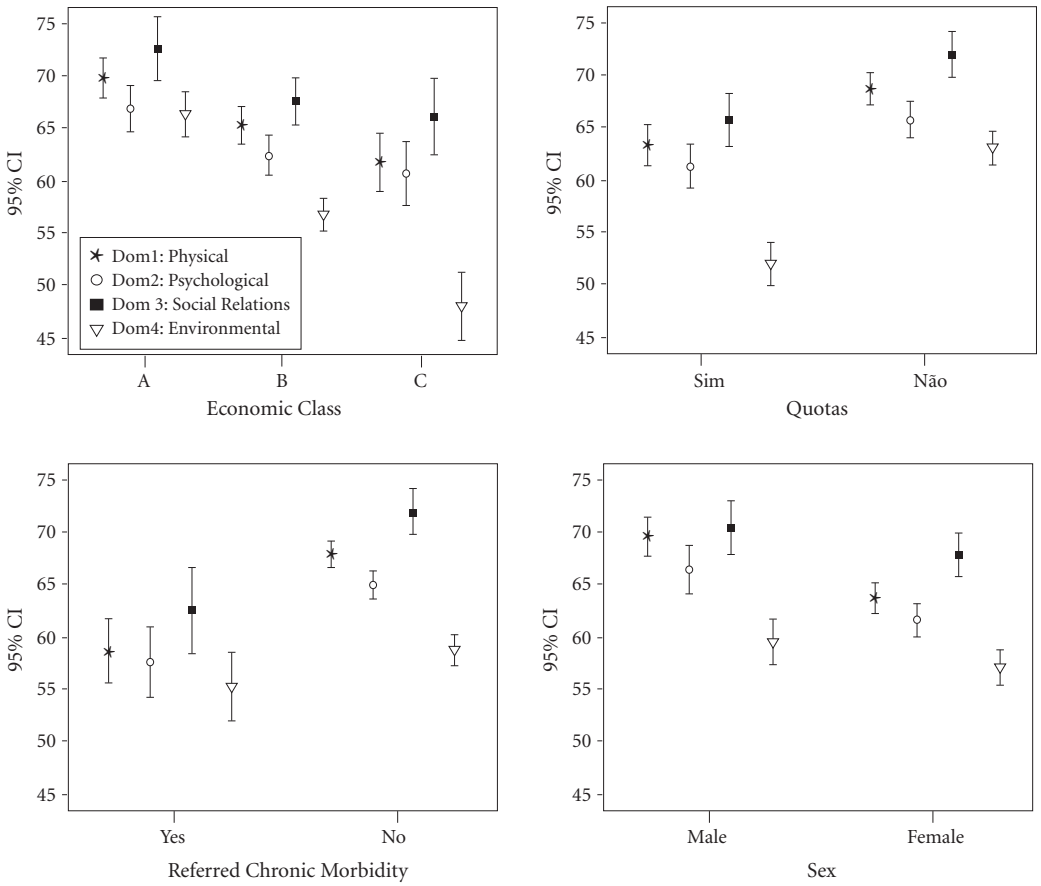

Figure 1. Quality of Life of Medical Students at UERJ (Whoqol-bref), by economic class, form of admission, presence of chronic morbidity and sex. Rio de Janeiro, 2010.

Note: All of the variables presented a P-value < 5% in each domain (t-test or ANOVA), except for: sex in Dom3 and Dom4; and, RCM in Dom4.

social relations domains, the greatest influence observed was the presence of having RCM (β = -7.7 and p-value <0.001 / β = -7.9 and p-value = 0.001) and being enrolled in the third or sixth year of study (β = -6.6 and p-value <0.001 / β = -7.0 and p-value <0.001). For the environment domain the most important variables were economic class (β = -7.8 and p-value < 0.001) and being a quota student (β = -5.3 and p-value = 0.002) (Table 1).

Regarding the simultaneous effects of the model's explanatory variables, a decrease in variability of the mean QOL scores in the four Whoqol-bref domains was observed when comparing the scores predicted by the regression (Figure 3) with the distribution of the original data (Figure 1). Furthermore, it can be seen that the effects of each variable in the domains, observed in the bi-variate analysis (Figure 1) persist, as is the case of the economic class gradient, or increase, as is the cases of form of admission, chronic morbidity and the year of study (Figure 3).

The stratification by year of study (being or not in the third or sixth years) reveals that the differences in QOL in relation to the form of admission, RCM and economic class are maintained for each subgroup, allowing the visualization of a decreasing gradient of QOL in each exposure scenario (Figure 4).

Discussion

Summary of results

The variables that were investigated individually (gender, economic class, order of entry, presence of chronic morbidity and year of study)

Ciência & Saúde Coletiva, 20(2):547-556, 2015

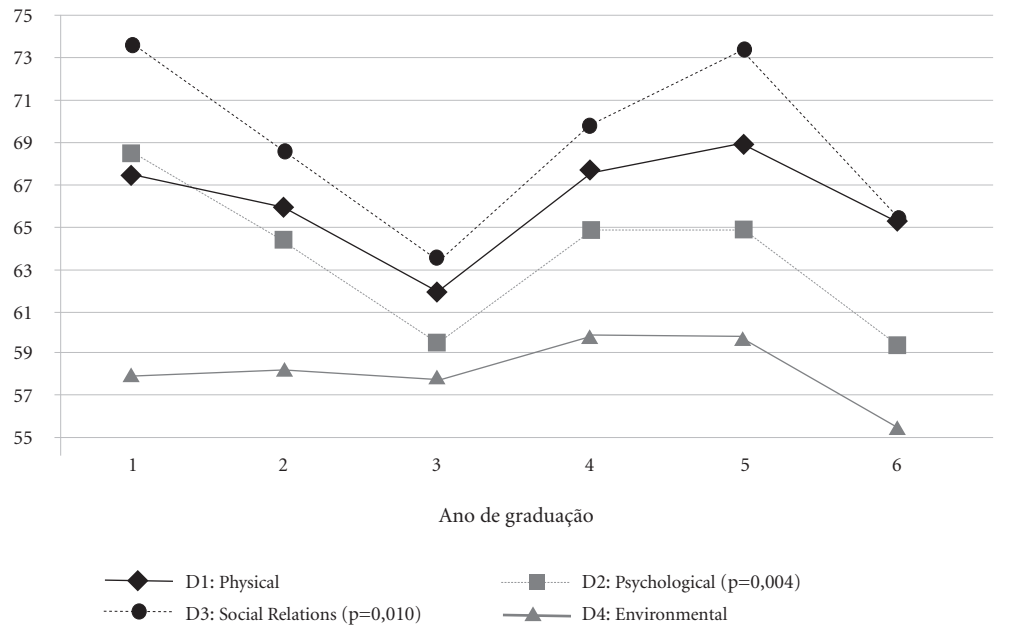

Figure 2. Quality of life scores (Whoqol-bref) by year of study for medical students. UERJ, 2010.

Table 1. Coefficients and respective significance levels of multiple linear regression models for the QOL outcomes in each domain. UERJ, 2010

Independent Variables	Physical		Psychological		Social Relations		Environmental	
	β	p	β	p	β	p	β	p
R^2	0,18		0,13		0,09		0,22	
(α = Constant)	81,4	< 0,001	77,4	< 0,001	79,9	< 0,001	77,1	< 0,001
Sex								
Male	0	-	0	-				
Female	-6,2	< 0,001	-5,1	0,001	-	-	-	-
Economic class								
A	0	-	0	-	0	-	0	-
B	-3,8	0,001	-3,2	0,009	-2,7	0,083	-7,8	< 0,001
C	-7,6	0,001	-6,4	0,009	-5,4	0,083	-15,6	< 0,001
Forma de admission (quota)								
Non-quota	0							
Quota	-2,5	0,114	-2,0	0,245	-4,5	0,042	-5,3	0,002
Referred chronic morbidity								
No	0	-	0	-	0	-	0	-
Yes	-9,8	< 0,001	-7,7	< 0,001	-7,9	0,001	-4,3	0,015
3º and 6º Year of study								
No	0	-	0	-	0	-	0	-
Yes	-4,3	0,003	-6,6	< 0,001	-7,0	< 0,001	-3,5	0,020

p = p-value of Beta coefficient (α) in the Wald test; β is the coefficient of each independent variable by regression; α is the constant in each model according to the QOL domain being investigated; The blank cells correspond to variables that were not considered in the final model.

revealed that students who were female, or of a lower economic class, or admitted under the quota system, or having RCM, or in the third or the sixth year of study had lower scores in almost all the quality of life domains measured by Whoqol-bref.

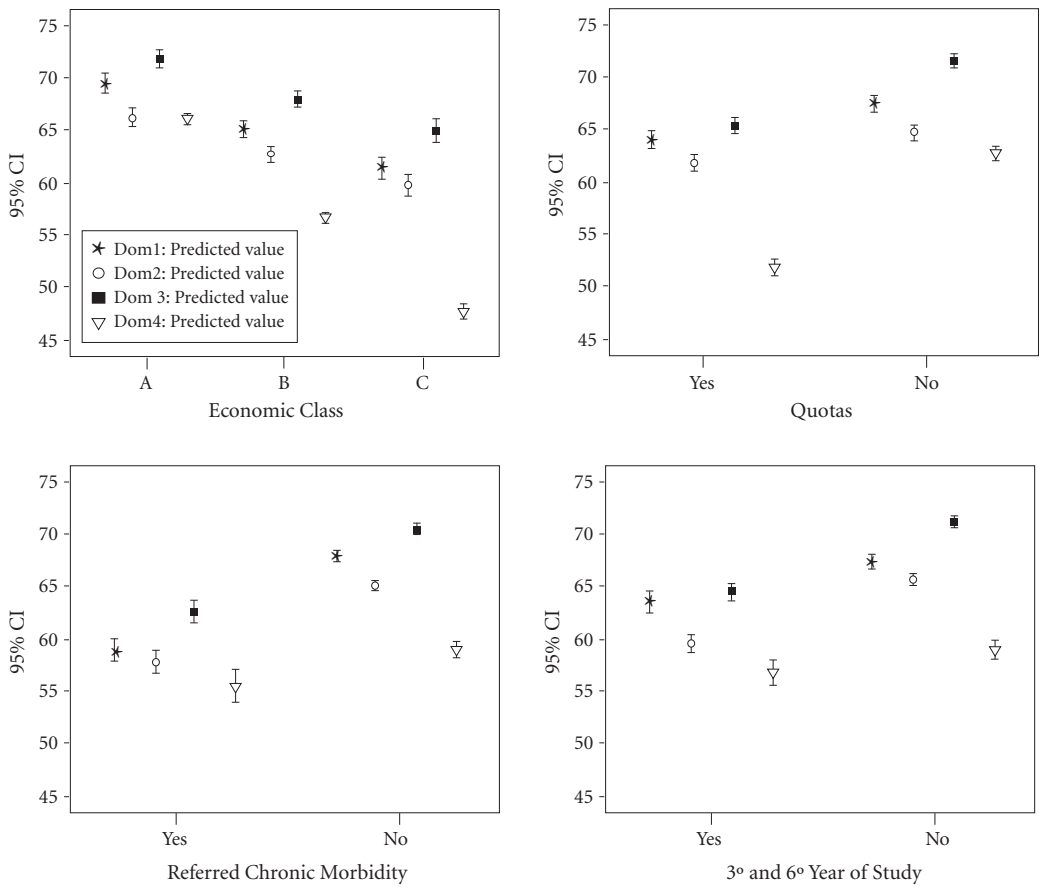

Figure 3. Predicted score for Quality of Life of Medical Students at UERJ (Whoqol-bref), by economic class, form of admission, presence of chronic morbidity and year of study. Rio de Janeiro, 2010.

All these variables were significant in influencing the QOL of medical students and remained in the multivariate model, which demonstrated that these effects are additive. However, the linear regression revealed that they only partially explain the QOL of medical students, ranging from 9% in the social relations domain to 22% in the environmental domain. Furthermore, their joint effect was able to express the variability of the scores showing decreases from 20.9 points (in D4) to 26.6 points (in D1), highlighting the differences found in the subgroups of students in relation to the average QOL for the total sample.

Regarding the effect of medical studies on QOL, being in the the third or sixth year of study had a statistically significant negative association with all the Whoqol-bref domains, principally on the psychological and social relations domains. When stratifying the predicted scores by year of study, the observed differences in QOL from the influence of the form of admission, RCM and economic class remained. In this sense the students admitted under quotas or having a form of chronic morbidity are even more vulnerable in these periods of their medical studies.

In the third year, students experience the challenge of dealing with both patients and the demands of the medical teachers during the much-awaited course of clinical medicine; and in the sixth year, when they undergo on-the-job training, there is a high level of pressure related to graduation and the responsibility to fully exercise the profession, as well as the examination for medical residency.

The results in the context of the literature

The results of the bi-variate analysis, which have been presented and discussed in detail in another publication[24], revealed that females,

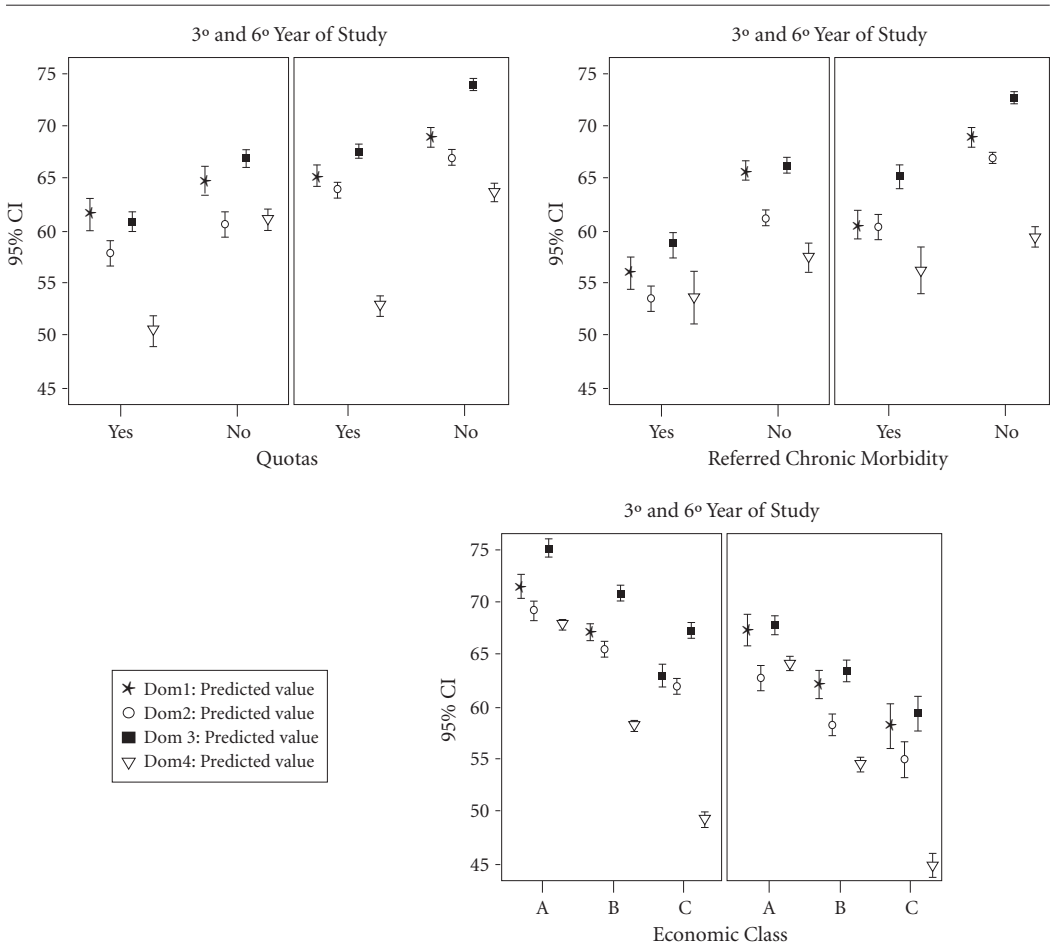

Figure 4. Predicted score for Quality of Life of Medical Students at UERJ (Whoqol-bref), by form of admission, presence of chronic morbidity and economic class, stratified by year of study (3rd and 6th = Yes; others = No). Rio de Janeiro, 2010.

those with RCM, those admitted under quotas and those coming from lower economic classes had lower scores in almost all the quality of life domains measured by Whoqol-bref as has been previously observed by other authors in studies involving medical students[13,14] or the general population[25]. Likewise, confirming the findings of other research, this study showed a decrease in the QOL of students as they progressed in their years of study[13,14,18,26].

Regarding the multivariate approach, Henning et al.[20] evaluated the effect of the stress of adapting to the academic and social environment on the QOL of foreign and domestic medical students in New Zealand, measured by the Whoqol-bref and controlled by social and economic variables. The foreign students had lower QOL scores primarily in the areas social and environmental relationships. Similarly, for the sample of UERJ students, we observed significant differences in the scores of these same QOL domains between those admitted under quotas and those not[24], even when controlling for social and economic variables, as observed by the regression coefficients (β = -4.5; p = 0.042 and β = -5.3; p <0.001).

The significant social and economic differences between those admitted under quotas and those not which was also reflected in the difference between the probabilities that the head of the student's family household had completed a university education may also be related to the social and cultural capital available to these students.

Many UERJ medical students come from homes which are located in cities or neighborhoods which are a considerable distance away from the faculty and so they end up going through a process of separation from their fami-

lies. This process may be linked to material difficulties that hinder their integration into the new social space they inhabit, although Paro et al.[26] in previous research did not observe significant differences in QOL between students living with their families or not.

Nogueira[27], in qualitative research with university students in Belo Horizonte in the 1990s, revealed that the cultural and professional capital of parents with high academic qualifications influences the academic lives of their children in various ways, either by the advice given and concrete actions on the curriculum of the children, or by the objective living conditions that allow them to study without having to work in activities not related to their own area of study, which for medical students, can be considered a source of relief considering the burden of work imposed by the faculty.

On the other hand, research conducted by Portes[28] revealed that some families from lower economic classes could reach a state of economic despair, with repercussions on the family's way of life, to ensure the permanence of their children at university. If, on the one hand, an appreciation of the value of learning and the internalization of an image of their parents as serious and hardworking can contribute to helping them overcome educational challenges, on the other hand, the fact of being brought up under the influence of a work ethic, often leads them to want to acquire a minimum level of financial autonomy, which can present a great threat to their future careers.

Another relevant outcome identified in research involving medical students is burnout. This term refers to work-related stress. It is prevalent among doctors, but some research has shown that medical students are also affected[29-31]. It is characterized by exhaustion (physical and emotional), dehumanization (emotional and affective detachment) and reduced personal achievement (dissatisfaction and inefficiency). The findings reveal that factors directly related to the study course[29,30] such as stressful life events[31] cause burnout in this population of students, with implications for their academic performance and quality of life.

Strengths and limitations of the study

As positive aspects we would highlight the representativeness of the student sample in each and every year of study and the use of a cross-cultural instrument, which had been validated in our type of environment, to measure QOL in its subjective and cross-cultural aspects.

Furthermore, there are no previous studies on QOL for students admitted under quotas and there are very few publications on the subject that use a multivariate approach.

As a limitation, we would emphasize the cross-cutting design of the study, which precludes us from knowing whether the prevalence of RCM increases with the number of years of study, or from investigating the possibility of the reverse causality of this variable with the students' QOL. Finally, we would point out that the theoretical model could be improved with the inclusion of some variables that were not investigated in this study, such as satisfaction with the course and the career choice, the support received from the university in the learning process, academic performance and the resilience of the students.

Implications for research and medical education

Further research is needed to explore the relationship between the QOL of students and the other variables not investigated here, as already mentioned above, as well as the use of the triangulation of quantitative and qualitative methods to better understand some of the results obtained, in the light of the *objectives, expectations, standards and concerns* of medical students.

The subject of caring for student health needs to be included in the agenda of the teaching staff and should begin at the reception of freshmen, to identify those who are potentially most vulnerable. To achieve this there is a need to develop strategies to learn about their living conditions, the presence of chronic diseases and the available social support.

In addition, the process of curriculum improvement should prioritize a careful look at the students in the third and sixth years of study and at offering them activities that help them to better perceive and cope with the stress inherent to professional training.

Conclusions

The National Curriculum Guidelines for Graduation in Medical School recommend that students learn to take care of their own health and wellness, as physicians and citizens, which is in contrast with our sample of young students, where 20% had RCM and 43% were admitted under quotas, and which were shown to be more vulnerable to the stress imposed by the course.

Even if the university were to support these students financially on a permanent basis we still

know little about the challenges they face during medical training or the relationships between academic performance and the process of integration into the new social environment and quality of life.

In order for medical schools to contribute to the development of such competency among future doctors it is necessary to identify and address the health needs of these students in a wider context, since it has been demonstrated that not only physical and emotional aspects, but also social and cultural aspects can influence their QOL and consequently their academic performance.

Furthermore, independently of an individual's vulnerabilities, until the curriculum is revised and improved, students who experience the traditional teaching model need greater attention, during their third and sixth years of study, which correspond to the critical stages of their graduation process.

Collaborations

ACS Chazan, MR Campos and FB Portugal participated equally in all stages of preparation of the article.

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