

# Stressors, psychological well-being, and overall health amongst students from public and private dental schools

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**Aim:** This study aimed to correlate stressors with psychological well-being and health factors in dental students from public and private schools. **Methods:** From February to May 2015, three different instruments (Dental Environment Stress – DES – Psychological General Well-Being – PGWB – and SF-36 Health Survey) were applied to students from two public and two private dental schools from the State of Ceará, Brazil. Mann-Whitney test or *t* test for independent samples were used in order to compare the stressors between private and public dental schools students. Correlations to each DES domain were performed using Kendall's Tau C test. **Results:** A total of 92 (45.32%) and 111 (56.68%) students from public and private schools, respectively, answered the questionnaire. Students from public schools demonstrated significantly higher scores in DES/academic performance and DES/personal and institutional factors ( $p < 0.05$ ). Significant negative correlations were detected between PGWB/anxiety and PGWB/general with all DES domains for both public and private schools ( $p < 0.05$ ). Additionally, DES/academic performance was significantly correlated with several SF-36 domains, such as physical function, vitality, and social functioning, to both public and private schools ( $p < 0.05$ ). However, DES/academic performance and SF-36/role physical was only significantly correlated in private school students ( $r = -0.171$ ,  $p = 0.039$ ), while SF-36/bodily pain ( $r = -0.274$ ,  $p < 0.001$ ), general health ( $r = -0.245$ ,  $p = 0.001$ ), and mental health ( $r = -0.286$ ,  $p < 0.001$ ) were significantly correlated with DES/academic performance only in public school students. **Conclusion:** Students from public and private dental schools presented different stressor patterns. Additionally, most of DES domains were significantly associated with PGWB and SF-36 to both public and private schools.

**Keywords:** Stress, psychological. Students, dental. Health personnel.

## Introduction

Psychological stress is defined as a dynamic process, as the perceived environmental pressure which jeopardizes an individual's well-being<sup>1</sup>. It is well known that university students can be highly stressed due to education demand<sup>2</sup>. This may lead to emotional, psychological, and physical impairments, which may compromise their education and general health<sup>3</sup>.

Several studies have identified the sources of stress in dental undergraduate students' behavior. The literature has shown some contributory stressful factors, such as management of patients' schedules, uncooperative patients, decreased time to relax, pressure to fulfill all technical and scientific demands, and fear of failing a school period<sup>4,5</sup>. It has been also demonstrated that, in comparison to the general population, dental students presented stressors in higher levels<sup>6</sup>, especially due to the highly technical tasks required<sup>5</sup>.

In Brazil, undergraduation in Dentistry is offered by several educational institutions, of which 56 and 176 were public and private dental schools, respectively, in 2015<sup>7</sup>. Nevertheless, few studies have assessed the stressors in Brazilian dental students<sup>8,9</sup>. Both types of schools demand a selective process, as entry requirement. However, the entrance exams in public dental schools is highly competitive.

Considering that private and public dental schools present different profiles of student population, the rationality for comparing both institutions is of utmost importance, mainly when one considers that several strategies may be developed in order to face health problems in these distinct populations. Therefore, this study aimed to analyze the stressors, overall health, psychological well-being and its correlation with stressors in dental students from public and private dental schools from the State of Ceará, Brazil. The null hypothesis of this study is that there are no significant differences in the stressors between students from public and private dental schools.

## MATERIAL AND METHODS

### Study Type and Ethical Aspects

This is a cross-sectional study that included dental students from four different dental schools from Ceará, Brazil. The study protocol was approved by the Institutional Review of the Federal University of Ceará under protocol 953.335/2015, and all volunteers signed an informed consent. The study was conducted in full accordance with the World Medical Association Declaration of Helsinki.

### Sample Source

The chosen public dental schools are from Universidade Federal do Ceará, one at the Campus of Fortaleza (State capital of Ceará) and the other at the Sobral Campus, (the fifth largest city of Ceará with approximately 203,000 inhabitants), as well as the private schools from Universidade de Fortaleza (UNIFOR) based in the city of Fortaleza, and from Faculdade Católica Rainha do Sertão (FCRS) in Quixadá (a city of Ceará with approximately 86,000 inhabitants). In 2015, a total of 519 and 981 students were regularly enrolled in the public and private dental schools, respectively. To be included, participants had to be

at least 18 years of age and be regularly enrolled in 2015, attending any academic term. Additionally, they had to complete at least the following variables in the questionnaire: sex, academic term, University/Faculty attended. Students that answered all these variables, but did not answer all the three instruments, were excluded from data analysis.

All dental schools involved in the present study have a closed group on Facebook, and each class from each dental school have an e-mail managed only by the class students. From February to May 2015, invitations were sent to these social media groups and to these e-mails, explaining the main objectives and the inclusion criteria of the present study. The volunteers were encouraged to answer the invitation by sending their personal e-mail to one of the researchers involved in the present study. They could also make an appointment to answer the questionnaire in a printed format. The confirmation of the student enrollment in the year 2015 was assured by contacting each dental school dean.

### Study Power

As all dental students have been invited to participate, a sample size calculation was not previously performed. The scores in Dental Environment Stress (DES) instrument was considered the main outcome of this study. Therefore, a study power was estimate, using the following parameters: alpha of 5%, mean $\pm$ SD DES total scores of 2.460 $\pm$ 0.505 and 2.257 $\pm$ 0.543 to public and private dental schools, respectively. A power of 78.67% for a two-sample comparison of means was determined. To achieve 80% power in this study, 209 dental students were necessary, which is closer to the final sample size of 203 participants.

### Instruments Applied and Collected Variables

Three different instruments were used, DES, the Psychological General Well-Being (PGWB) index, and the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). Both DES and SF-36 were translated and validated to a Brazilian sample<sup>9,10</sup>. The PGWB instrument was previously validated to a Portuguese sample<sup>11</sup> and another study had used it in Brazilian samples<sup>12</sup>. In addition to the three instruments, sex (male or female), age, clinical training (clinical training or pre-clinical training courses), dental school attended (UFC/For-taleza, UFC/Sobral, UNIFOR or FCRS) were collected in this questionnaire.

The Brazilian validated format of the DES instrument is constituted of 36 questions, which identify and quantify the sources of stress in dental students (8). The items were answered based on the four point Likert scale, such as not stressful (1 point), slightly stressful (2 points), moderately stressful (3 points), and very stressful (4 points). Higher scores mean a more stressful source. This instrument is divided into five dimensions.

The PGWB index measures the subjective general well-being and distress in the dental students. The original scoring per item ranges from 0 to 5, giving a maximum score of 110. This instrument is composed by 22 questions and includes six dimensions. The SF-36 is a multidimensional instrument composed of 36 items and provides composite scores for eight dimensions. Lower scores mean a less favorable health state.

### Dealing With Missing Data

To each instrument, different approaches were performed in order to deal with missing data. For PGWB, as the missing data were low, the items were replaced by employ-

ing inter-item correlations, as previously reported<sup>13</sup>. For the other instruments, when a score item was absent, the mean scores of the dimension was calculated and attributed to the missing question.

## Statistical Analysis

Public dental schools were compared to the private dental schools. Shapiro-Wilk normality test was applied to each variable, and when a normal distribution was detected, *t* test for independent samples was applied. Mann-Whitney test was used only when a non-normal distribution was detected. The comparisons of sex and attending to academic clinical courses were performed by Chi-square. The reliability of the three instruments was assessed by Cronbach's alpha coefficients.

Additionally, Cohen's *d* assessed the effect size of all comparisons performed. Kendall's Tau C test coefficients were used to assess the correlation between DES dimensions and the dimensions of the two other instruments.

The statistical analysis was carried out with SPSS version 21.0 for Windows (IBM® SPSS Statistics, New York, USA), and a *p*-value <0.05 was considered to represent a significant difference. Bonferroni correction was applied in the analyses of each DES domain, as each question had already been included in the domains. Therefore, the new *p*-values established were: academic performance, *p*<0.005; difficulties and insecurities about their professional future, *p*<0.008; responsibilities with patients, *p*<0.013; Personal and institutional factors, *p*<0.006; Interpersonal relationships, *p*<0.006.

## RESULTS

Overall, 237 e-mails were received, and the questionnaire was sent to 231 dental students, as six of them were not regularly enrolled in the year 2015. Two-thousand and three students returned the questionnaire (response rate of 87.88%). Ninety-eighty (48.28%) and 105 (51.72%) questionnaires were, respectively, filled in a printed and electronic format. Table 1 shows the demographical characteristics, according to dental school type. Students from public dental schools were significantly older in comparison to the ones from private schools (*p*=0.003).

### DES Instrument

The overall and each dimension reliability analyses found for DES instrument are demonstrated in Table 2. The stressors, according to dental school type, are expressed in Table 3. Public dental school students presented significantly higher total scores in the DES instrument in comparison to private dental school students (*p*=0.005). The effect size was considered small to the overall score (Cohen's *d* = 0.381), other questions showed medium to large effect size, such as amount of assigned classwork (Cohen's *d* = 0.553), atmosphere created by faculty (Cohen's *d* = 0.932), lack of time for relaxation and recreation (Cohen's *d* = 0.647), completing graduation requirements (Cohen's *d* = 0.523), expectations of dental school and the reality (Cohen's *d* = 0.596), and lack of time to do assigned school work (Cohen's *d* = 0.577). To all those questions, students from public dental schools presented higher scores.

**Table 1.** Sample demographical characteristics, according the dental school type.

		Overall (n=203)	Public (n=92; 45.32%)	Private (n=111; 56.68%)	P-value
Dental School	UFC – Fortaleza – n (%)	-	65 (70.65)	-	-
	UFC – Sobral – n (%)	-	27 (29.35)	-	
	UNIFOR – n (%)	-	-	90 (81.08)	
	FCRS – n (%)	-	-	21 (18.92)	
Sex	Male – n (%)	59 (29.1)	30 (32.6)	29 (26.1)	0.353*
	Female – n (%)	144 (70.9)	62 (67.4)	82 (73.9)	
Age (in years)	Mean±SD (median-min.;max.)	21.15±4.70 (21-18;50)	22.31±2.75 (22-18;30)	22.01±5.82 (20-18;50)	0.003α§
Clinical training	Pre-clinical training – n (%)	75 (36.9)	36 (39.1)	39 (35.1)	0.563*
	Clinical training – n (%)	128 (63.1)	56 (60.9)	72 (64.9)	

Legend: UFC: Universidade Federal do Ceará; UNIFOR: Universidade de Fortaleza; FCRS: Faculdade Católica Rainha do Sertão; \*Chi-square; αMann-Whitney test; §Cohen's d=0.066

**Table 2.** Cronbach's alpha of all domain from the 3 questionnaires used.

Domain	Cronbach's alpha
<b>DES</b>	
Academic performance	0.802
Difficulties and insecurities about their professional future	0.822
Responsibilities with patients	0.755
Personal and institutional factors	0.751
Interpersonal relationships	0.679
<b>Overall</b>	0.915
<b>PGWBI</b>	
Anxiety	0.756
Depressed mood	0.665
Positive well-being	0.563
Self-control	0.411
General health	0.540
Vitality	0.521
<b>Overall</b>	0.868
<b>SF-36 Health Survey</b>	
Physical functioning	0.823
Role-physical	0.622
Bodily pain	0.710
General health	0.677
Vitality	0.683
Social functioning	0.373
Role-emotional	0.639
Mental Health	0.711
<b>Overall</b>	0.831

**Table 3.** Mean (SD) stressors by type of school, using DES scale.

	Overall (n=203)	Public (n=92)	Private (n=111)	Difference between school type (p-value) *	Cohen's d
1: Amount of assigned classwork	2.59 (1.00)	2.88 (0.88)	2.35 (1.03)	<0.001	0.553
2: Lack of cooperation by patient in their home care	1.97 (0.94)	1.92 (0.94)	2.00 (0.94)	0.872	0.085
3: Difficulty of classwork	2.31 (0.92)	2.52 (0.93)	2.14 (0.88)	0.005	0.420
4: Responsibilities for comprehensive patient care	1.89 (1.08)	1.92 (1.07)	1.87 (1.09)	0.173	0.046
5: Competition for grades	2.17 (1.16)	2.23 (1.21)	2.13 (1.12)	0.543	0.086
6: Patients being late or not showing for their appointments	2.30 (1.22)	2.16 (1.26)	2.41 (1.19)	0.249	0.204
7: Examinations and grades	3.48 (0.82)	3.61 (0.71)	3.37 (0.88)	0.048	0.300
8: Difficulty in learning clinical procedures	1.99 (1.07)	2.03 (1.09)	1.95 (1.05)	0.004	0.075
9: Atmosphere created by faculty	2.17 (1.17)	2.71 (1.12)	1.72 (1.00)	<0.001	0.932
10: Relations with member of the opposite sex	1.38 (0.82)	1.26 (0.69)	1.49 (0.90)	0.022	0.289
11: Receiving criticism about work	2.30 (1.04)	2.44 (1.05)	2.19 (1.02)	0.102	0.242
12: Difficulty in learning precision manual skills required in preclinical and laboratory work	2.01 (1.10)	2.16 (1.19)	1.88 (1.00)	0.001	0.255
13: Lack of self-confidence in be a successful dental student	2.44 (1.15)	2.66 (1.12)	2.25 (1.14)	0.010	0.363
14: Lack of self-confidence in be a successful dentist	2.55 (1.13)	2.72 (1.15)	2.41 (1.09)	0.050	0.277
15: Lack of time for relaxation and recreation	3.11 (1.03)	3.45 (0.88)	2.82 (1.06)	<0.001	0.647
16: Amount of cheating in dental school	2.22 (1.10)	2.20 (1.14)	2.24 (1.06)	0.636	0.037
17: School rules and regulations	2.25 (1.02)	2.47 (1.02)	2.06 (0.99)	0.007	0.408
18: Working on patients with dirty mouths	2.01 (1.11)	2.05 (1.12)	1.97 (1.10)	0.034	0.072
19: Lack of family atmosphere in the dormitories during school	1.81 (1.11)	1.80 (1.11)	1.82 (1.11)	0.815	0.018
20: Completing graduation requirements	2.85 (1.21)	3.19 (1.04)	2.58 (1.28)	0.001	0.523
21: Reconcile personal life issues with dental school routines	3.03 (1.01)	3.27 (0.92)	2.83 (1.05)	0.002	0.446
22: Expectations of dental school and the reality	2.50 (1.08)	2.84 (1.03)	2.22 (1.05)	<0.001	0.596
23: Lack of participation in the school's decision-making	2.31 (1.12)	2.51 (1.12)	2.15 (1.09)	0.020	0.326
24: Fear of failing course or year	3.34 (1.02)	3.59 (0.74)	3.13 (1.16)	0.009	0.473
25: Insecurity concerning professional future	2.87 (1.01)	2.95 (0.96)	2.80 (1.05)	0.335	0.149
26: Financial responsibilities	2.97 (1.09)	3.12 (1.02)	2.85 (1.14)	0.086	0.250
27: Lack of time to do assigned school work	2.97 (0.96)	3.26 (0.78)	2.73 (1.04)	<0.001	0.577
Continue					

Continuation					
28: Considering entering some other field of work	2.02 (1.14)	1.99 (1.15)	2.05 (1.14)	0.668	0.052
29: Difficulty in undertake conjugal commitments	2.10 (1.21)	2.13 (1.19)	2.08 (1.23)	0.768	0.041
30: Personal physical health	2.46 (1.17)	2.72 (1.21)	2.25 (1.09)	<b>0.005</b>	0.408
31: Attitudes of school toward women dental students	1.68 (1.02)	1.46 (0.79)	1.86 (1.15)	<b>0.011</b>	0.405
32: Family conflict throughout your career development	1.77 (1.09)	1.70 (1.01)	1.84 (1.15)	0.556	0.129
33: Discrimination due to race, class status or ethnic group	1.70 (1.01)	1.51 (0.88)	1.87 (1.08)	<b>0.019</b>	0.365
34: Inconsistency feedback of your work between different instructors	2.41 (1.20)	2.66 (1.14)	2.20 (1.21)	<b>0.005</b>	0.391
35: Fear of being unable to catch up if get behind	2.82 (1.14)	3.01 (1.08)	2.66 (1.18)	<b>0.029</b>	0.309
36: Attitudes of school towards homosexual dental students	1.77 (1.08)	1.53 (0.93)	1.96 (1.15)	<b>0.005</b>	0.411
Total mean score	2.34 (0.53)	2.46 (0.51)	2.26 (0.54)	<b>0.005</b>	0.381

Legend: SD – standard deviation; \* Mann-Whitney test; Bold numbers mean statistically significance.

Table 4 shows the comparison between dental school type and dimensions to each instrument. Academic performance and personal and institutional factors were significantly higher stressors in public dental school students ( $p < 0.001$  and  $p = 0.001$ , respectively). However, the only dimension presenting a large effect size was academic performance (Cohen's  $d = 0.904$ ).

## PGWB Index

The reliability analysis found an alpha coefficient of 0.868 for PGWB index (Table 2). In general, public dental school students presented significantly lower total scores when compared to students from private schools ( $p = 0.023$ ). Additionally, anxiety, positive well-being, and vitality dimensions were significantly lower in these students. Nonetheless, depressed mood, self-control, and general health dimensions did not demonstrate significant difference between dental school type. Vitality was the only dimension showing at least a medium effect size (Cohen's  $d = 0.909$ ).

## SF-36 Health Survey

The reliability analysis found an alpha coefficient of 0.831 for SF-36 Health survey (Table 2). The total score did not show statistically significance between groups ( $p = 0.259$ ). Similarly, six dimensions were not significantly different between dental school type. On the other hand, two dimensions were significantly lower in the public dental school students, vitality and social functioning ( $p = 0.016$  and  $p = 0.006$ , respectively). However, none of the dimensions showed a medium or large effect size.

## Correlations of Survey – DES and PGWB

The correlation between DES and PGWB total scores showed a negative significant correlation to both dental schools type ( $r = -0.412$  and  $r = -0.386$ ,  $p < 0.001$  to public dental and

**Table 4.** Respondents' mean score (SD) on dimensions of each survey by school type.

Dimension	Overall (n=203)	Public (n=92)	Private (n=111)	Difference between school type (p-value)*	Cohen's d
<b>DES</b>					
Academic performance (10-40)	28.15 (6.14)	30.91 (5.38)	25.86 (5.79)	<b>&lt;0.001</b>	0.904
Difficulties and insecurities about their professional future (6-24)	14.71 (4.94)	15.47 (5.01)	14.08 (4.81)	0.061	0.283
Responsibilities with patients (4-16)	8.16 (3.32)	8.07 (3.41)	8.24 (3.26)	0.716	0.051
Personal and institutional factors (8-32)	19.04 (5.46)	20.43 (5.18)	17.87 (5.43)	<b>0.001</b>	0.482
Interpersonal relationships (8-32)	14.52 (4.67)	13.68 (4.26)	15.21 (4.90)	0.022	0.294
Total score (36-144)	84.57 (19.25)	88.57 (18.20)	81.26 (19.55)	<b>0.007§</b>	0.387
<b>PGWB</b>					
Anxiety (0-25)	12.14 (4.56)	11.23 (4.82)	12.90 (4.21)	<b>0.017</b>	0.369
Depressed mood (0-15)	9.73 (3.06)	9.65 (2.99)	9.80 (3.13)	0.834	0.049
Positive well-being (0-20)	10.78 (3.15)	10.00 (3.07)	11.42 (3.08)	<b>0.004</b>	0.462
Self-control (0-15)	9.47 (2.66)	9.49 (2.74)	9.46 (2.61)	0.897	0.011
General health (0-15)	8.66 (2.64)	8.51 (2.69)	8.78 (2.60)	0.507	0.104
Vitality (0-20)	9.83 (2.97)	8.96 (2.86)	11.56 (2.86)	<b>&lt;0.001</b>	0.909
Total score (0-110)	60.62 (14.12)	57.84 (14.58)	62.93 (13.36)	<b>0.011§</b>	0.364
<b>SF-36</b>					
Physical functioning (0-100)	74.66 (20.32)	77.12 (19.95)	72.61 (20.49)	0.104	0.223
Role physical (0-100)	43.32 (33.62)	42.39 (35.69)	44.09 (31.93)	0.615	0.050
Bodily pain (0-100)	65.90 (21.55)	64.88 (22.42)	66.76 (20.85)	0.444	0.087
General health (0-100)	61.29 (18.14)	60.57 (20.50)	61.89 (15.97)	0.973	0.072
Vitality (0-100)	46.61 (17.89)	43.37 (18.41)	49.31 (17.05)	<b>0.016</b>	0.335
Social functioning (0-100)	61.01 (21.44)	56.79 (22.88)	64.55 (19.57)	<b>0.006</b>	0.365
Role emotional (0-100)	51.65 (37.77)	51.09 (40.28)	52.12 (35.70)	0.895	0.027
Mental health (0-100)	59.55 (17.26)	58.43 (17.19)	60.47 (17.34)	0.506	0.118
Total score (0-800)	463.85 (112.02)	454.64 (124.52)	471.56 (100.32)	0.295§	0.150

Legend: SD – Standard deviation; \*Mann-Whitney test, except when otherwise specified; § t test for independent samples; Bold numbers mean statistically significance.

private dental school students, respectively). Table 5 shows the correlation between each dimension of DES and PGWB surveys according to dental school type. All the significant correlation found were negative, demonstrating lower quality of life while stressors increase. Moreover, these correlations have ranged from low to moderate.

### Correlations of Survey – DES and SF-36

The correlation between DES and SF-36 total scores also showed a negative significant correlation to both dental schools type ( $r=-0.260$  and  $r=-0.286$ ,  $p<0.001$  to public dental and private dental school students, respectively). The correlation



**Table 5.** Correlations of DES and PGWB dimensions scores, according to dental school type. Correlations are expressed using Kendall's Tau C test.

	DES/Academic performance		DES/Difficulties and insecurities about professional future		DES/Responsibilities with patients		DES/Personal and institutional factors		DES/Interpersonal relationships	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
PGWB/Anxiety	-0.468*	-0.257*	-0.433*	-0.248*	-0.198*	-0.227*	-0.343*	-0.304*	-0.211*	-0.259*
PGWB/Depressed mood	-0.275*	-0.186*	-0.230*	-0.224*	-0.131	-0.234*	-0.307*	-0.283*	-0.242*	-0.327*
PGWB/Positive well-being	-0.205*	-0.185*	-0.158*	-0.178*	-0.032	-0.074	-0.143*	-0.255*	-0.132*	-0.217*
PGWB/Self-control	-0.199*	-0.219*	-0.209*	-0.216*	-0.052	-0.091	-0.217*	-0.294*	-0.235*	-0.129
PGWB/General health	-0.323*	-0.231*	-0.284*	-0.193*	-0.241*	-0.271*	-0.341*	-0.323*	-0.169*	-0.222*
PGWB/Vitality	-0.324*	-0.281*	-0.189*	-0.345*	-0.135	-0.138*	-0.260*	-0.275*	-0.173*	-0.183*

Legend: \*statistically significance,  $p < 0.05$

**Table 6.** Correlations of DES and SF-36 Health Survey dimensions scores by respondents' school type. Correlations are expressed using Kendall's Tau C test.

	DES/ Academic performance		DES/ Difficulties and insecurities about professional future		DES/ Responsibilities with patients		DES/ Personal and institutional factors		DES/ Interpersonal relationships	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
SF-36/Physical function	-0.227*	-0.151*	-0.108	-0.156*	-0.131	-0.197*	-0.220*	-0.192*	-0.047	-0.151*
SF-36/Role physical	-0.056	-0.171*	0.004	-0.115	-0.085	-0.073	-0.170*	-0.194	-0.232*	0.001
SF-36/Bodily pain	-0.274*	-0.107	-0.299*	-0.155	-0.249*	-0.082	-0.326*	-0.132	-0.124	-0.153*
SF-36/General health	-0.245*	-0.138	-0.149	-0.136	-0.150*	-0.094	-0.192*	-0.164*	-0.136	-0.247*
SF-36/Vitality	-0.368*	-0.209*	-0.238*	-0.194*	-0.050	-0.097	-0.227*	-0.232*	-0.136	-0.217*
SF-36/Social Functioning	-0.207*	-0.218*	-0.200*	-0.159*	-0.137	-0.142*	-0.155*	-0.349*	-0.034	-0.220*
SF-36/Role emotional	-0.046	-0.145	-0.048	-0.196*	-0.002	-0.025	-0.043	-0.151	-0.188*	-0.053
SF-36/Mental health	-0.286*	-0.134	-0.177*	-0.093	-0.100	-0.076	-0.274*	-0.162*	-0.175*	-0.186*

Legend: \*statistically significance,  $p < 0.05$

between each dimension of DES and SF-36 surveys, according to dental school type, is showed in Table 6.

DES/academic performance was significantly correlated with all SF-36 dimension, except for SF36/role physical and SF-36/role emotional, in students from public schools. In fact, for those students, SF-36/role emotional was not significantly correlated with

any DES dimension. Regarding SF-36/bodily pain, almost all DES dimensions showed a significant negative correlation, except for DES/interpersonal relationship.

In students from private schools, the DES/academic performance was significantly correlated with SF-36/physical function, SF-36/role physical, SF-36/vitality, and SF-36/social functioning. These students showed negative significant correlation in SF-36/bodily pain dimension only with DES/interpersonal relationship ( $r=-0.153$ ,  $p=0.024$ ).

## DISCUSSION

This study aimed to correlate stressors with psychological well-being and health factors in dental students from both public and private dental schools from the State of Ceará, Brazil. To the best of the authors' knowledge, this the first study to compare the stressors for students in public and private dental schools involving Brazilian students. Overall, students from public dental schools presented higher stressors, as demonstrated in the significantly higher DES total score. Moreover, DES domains were also negatively correlated with psychological well-being and health factors in both public and private dental schools. These correlations presented values ranging from weak to moderate.

Psychological stress is defined as the perceived environmental pressure, which jeopardizes the well-being of an individual<sup>14</sup>. Higher sources of stress are correlated with worst academic performances<sup>15</sup> and reduced motivation in the academic career<sup>16</sup>. Additionally, the literature also reports that prolonged periods of psychological distress represents a risk factor for burnout, meanwhile strategies to reduce stressors may prevent it in a long term<sup>17</sup>. Regarding dental students, the literature reports prevalence of stress so high as 100%<sup>18</sup>. Higher emotional and psychological problems are detected in dental students when compared to other health students, such as medical students<sup>19</sup>. It is well established that higher levels of stress are expected in the final years of their education<sup>20</sup>. It is important to highlight that no significant difference was found between public and private students regarding their attendance in clinical/pre-clinical academic courses. Therefore, the differences in the stressors must not be explained by this variable.

The DES instrument is the best tool to assess and quantify stressors, and its Brazilian validated form was used in the present study<sup>8</sup>. This instrument has been largely used in Dentistry, and one systematic review with meta-analysis showed a pooled DES total scores of 2.34 (95%CI 2.22 – 2.45), which suggests the presence of elevated stressors levels in undergraduate dental students<sup>21</sup>. The present study is in accordance with these results, as a similar total mean DES score was found.

Furthermore, an institutional effect in this outcome was shown, since dental students from public schools presented higher scores in comparison to private dental school students. Similar results have been shown in Malaysian dental students, as students from public universities presented higher stressor levels than their counterparts at private dental schools<sup>22</sup>. The explanation of such differences are challenging, and must take into consideration the social background of the students and the institutions involved in this study. Due to the approval of the Federal Law 12.711/2012, which

determined the reservation of 50% of the admissions for students coming from public education within every federal university in the country, it can be inferred that students from public schools present lower socioeconomic status when compared to those from private schools. Consequently, it is possible to hypothesize that students attending private universities present less financial related problems, and thus lower stressors. However, no socioeconomic status was assessed in the present study.

In public schools, a great number of paid extracurricular programs or projects are available. However, these activities can also lead to a greater generation of stress. The search for scholarships or other income sources may be intensified in public universities, mainly due to the academic necessities and the need to afford the dwelling expenses or to reduce their financial dependence. On the other hand, the public institutions also offer various opportunities for students getting financial support, such as housing assistance or scholarships for students in socioeconomic vulnerability situation, which may have benefic effect on certain stressors of those students. Additionally, after 2015, these institutions started to offer, for all students, dental materials and instruments throughout the course, in an attempt to decrease school dropout due to problems related to the acquisition of these materials. Since the present study was conducted before this policy, different results could found after the implementation of this new policy.

In Brazil, the National System for Evaluation in Higher Education is responsible for evaluating both private and public higher education institutions, one of these evaluations is composed by the National Student Proficiency exam. This exam has been performed every three years, and it is applied to students in the final years. A previous study showed that public educational institutions presented better ranks when compared to those found for the private ones<sup>23</sup>. More specifically, all public dental schools involved in the present study were evaluated with the best relative positions (score=5, the highest score), meanwhile the private institutions presented a mean score of only 2.5. The search for better evaluation by the educational institution can raise the generation of stressors due to the demand for better performance in public school students. In this sense, it is crucial to highlight that the atmosphere created by the faculty, lack of time for relaxation and recreation were the DES domains with the highest effect size in the present study.

The competition to enter in a public dental school is significantly higher in comparison to the selection process in private dental schools. The literature has consistently shown that higher levels of competition may increase the levels of stress<sup>24,25</sup>, which partially explain the results of the present study. Moreover, both public dental schools involved in the present study are financed by the Federal government, which has now been dealing with a major internal crisis.

Despite of the higher overall DES scores found in students from public schools, students from private schools presented a significantly higher scores in four questions of the interpersonal relationships domain. These questions are related to attitudes of school towards women and homosexual dental students, relationship with the opposite sex, and discrimination due to race or class status. This is in agreement with a previous study, which has demonstrated that students in the fourth year from private institution presented the highest total mean score for personal issues compared to

those from public universities, showing that the personal issue domain may constitute a significant source of stress in private schools<sup>22</sup>.

Dental students are frequently exposed to several stressors, which range from taking tests to enter dental universities, dealing with clinical training, and finally to understand the complex patient-dentist relationship. All these situations can lead to great fatigue, poor health, and development of serious adverse habits such as tobacco smoking, drinking, use and abuse of illicit drugs<sup>26</sup>. Therefore, strategies as meditation; regular practice of physical exercise and sports; acquire a more balanced diet; optimism; sharing feelings and experiences with close people including teachers and classmates have been encouraged<sup>26</sup>. Furthermore, the following measures may be helpful: raising awareness and encouraging dental students to seek out the existent psychological support services.

The total score in the PGWB index was significantly lower in the public dental school students. Additionally, this group showed lower scores in the following domains: anxiety, positive well-being, and vitality. The literature demonstrates that students with a better living situation report a superior general well-being<sup>4</sup>. Additionally, dental students who have claimed to exercise regularly present a higher well-being than their counterparts<sup>3</sup>. These characteristics were not assessed in the present study, and further studies are necessary to establish these conditions.

Regarding health status, assessed by the SF-36, the literature shows that female students and those in the later years of study express more problems<sup>34</sup>. In the present study, the following domains were significantly lower in students from public schools: vitality and social functioning. The age difference among the sample should be put into perspective when interpreting these results.

One of the most remarkable findings of the present study is the significant negative correlation with stressors and several PGWB and SF-36 domains. Previous studies showed similar results in dental students from different nationalities<sup>34</sup>. Therefore, it is reasonable to state that high dental students' workload can impair their general health and well-being.

The cross-sectional design, which does not allow temporality, may be the main weakness of the present study. Additionally, a higher external validity of this study may not be expected, as only e-mail and social media were used to recruit the participants. However, a posteriori power calculation showed an estimation of approximately 80%, demonstrating that an appropriate number of dental students were involved in this study.

This is the first study to correlate stressors with psychological well-being and general health in dental students from both public and private school. Furthermore, the use of validated instruments to Portuguese language and the high study power detected are the main strengths of the present study. Within the limits of the present study design, no potential solution may be directly proposed in order to solve the stressors differences and their impact in the overall health and psychological well-being of dental students. Those findings must be used in strategies implementations that may help dental students during their academic careers, especially in improving their coping skills. Additionally, the curriculum planning must consider that stressors may

be triggered by both academic and non-academic sources. However, it should be put into perspective that eliminating all stressors is almost impossible.

It was concluded that dental students from public and private dental schools presented different stressors pattern. Higher stressors were detected in dental students from public schools. Additionally, most of dental environment sources of stress domains were significantly associated with well-being and general health for both public and private schools.

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## LIST OF ALL CAPTIONS

Universidade de Fortaleza: UNIFOR

Faculdade Católica Rainha do Sertão: FCRS

Dental Environment Stress: DES

Psychological General Well-Being: PGWB

Medical Outcomes Study 36-Item Short-Form Health Survey: SF-36