
Perception of Educational Environment Among Undergraduate Students in a Chiropractic Training Institution

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Purpose: The impact of the educational environment in student learning is well documented. However, there is a scarcity in the literature exploring the educational environment in chiropractic training institutions. This study aimed to identify the perceived educational environment in a chiropractic training institution and the possible perceptual differences among different demographic groups. **Methods:** The perceived educational environment was surveyed using Dundee Ready Education Environment (DREEM), which is a validated, self-administered, and Likert-type inventory. DREEM items focus on subdomains related to learning, teachers, self-confidence, academic atmosphere, and social environment. The results were analyzed and interpreted in relation to standard norms of DREEM and demographic variables. **Results:** The survey was completed by 124 chiropractic undergraduate students (response rate 83%). Statistically, the inventory items showed high correlation and the subdomains showed a close relationship. Overall the DREEM score was very high: 156.1/200 (78%). The subdomain scores were also at very high levels. However, the scoring of four items by students was consistently poor: lack of a support system for stressed students, 1.8 (SD 1.1); authoritarian teachers, 1.8 (SD 1.2); inadequate school time-tabling, 2.0 (SD 1.1); and overemphasis on factual learning, 2.0 (SD 1.0). There were no statistically significant differences in DREEM scores between gender, age, minority, and ethnicity groups. **Conclusions:** In general, students perceived that a sound educational environment is fostered by the institution and its educational program for all students despite their demographic variations. However, certain specific elements of the educational process may need to be addressed to improve the educational experience. (J Chiropr Educ 2011;25(2):151–163)

Key Indexing Terms: Chiropractic; Education; Educational Measurement

INTRODUCTION

Educational environment, synonymous with climate, atmosphere, or ambiance, is multifaceted and can be described as an educational institution's personality, spirit, and culture.¹ It also postulates what it is like to be a learner within a given organization¹ and influences student behavior and the prediction of students' accomplishment, contentment, and success.^{2, 3} Educational environment studies have shown that there is a high price to be paid for dysfunctional

and malfunctioning learning environments,^{4–10} because the educational environment is an indispensable part of the curriculum, affecting the interaction between student, methods, assessment, and educational outcomes.¹¹ Therefore, evaluating the educational environment, especially in periods of curriculum change, is encouraged.^{12, 13} Assessing this environment, however, can be extremely intricate, because it encompasses a multitude of diverse factors.¹⁴ Bassaw et al. have pointed out that the educational environment as perceived by students is one of the most central components influencing the accomplishment of a successful curriculum.¹⁵

To our knowledge, only two studies have endeavored to identify the perceived student perception of the educational environment in chiropractic educa-

tional institutions. In one study,¹⁶ students' experience with the educational environment was measured and the findings were used as the basis of introducing remedial measures for weaker areas. In a second study,¹⁷ the discord between students' experience with the educational environment and how they would have wanted or preferred it to be was studied. Thus, there is a scarcity in the literature regarding the analysis of students' perceptions of the educational environment among chiropractic institutions, especially in a European context.

Several research groups have attempted to identify and quantify the presence and impact of somewhat ethereal features of an educational environment using a variety of methodologies: qualitative,¹⁸ quantitative,^{19–21} and mixed method.^{22, 23} The Dundee Ready Education Environment (DREEM) inventory is a robust instrument, quantitatively measuring students' perception of the educational environment in relation to different domains, and has proven to have high content and construct validity.^{24, 25} It has shown consistently high reliability in a diversity of surroundings.^{15, 16, 24, 26–31} Thus, the instrument is useful, versatile, and "culture free" and has been used in a range of settings. It has proven to be a useful diagnostic tool to measure the quality of the educational environment as perceived by students.

This study analyzed the strengths and weaknesses of the educational environment as perceived by undergraduate students and investigated problems that were specific to the different demographic groups, such as gender, age, year of study, minority belonging, ethnicity, and intention to leave the field.

METHODS

The Scandinavian College of Chiropractic offers a 5-year full-time undergraduate program in chiropractic medicine and is located in a suburb of Sweden.

Instrument

The DREEM instrument has been translated and validated to be used in Sweden.¹³ The DREEM is a 50-item, self-administered, Likert-type inventory, consisting of five domains:

- Students' perceptions of learning (SPL): 12 items/maximum score 48;
- Students' perceptions of teaching (SPT): 11 items/maximum score 44;

- Students' academic self-perceptions (SASP): 8 items/maximum score 32;
- Students' perceptions of atmosphere (SPA): 12 items/maximum score 48; and
- Students' social self-perceptions (SSSP): 7 items/maximum score 28.

Each item is scored 4–0 with 4 = strongly agree, 3 = agree, 2 = unsure, 1 = disagree, and 0 = strongly disagree by the respondents on a five-point Likert scale. The instrument has an overall score of 200, signifying the ideal educational environment as perceived by students. A score of 0 is lowest and a very perturbing result. The domain scores can be interpreted against standard guidelines and, in addition, individual item scores can also be examined to identify specific strengths and weaknesses.³²

Population and Sampling

A convenience sample of 150 undergraduate students from five cohorts (year of class) was invited to participate in the study. The study was launched in the first 5 weeks of spring 2009. A member of staff not related to the study administered the questionnaire after class to students. Students not present at the time of data collection were invited through e-mail. The participation was voluntary and the questionnaire was anonymous. Ethics approval was granted by the Research Ethical Board of the Chiropractic Association of Sweden and the Scandinavian College of Chiropractic Scientific Council (Board of Ethical Approval) in accordance with the Declaration of Helsinki.

Data Analysis

The completed surveys were scored manually because several items of the instrument needed reverse scoring (items 4, 8, 9, 17, 25, 35, 39, 48, and 50). The data were subsequently exported to SPSS (SPSS Inc, Chicago, IL) for inferential statistical analysis. As data for each variable showed normal distribution (D'Agostino and Pearson omnibus normality test), parametric statistics were used.

A comparison of mean values of scores among female and male students was completed using the Student *t* test for two independent samples, and the comparison of scores between the five cohorts (years of study) was done using one-way analysis of variance (ANOVA), followed by the Tukey test of multiple comparisons. Cronbach alpha coefficients were used to

assess internal consistency and Pearson *r* correlation coefficients calculated between DREEM domain scores were used to gauge correlations (reflections of associations). The criterion variables were the perception of the educational climate as measured by scores on the five domains of the DREEM. The primary predictor variable was year of class and secondary predictor variables were gender, age, ethnicity, minority, earlier studies in higher education, and intent to leave the field. Probability values less than .05 (5%) were considered statistically significant.

RESULTS

Response Rate and Sample Characteristics

One hundred twenty-four students completed the inventory (124/150, 83%). No questionnaire was rejected because of incompleteness. There were 87 male (70%) and 37 female respondents (30%). The mean age of the sample was 26.7 (SD 5.5, range 19–46). Twenty-eight participants out of 124 (23%), 20 men and 8 women, had a non-Scandinavian ethnic background (ie, at least one parent is an immigrant). Sixteen participants (13%), 14 men and 2 women, out of the 124, perceived themselves as belonging to a minority group.

Reliability of Instrument

The analysis of internal consistency of DREEM items was conducted using the overall and domain scores. A minimum coefficient alpha of 0.70 was used to indicate an adequate level of internal consistency for the domain scores.³³ Each of the 50 items on the DREEM was correlated with the overall score for the scale and alpha values were computed with each item removed. The overall reliability coefficient alpha was 0.912 and domain scores surpassed the 0.70 threshold, except for SASP.

Overall and Domain Scores

The overall mean score was 156.1 out of 200 (78%). As shown in Table 1, the total highest mean score for an individual item was 3.7 (items 16 and 33) and 11 items were scored with < 3.0 (items 3, 4, 9, 12, 13, 24, 25, 27, 29, 32, and 48). The highest overall mean score was 167.5 (SD 16.1) (84%) in year 1 and the lowest overall mean score was 150.8 (SD 16.8) in year 4. SPA and SSSP generated the highest individ-

ual domain scores (79% of the maximum score); conversely SPL and SPT produced the lowest individual domain scores (77% of the maximum score). Pearson correlation coefficients between the five domains were strong and indicated a relationship significant at a .01 level (two-tailed). The overall and domain scores for each cohort are presented in Table 2.

Students' Perceptions of Learning

The mean domain score was 37/48 (SD 5.4) and can be analyzed as suggested by McAleer and Roff³² (Table 3). There were no statistically significant differences between different demographic groups.

Students' Perceptions of Teachers

The grouped mean SPT score was 33.9/44 (SD 4.9; Table 3). However, 1st-year students perceived the environment significantly more positively (*p* .004) compared with their seniors. When multiple comparisons were used to see where the significant differences were between groups at a time, they revealed that year 1 significantly differed from the other cohorts (Fig. 1): year 2 (*p* = .001), year 3 (*p* = .004), year 4 (*p* = .000), and year 5 (*p* = .004).

Students' Academic Self-Perceptions

The pooled mean domain score was 25.3/32 (SD 3.21; Table 3). This was undisputed as there were no statistically significant differences between different demographic groups.

Students' Perceptions of Atmosphere

The grouped mean score was 37.9/48 (SD 5.5; Table 3). There were statistically significant differences between SPA and the diverse demographic groups (*p* .037). The use of multiple comparisons to distinguish where the significant differences were between groups at a time disclosed that 1st-year students significantly differed from the other cohorts (Fig. 2): year 2 (*p* = .017), year 3 (*p* = .003), year 4 (*p* = .009), and year 5 (*p* = .041).

Students' Social Self-Perceptions

The grouped mean SSSP score was 22.1/28 (SD 3.9; Table 3). This was unambiguous as there were no statistically significant differences between dissimilar demographic groups.

Table 1. Total minimum and maximum values, mean, and standard deviations (SD) for individual DREEM items

Question Items	Min–Max	Mean (SD)
1. I am encouraged to participate.	0–4	3.3 (0.9)
2. The teachers are knowledgeable.	2–4	3.5 (0.5)
3. There is a good support system for students who get stressed.	0–4	1.8 (1.1)
4. I am too tired to enjoy this course.	0–4	2.9 (1.2)
5. Learning strategies which worked for me before continue to work for me now.	0–4	3.0 (1.0)
6. The teachers are patient with the patients.	1–4	3.2 (0.8)
7. The teaching is often stimulating.	0–4	3.4 (0.7)
8. The teachers ridicule the students.	1–4	3.4 (0.9)
9. The teachers are authoritarian.	0–4	1.8 (1.2)
10. I am confident about my passing this year.	0–4	3.4 (0.9)
11. The atmosphere is relaxed during the clinical teaching.	0–4	3.2 (0.9)
12. This school is well time-tabled.	0–4	2.0 (1.1)
13. The teaching is student centered.	0–4	2.9 (1.0)
14. I am rarely bored on this course.	1–4	3.2 (0.7)
15. I have good friends in this school.	0–4	3.6 (0.8)
16. The teaching helps to develop my competence.	1–4	3.7 (0.6)
17. Cheating is a problem in this school.	0–4	3.2 (1.1)
18. The teachers have good communication skills with patients.	2–4	3.3 (0.8)
19. My social life is good.	1–4	3.6 (0.6)
20. The teaching is well focused.	1–4	3.2 (0.6)
21. I feel I am being well prepared for my profession.	1–4	3.3 (0.7)
22. The teaching helps to develop my confidence.	0–4	3.3 (0.7)
23. The atmosphere is relaxed during lectures.	1–4	3.5 (0.7)
24. The teaching time is put to good use.	0–4	2.9 (1.0)
25. The teaching overemphasizes factual learning.	0–4	2.0 (1.0)
26. Last year work has been a good preparation for this year's work.	1–4	3.2 (0.7)
27. I am able to memorize all I need.	0–4	2.7 (0.9)
28. I seldom feel lonely.	0–4	3.4 (0.9)
29. The teachers are good at providing feedback to students.	0–4	2.9 (0.9)
30. There are opportunities for me to develop interpersonal skills.	1–4	3.1 (0.9)
31. I have learned a lot about empathy in my profession.	0–4	3.0 (1.0)
32. The teachers provide constructive criticism here.	0–4	2.8 (1.0)
33. I feel comfortable in class socially.	0–4	3.7 (0.7)
34. The atmosphere is relaxed during seminars/tutorials.	1–4	3.5 (0.7)
35. I find the experience disappointing.	0–4	3.3 (1.0)
36. I am able to concentrate well.	0–4	3.0 (0.8)
37. The teachers give clear examples.	1–4	3.2 (0.7)
38. I am clear about the learning objectives of the course.	0–4	3.3 (0.9)
39. The teachers get angry in class.	1–4	3.6 (0.6)
40. The teachers are well prepared for their classes.	0–4	3.1 (0.8)
41. My problem-solving skills are being well developed here.	1–4	3.2 (0.6)
42. The enjoyment outweighs the stress of studying chiropractic.	1–4	3.1 (0.8)
43. The atmosphere motivates me as a learner.	0–4	3.0 (1.0)
44. The teaching encourages me to be an active learner.	1–4	3.2 (0.7)
45. Much of what I have to learn seems relevant to a career in chiropractic.	1–4	3.5 (0.7)
46. My accommodation is pleasant.	1–4	3.6 (0.7)
47. Long-term learning is emphasized over short-term learning.	0–4	3.2 (0.9)
48. The teaching is too teacher centered.	0–4	2.7 (0.9)
49. I feel able to ask the questions I want.	0–4	3.3 (1.0)
50. The students irritate the teachers.	1–4	3.0 (1.0)

Table 2. DREEM domains and overall scores for each of the cohorts

Year of Class (% response)	Number of Students (n = 124)	SPL Mean (SD) Score/48 (% max score)	SPT Mean (SD) Score/44 (% max score)	SASP Mean (SD) Score/32 (% max score)	SPA Mean (SD) Score/48 (% max score)	SSSP Mean (SD) Score/28 (% max Score)	Overall Mean (SD) Score/200 (% max score)	DREEM Percentage for Each Class
1 (73)	19	39.7 (4.9)	37.7 (4.1)	25.9 (3.6)	41.4 (4.3)	22.8 (3.9)	167.5 (16.1)	84%
2 (71)	24	36.9 (5.9)	32.9 (5.4)	24.9 (3.5)	37.3 (6.6)	22.3 (3.0)	154.3 (19.9)	77%
3 (88)	29	37.3 (6.0)	33.7 (5.4)	24.8 (3.6)	36.6 (6.1)	22.4 (4.3)	154.8 (21.7)	77%
4 (85)	28	35.3 (4.1)	32.6 (3.9)	24.5 (2.5)	37.1 (5.3)	21.3 (4.0)	150.8 (16.8)	75%
5 (100)	24	36.7 (5.6)	33.6 (3.8)	26.2 (2.4)	37.9 (3.9)	22.0 (4.2)	156.5 (14.8)	78%
Mean overall		37.0 (77%)	33.9 (77%)	25.2 (78%)	37.8 (79%)	22.1 (79%)	156.1 (78%)	
Lower 95% CL		36.1 (75%)	33.0 (75%)	24.6 (78%)	36.8 (77%)	21.4 (75%)	152.8 (77%)	
Upper 95% CL		38.0 (79%)	34.8 (80%)	25.8 (82%)	38.8 (81%)	22.8 (82%)	159.4 (80%)	

Table 3. Guide to facilitate analysis of results and interpretations of DREEM domain scores as suggested by McAleer and Roff³²

Domain	Score	Interpretation
SPL	0–12	Very poor
	13–24	Teaching is viewed negatively
	25–36	A more positive approach
	37–48	Teaching highly thought of
SPT	0–11	Abysmal
	12–22	In need of some retraining
	23–33	Moving in the right direction
	34–44	Model teachers
SASP	0–8	Feeling of total failure
	9–16	Many negative aspects
	17–24	Feeling more on the positive side
	25–32	Confident
SPA	0–12	A terrible environment
	13–24	There are many issues that need changing
	25–36	A more positive atmosphere
	37–48	A good feeling overall
SSSP	0–7	Miserable
	8–14	Not a nice place
	15–21	Not too bad
	22–28	Very good socially

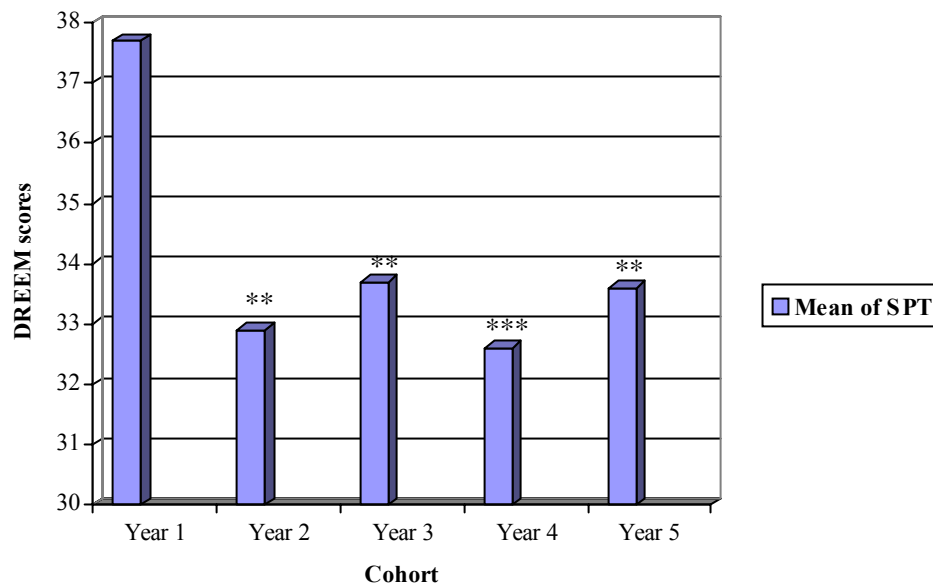


Figure 1. Students' perceptions of teachers (SPT). Year 1 was statistically different from all other years. ** $p < .01$, *** $p < .001$.

Gender

The total mean score was 156.6 (SD 16.7) for males and 155.9 (SD 23.5) for females. When men and women were compared in the five domains using ANOVA statistics en masse, no significant differences were detected. Hence, in four out of the five domains men scored higher. When individual items were analyzed, male students scored higher for 26 items and female students scored higher for 24 items. When items were analyzed individually, three items showed statistically significant mean differences amid genders (Table 4).

Age

Dichotomizing the participants as 26 or under (younger students, $n = 73$) and 27 or above (older students, $n = 51$), using an arbitrary cutoff point close to the total mean, revealed no statistical significant differences. The total mean score was 157.2 (SD 19.5) for students who were 26 years of age or under and 155.6 (SD 18.5) for students who were over 27 years of age. When items were analyzed individually, four items showed statistically significant mean differences amid the two cohorts (Table 4). Correlational analysis

showed no significant relationships between age and the five domains.

Minority

The mean score was 150.3 (SD 23.4) for the minority group and 157.3 (SD 18.2) for the nonminority group. There were no statistically significant differences in the total score or in any of the five domains. When individual items were scrutinized, four question items among those who perceived themselves as belonging to a minority group displayed statistically significant lower mean scores (Table 4).

Ethnicity

The mean score was 152.4 (SD 25.1) for students with an immigrant background and 157.3 (SD 16.6) for students without an immigrant background. There were no statistically significant differences in any of the five domains or the total score. When individual items were analyzed, six question items among those who had an immigrant background displayed statistically significant lower mean scores compared with those without an immigrant background (Table 4).

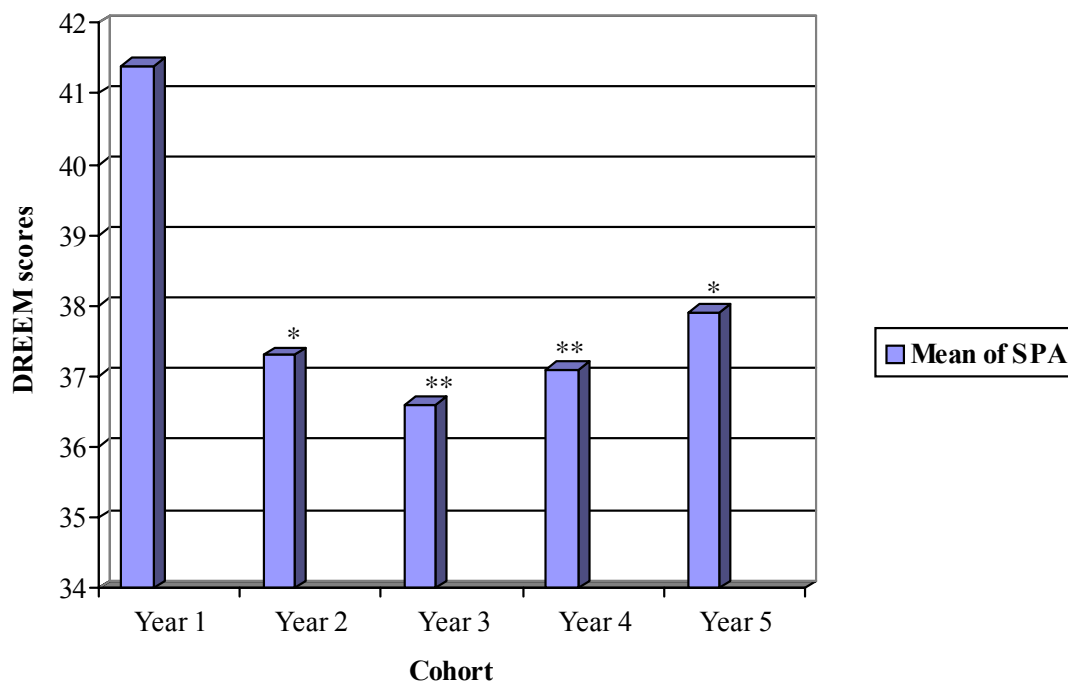


Figure 2. Students' perception of atmosphere (SPA). Significant differences between 1st-year students and all other cohorts were noted. * $p < .05$; ** $p < .01$.

Higher Education

Thirty-four participants (27%), 23 men and 11 women, had previously been studying in other higher educational institutions. The mean score was 154.7 (SD 19.0) for those students who had formerly studied at a higher education institution and 157.0 (SD 19.1) for those who had not. There were no statistical significant differences in the total score or any of the five domains. When individual items were analyzed, two items differed significantly statistically (Table 4).

Intention to Leave the Field

Concerning the intention to leave the field, no analysis was possible because all 124 participants responded that their intention was to work as a chiropractor after graduation.

DISCUSSION

General Considerations

A relatively higher response rate (83%) may be a reflection of students' interest in completing the

survey. Overall reliability values generated in this study (0.91) were much higher than thresholds generally considered acceptable for scales (0.70) and also similar to published studies,^{13, 25, 26, 29, 34, 35} which indicates that the DREEM instrument can reliably be used in a context of chiropractic education. Two items (42 and 45) of the original scale were slightly modified from the original version of the DREEM to better translate and correspond with chiropractic education, which seemed to have no effect on its validity and reliability. The development of the DREEM instrument has been based on grounded theory and Delphi technique of consensus and is tenaciously shaped as a generic instrument with no culturally specificity to a given region.²⁷

The results of this study showed the highest overall DREEM score that is reported in the published literature, which in turn means the existence of an excellent educational climate.^{24, 32} The only published results close to the result of the current study are from the United Kingdom: 69.5%,³⁶ 70.4%,³⁷ and 71.5%.³⁸

To better delineate the strengths and weaknesses, the domains and analogous items of DREEM

Table 4. Individual statistically significant items of DREEM inventory and outcome variables of gender, age, minority, ethnicity, and higher education

Item	Gender			Age		Minority		Ethnicity			Higher Education	
	Male (n = 87)	Female (n = 37)	p Value	≤ 26 (n = 73)	≥ 27 (n = 51)	Yes (n = 16)	No (n = 108)	Yes (n = 28)	No (n = 96)	p Value	Yes (n = 34)	No (n = 90)
2	3.5 ± 0.1	3.5 ± 0.1	0.834	3.6 ± 0.1	3.5 ± 0.1	3.2 ± 0.1	3.6 ± 0.1	3.1 ± 0.2	3.4 ± 0.1	0.016*	3.3 ± 0.1	3.4 ± 0.1
8	3.4 ± 0.1	3.3 ± 0.2	0.764	3.3 ± 0.1	3.6 ± 0.1	2.9 ± 0.2	3.5 ± 0.1	3.4 ± 0.1	3.2 ± 0.1	0.404	3.0 ± 0.2	3.3 ± 0.1
9	1.9 ± 0.1	1.9 ± 0.2	0.971	1.6 ± 0.1	2.1 ± 0.2	1.6 ± 0.3	1.8 ± 0.1	2.0 ± 0.2	2.0 ± 0.1	0.751	1.5 ± 0.2	2.1 ± 0.1
20	3.2 ± 0.1	3.2 ± 0.1	0.988	3.3 ± 0.1	3.1 ± 0.1	3.3 ± 0.2	3.2 ± 0.1	2.9 ± 0.2	3.2 ± 0.1	0.015*	3.2 ± 0.1	3.1 ± 0.1
42	3.0 ± 0.1	3.4 ± 0.1	0.041*	3.2 ± 0.1	3.0 ± 0.1	3.3 ± 0.2	3.1 ± 0.1	2.9 ± 0.2	3.4 ± 0.1	0.048*	3.2 ± 0.2	3.3 ± 0.1
43	3.0 ± 0.1	3.1 ± 0.2	0.629	3.2 ± 0.1	2.8 ± 0.1	2.8 ± 0.2	3.0 ± 0.1	3.3 ± 0.2	3.5 ± 0.1	0.046*	3.4 ± 0.1	3.5 ± 0.1
45	3.5 ± 0.1	3.4 ± 0.1	0.315	3.5 ± 0.2	3.4 ± 0.1	3.1 ± 0.2	3.5 ± 0.1	2.8 ± 0.2	3.2 ± 0.1	0.019*	3.1 ± 0.1	3.1 ± 0.1
46	3.5 ± 0.1	3.9 ± 0.1	0.008**	3.7 ± 0.1	3.5 ± 0.1	3.3 ± 0.2	3.7 ± 0.1	3.4 ± 0.2	3.7 ± 0.1	0.022*	3.7 ± 0.1	3.6 ± 0.1
49	3.5 ± 0.1	2.9 ± 0.2	0.002**	3.3 ± 0.1	3.2 ± 0.1	3.2 ± 0.2	3.3 ± 0.1					

Data are presented as mean, standard deviation (SD), and significance level. Statistically significant differences are highlighted with bold.

* $p < .05$, ** $p < .01$.

instrument were comparatively interpreted. Based on standard interpretation,³² the results indicate that teaching was highly thought of (77%), the students perceived the educational institution as having model teachers (77%), students were confident regarding their academic success (79%), and students felt the overall atmosphere to be very positive (79%). Their social self-perceptions were not too bad (79%).

Apart from the existence of a good educational environment, the overall high score may also be attributed to several reasons: small private institutions may score predominantly well, chiropractic students differ from other students, or it is a “new school” phenomenon as proposed by McKendree.³⁷

When looking at the domain scores, students’ perception of learning and students’ perception of teachers scored the lowest in this study. Interestingly, these items have been rated low in many other studies.^{16, 27, 36, 39, 40} Hence, they can be generically weak areas of educational environment.

Specific Implications

In the sample of the present study, the score from all the five domains of DREEM pointed to more affirmative perceptions by all five cohorts. However, four questions consistently received poor scores, indicating cause for concern. These questions dealt with a support system for students who get stressed, authoritarian teachers, school time-tabling, and an overemphasis on factual learning. Similar concerns and findings have been raised and identified by Dunne et al.³⁹

The support mechanism for students was reported in the survey to be inadequate and students participating in the study shared the perception that there was not a good support system for those who get stressed. This view has been supported by other researchers as well.^{13, 31, 40} Health care students are exposed to a diversity of pressures, many of which may cause stress.^{41, 42} Guthrie et al.⁴³ reported that, even in the early years of health care education, up to 50% of students’ stress is related to aspects of the course work. Bassaw et al.¹⁵ have argued that students must be supported all the way through the educational path, from entering school to qualifying and beyond. An educational institution requires a student-friendly atmosphere where high criterion academic support is effortlessly accessible. It has been further shown that innovative health care educational institutions have a better support system for stressed students than traditional institutions.³⁶ Creating a more accessible

support system may help in diminishing the number of students who fail courses and the attrition rate.

Similar to many other cohorts of students,^{16, 31, 39, 40, 44} the overall perception of the cohorts in this study was that teachers were too authoritarian. This may be a manifestation of the “older type” of senior teacher who teaches by experience rather than by direction and may indicate that some teachers are still using conventional methods. This could also simply reflect young adults being disaffected with any authority figure. Conversely, this could actually be an accurate assessment of the students’ environment.

Another area of concern was time-tabling. The time-tabling of the institution was considered as insufficient, with very low mean scores. This tendency was detected all over the sample. Addressing this matter may do a lot to assuage the distress expressed by the students. A report by the Irish Medical Council highlighted that improved administration is central for qualitative education.⁴⁵ Interestingly, it was further observed that clinical students perceived the time-tabling issue more negatively than preclinical students, indicating that students during their clinical phase of the training perceive a more deprived scheduling and course coordination. Indeed, clinical students are subjected to demanding situations at various phases of clinical training, particularly to travel between the teaching institutions and teaching hospitals. Under such circumstances, establishing a realistic time schedule is essential. Similar findings have been detected by several other research groups^{16, 30, 31, 39, 46} and they think that the issue is attributable to poor coordination, underresourcing, and complicated scheduling.

Students were also stressed by memorization of too many facts. The chiropractic program might be focusing on the retention of too many facts rather than the attainment of practical skills. Addressing this issue may help to alleviate the anxiety expressed by the students. This issue has also been supported by others. Jiffry et al. found that the learners were overburdened with learning activities and that this should be addressed during curricular reforms.^{30, 39} Students’ perception of accentuated factual learning can also be conferred in the context of assessment methods used, since it is well recognized that assessment has the propensity to drive learning.⁴⁷ Davis⁴⁸ has pointed out that to improve understanding and preserve what has been learned, teaching has to move away from rote memorization and passive learning and promote active and deeper approaches of learning and endorse

engagement of students. Till¹⁷ has pointed out that it is unfortunately rather common that students in health care educational programs complain of time-tabling, stress, and tiredness, which prohibits them from enjoying a program to the extent that they would like. She postulates that this is probably due to the quantity of information that has to be covered during undergraduate studies.

The DREEM scores of this study did not show any significant gender differences between groups, which is consistent with some of the other DREEM studies.^{15, 16, 29, 38, 40, 44} However, with individual items, there were statistical differences between female and male students for three items. Women perceived the items “the enjoyment outweighs the stress of studying chiropractic” and “my accommodation is pleasant” with higher negativity than males. On the contrary, men felt they were more able to ask the questions they wanted than females. Similar item-related gender differences were found by other research groups.^{40,44} However, it is difficult to execute a comparative analysis because this issue is highly dependent on local context, cultural differences, and unrecognized confounding factors.

When the present sample was dichotomized as younger and older students using an arbitrary cutoff value, it revealed no statistical significant differences. No studies that compare the perception of the educational environment concerning younger or older students have been identified in the research literature. Interestingly, when items were analyzed individually, some items showed statistically significant differences between the groups in the study. Older students perceived that the teachers have been ridiculing students and perceived the teachers’ authoritativeness with significant negativity. This may indicate that older students have matured, are more independent, and have developed a more self-directed approach to learning and they look at teachers with a different view when compared to younger students. However, younger students perceived that the teaching should be better focused, but the learning atmosphere motivates them as learners compared with their older peers. Wilkinson et al.⁴⁹ have commented that graduates and more mature students convey distinct qualities to a program or course and many of these qualities relate to a student’s age and not to a prior degree.

Ethnic background was defined in the survey as having at least one parent with an ethnic background other than Swedish and minority belonging was

exemplified in the survey by religion, disability, sexuality, political affiliation, feminism, social class, and ethnicity. Nearly one-quarter of the sample in the study reported having a non-Swedish ethnic background. The cohorts in the study did not display any statistically significant differences. This is in contrast to the study by Avalos et al.,⁴⁵ who reported statistical significant differences between Irish and non-Irish students in perceptions of atmosphere and social self-perception. However, in the present study, when individual items were analyzed, some students with other ethnic backgrounds indicated that the teaching was not stimulating but boring, cheating was a problem, the atmosphere during lectures was not relaxed, there was a lack of opportunities to develop interpersonal skills, and the environment was socially uncomfortable. Seabrook has pointed out that it is imperative for institutions to provide suitable, early, and continuous diversity training and to identify role models to match the student profile.¹⁸ Lempp and Seale⁵⁰ stated that hasty changes in the cultural composition and gender ratio of health care students may have important implications for health care education. Indeed, the task to identify any cross-cultural discrepancies within an educational institution is imperative and ought to be framed in terms of zero tolerance.

Students’ belonging to a minority group was not statistically different for total or domain scores. However, four items were rated low by the students belonging to minority groups: the teachers are knowledgeable; the teachers ridicule the students; much of what I have to learn seems relevant to a career in chiropractic; and my accommodation is pleasant. Even though there was no significant disparity between the cohorts, it is important to understand that hearing directly from minority students could help educational institutions to enhance the educational climate specific to this cohort. It is imperative to provide a stipulation of an open, oppression-free, and diverse environment in the micro-society of any educational institution.

It is of course difficult to assess why these two cohorts displayed significantly lower scores for some individual items. But it is imperative that we are aware of this difference and reflect on it. Americano and Bhugra⁵¹ have pointed out that an understanding of diversity is essential in the teaching and practice of health care as well as for personal and professional growth.

Students who had previously been studying in other higher educational institutions perceived the atmosphere to be less relaxed during the clinical

teaching and were also less pleased with the time-tabling compared with students who had no prior experience of other higher educational institutions. However, as mentioned earlier, it is possible that this reflects virtues related to students' age and maturity rather than earlier training experiences.⁴⁹

Students, as the "consumers" of chiropractic education, are valuable assets in providing feedback for curriculum revision and improvement of the learning environment. Unfortunately, the student voice largely remains an untapped resource, as future directions often emanate from other stakeholders. Few studies have addressed the educational climate of chiropractic education from the students' perspective. Till¹⁶ measured how students were experiencing the educational environment in a chiropractic training institution to guide institutional remediation during a reform of curriculum. She found a much lower total score (48%) than the present study, indicating a poor educational environment. The domain scores in her study for learning (SPL) and students' academic self-perception (SASP) were the lowest. In concordance with the present study, Till also found a general decrease in scores from year 1, even though the overall mean score increased again among 5th-year students in the current study. In her second study, Till¹⁷ measured the discord between how students were actually experiencing the educational environment and how they would have wanted or preferred it to be. There she discovered a strong relationship between the two areas and the students who saw educational environment problems were the students who had higher expectations or preferences. She detected a large dissonance between ideal and actual responses to an inadequate support system for students who get stressed, teaching, and school time-tabling. Her findings, which are specific to chiropractic training, strengthen the findings in the present study.

Based on the results of the study, there are a number of recommendations for future research. Roff⁵² has pointed out a number of other uses of DREEM: comparing different educational environments, exploring factors affecting student performance, and predicting student performance. A well recognized fact is that learning environment has a substantial effect on how students learn and their academic success.^{16, 52} Therefore, a good future study would be to explore the correlation between students' perception of the learning climate and the academic success of students who participated in the study. However, more work needs to be done to establish whether or

not the outcome instruments can be consistently used to distinguish varied types of academic achievers. It could also be appealing to use qualitative studies to help elucidate students' perceptions of the educational environment and deepen the understanding of this phenomenon. Whittle et al.²² have acknowledged the notion of combining quantitative and qualitative methods to investigate students' perceptions of the educational environment for a better outcome.

Although the intent of the study was to examine perceptions of the educational environment in a chiropractic training environment as an entirety, the research instrument employed has some limitations. The use of a questionnaire to assess the perception of learning environment can be complex because there is the risk of leaving out some elements of an explicit context.¹⁸ DREEM creates an instantaneous portrait of student perception of their educational study climate, but cannot give specific data about the concerns underlying poor scores. Using qualitative methods could have been useful to recognize areas not captured within the quantitative instrument that necessitate remediation.

From a statistical point of view, utilizing means and parametric statistical testing on ordinal data from Likert scales in questionnaires as used in this study⁵³ may not be acceptable to some. However, according to Carifio and Perla,⁵⁴ the debate on Likert scales and how they should be analyzed evidently and strongly goes to the intervalist position if analyzing more than one single Likert item. It is, therefore, entirely suitable to summarize the scores produced from Likert scales using means and standard deviations, and it is entirely suitable to use parametric techniques.

In the present study probability values less than 5% were used to signify statistical significance. However, one could argue to use a significance level at 0% instead, but then there is an increased chance of picking up a false negative; likewise, a significant level of 1% is very sensitive, but not specific, because significant differences could be missed. However, the findings in this study were statistically significant and the importance of this has been discussed, but of course further studies must be conducted to further validate these results.

Investigating students' perception of the educational environment is a delicate matter. Student perceptions may be excellent even with a terrible program, as a result of extraneous factors such as institutional marketing, relative student ignorance as to what constitutes educational quality, and even campus morale.

Finally, given the nature of the study, there is a risk of the students not being honest to protect themselves and their peers and to avoid speaking against their teachers. More information may have been revealed with the use of focus groups or independent one-to-one interviews.

CONCLUSION

This study illuminated some prominent findings regarding how undergraduate students in a Swedish chiropractic institution perceive the educational environment. The DREEM score, which is the highest score reported in the published literature, is indicative of an excellent educational environment at the institution studied. Students perceived that a sound educational environment is fostered by the institution and its educational program for all students despite demographic variations. However, as indicated in the individual item analysis, there are certain individual aspects of educational environment that need attention.

CONFLICTS OF INTEREST

There were no external sources of funding for this study and no conflicts of interests were identified within this investigation.

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REFERENCES

1. Holt MC, Roff S. Development and validation of the Anaesthetic Theatre Educational Environment Measure (ATEEM). *Med Teach* 2004;26:553–8.
2. Genn JM. AMEE Medical Education Guide No. 23 (Part 2): Curriculum, environment, climate, quality and change in medical education—a unifying perspective. *Med Teach* 2001;23:445–54.
3. Mulrooney A. Development of an instrument to measure the practice vocational training environment in Ireland. *Med Teach* 2005;27:338–42.

4. Jamaiah I. Review of research in learning environment. *J Univ Malaya Med Cent* 2008;11:7–11.
5. Baldwin DC, Daugherty SR, Eckenfels EJ. Student perceptions of mistreatment and harassment during medical school. A survey of ten United States schools. *West J Med* 1991;155:140–5.
6. Cleave-Hogg D, Rothman AI. Discerning views: medical students' perceptions of their learning environment. *Eval Health Prof* 1991;14:456–74.
7. Kassebaum DG, Cutler ER. On the culture of student abuse in medical school. *Acad Med* 1998;73:1149–58.
8. Metcalfe DH, Matharu M. Students' perception of good and bad teaching: report of a critical incident study. *Med Educ* 1995;29:193–7.
9. Hicks B. How can a deanery win the battle against bullying? *BMJ (Clin Res Ed)* 2003;326:129.
10. Quine L. Workplace bullying in junior doctors: questionnaire survey. *BMJ* 2002;13:878–9.
11. Harden RM, Crosby JR, Davis MH. AMEE Guide No. 14. Outcome-based education. Part 1: An introduction to outcome-based education. *Med Teach* 1999;21:7–14.
12. Chandratilake MN, de Silva NR. Identifying poor concordance between the “planned” and the “hidden” curricula at a time of curriculum change in a Sri Lankan medical school using the Dundee Ready Education Environment Measure. *South East Asian J Med Educ* 2009;3:15–19.
13. Edgren G, Haffling AC, Jakobsson U, McAleer S, Danielsen N. Comparing the educational environment (as measured by DREEM) at two different stages of curriculum reform. *Med Teach* 2010;32:233–8.
14. Genn JM. AMEE Medical Education Guide No. 23 (Part 1): Curriculum, environment, climate, quality and change in medical education—a unifying perspective. *Med Teach* 2001;23:337–44.
15. Bassaw B, Roff S, McAleer S, et al. Students' perspectives on the educational environment, Faculty of Medical Sciences, Trinidad. *Med Teach* 2003;25:522–6.
16. Till H. Identifying the perceived weaknesses of a new curriculum by means of the Dundee Ready Education Environment Measure (DREEM) Inventory. *Med Teach* 2004;26:39–45.
17. Till H. Climate studies: can students' perceptions of the ideal educational environment be of use for institutional planning and resource utilization? *Med Teach* 2005;27:332–7.
18. Seabrook MA. Clinical students' initial reports of the educational climate in a single medical school. *Med Educ* 2004;38:659–69.
19. Roff S. Education environment: a bibliography. *Med Teach* 2005;27:353–7.
20. Audin K, Davy J, Barkham M. University quality of life and learning (UNIQoLL): an approach to student well-being, satisfaction and institutional change. *J Further Higher Educ* 2003;27:365–82.
21. Sobral DT. Medical students' self-appraisal of first-year learning outcomes: use of the course valuing inventory. *Med Teach* 2004;26:234–8.
22. Whittle SR, Whelan B, Murdoch-Eaton DG. DREEM and beyond; studies of the educational environment as a means for its enhancement. *Educ Health* 2007;20:7.

23. Denz-Penhey H, Murdoch JC. A comparison between findings from the DREEM questionnaire and that from qualitative interviews. *Med Teach* 2009;31:449–53.
24. Roff S, McAleer S, Harden RM, et al. Development and validation of the Dundee Ready Education Environment Measurement (DREEM). *Med Teach* 1997;19:295–9.
25. de Oliveira Filho GR, Vieira JE, Schonhorst L. Psychometric properties of the Dundee Ready Educational Environment Measure (DREEM) applied to medical residents. *Med Teach* 2005;27:343–7.
26. Pimparyon PS, Roff S, McAleer S, Poonchai B, Pemba S. Educational environment, student approaches to learning and academic achievement in a Thai nursing school. *Med Teach* 2000;22:359–64.
27. Roff S, McAleer S, Ifere OS, Bhattacharya S. A global diagnostic tool for measuring educational environment: comparing Nigeria and Nepal. *Med Teach* 2001;23:378–82.
28. Al-Hazimi A, Al-Hyiani A, Roff S. Perceptions of the educational environment of the medical school in King Abdul Aziz University, Saudi Arabia. *Med Teach* 2004;26:570–3.
29. Mayya S, Roff S. Students' perceptions of educational environment: a comparison of academic achievers and under-achievers at Kasturba Medical College, India. *Educ Health* 2004;17:280–91.
30. Jiffry MT, McAleer S, Fernando S, Marasinghe RB. Using the DREEM questionnaire to gather baseline information on an evolving medical school in Sri Lanka. *Med Teach* 2005;27:348–52.
31. Demirören M, Palaoglu Ö, Kemahli S, Özyurda F, Ayhan IH. Perceptions of students in different phases of medical education of educational environment: Ankara University Faculty of Medicine. *Med Educ* [online] 2008;13:1–5.
32. McAleer S, Roff S. AMEE Education (Dundee). Part 3: A practical guide to using the Dundee Ready Education Environment Measure (DREEM). In: Genn JM (ed). Guide No. 23: Curriculum, environment, climate, quality and change in medical education: a unifying perspective. Dundee, UK: Association of Medical Education in Europe; 2002.
33. Nunnally J. Psychometric theory, 2nd ed. New York: McGraw-Hill; 1978.
34. Riquelme A, Oporto M, Oporto J, et al. Measuring students' perceptions of the educational climate of the new curriculum at the Pontificia Universidad Catolica de Chile: performance of the Spanish translation of the Dundee Ready Education Environment Measure (DREEM). *Educ Health* 2009;22:112.
35. Dimoliatis ID, Vasilaki E, Anastassopoulos P, Ioannidis JP, Roff S. Validation of the Greek translation of the Dundee Ready Education Environment Measure (DREEM). *Educ Health* 2010;23:348.
36. Al-Hazimi A, Zaini R, Al-Hyiani A, et al. Educational environment in traditional and innovative medical schools: a study in four undergraduate medical schools. *Educ Health* 2004;17:192–203.
37. McKendree J. Can we create an equivalent educational experience on a two-campus medical school? *Med Teach* 2009;1–4.
38. Miles S, Leinster SJ. Medical students' perceptions of their educational environment: expected versus actual perceptions. *Med Teach* 2007;41:265–72.
39. Dunne F, McAleer S, Roff S. Assessment of the undergraduate medical education environment in a large UK medical school. *Health Educ J* 2006;65:149–58.
40. Al-Ayed IH, Sheik SA. Assessment of the educational environment at the College of Medicine of King Saud University, Riyadh. *East Mediterr Health J* 2008;14:953–9.
41. Dent JA, Harden MH. A practical guide for medical teachers, 2nd ed. Philadelphia, PA: Elsevier Churchill Livingstone; 2005.
42. Folse ML, DaRosa, DA, Folse R. The relationship between stress and attitudes toward leisure among first-year medical students. *J Med Educ* 1985;60:610–7.
43. Guthrie EA, Black D, Shaw CM, Hamilton J, Creed FH, Tomenson B. Embarking upon a medical career: psychological morbidity in first year medical students. *Med Educ* 1995;29:337–41.
44. Abraham R, Ramnarayan K, Vinod P, Torke S. Students' perceptions of learning environment in an Indian medical school. *BMC Med Educ* 2008;8:20.
45. Avalos G, Freeman C, Dunne F. Determining the quality of the medical educational environment at an Irish medical school using the DREEM inventory. *Ir Med J* 2007;100:522–5.
46. Bouhaimeda M, Thaliba L., Doic SAR. Perception of the educational environment by medical students undergoing a curricular transition in Kuwait. *Med Prin Pract* 2009;18:204–8.
47. McLachlan JC. The relationship between assessment and learning. *Med Educ* 2006;40:716–7.
48. Davis MH. AMEE Medical Education Guide No. 15: problem-based learning: a practical guide. *Med Teach* 1999;21:130–40.
49. Wilkinson TJ, Wells JE, Bushnell JA. Are differences between graduates and undergraduates in a medical course due to age or prior degree? *Med Educ* 2004;38:1141–6.
50. Lempp H, Seale C. The hidden curriculum in undergraduate medical education: qualitative study of medical students' perceptions of teaching. *BMJ (Clin Res Ed)* 2004;329:770–3.
51. Americano A, Bhugra, D. Understanding medical education. In: Swanwick T, ed. Dealing with diversity. Association for the Study of Medical Education, Edinburgh, Scotland, 2008.
52. Roff S. The Dundee Ready Educational Environment Measure (DREEM)—a generic instrument for measuring students' perceptions of undergraduate health professions curricula. *Med Teach* 2005;27:322–5.
53. Jamieson S. Likert scales: how to (ab)use them. *Med Educ* 2004;38:1217–8.
54. Carifio J, Perla R. Resolving the 50-year debate around using and misusing Likert scales. *Med Educ* 2008;42:1150–2.