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Original Article

Evaluation of the Clinical Learning Environment (CLE) Using the Postgraduate Hospital Educational Environment Measure (PHEEM) in Viewpoint of Dental Residents: A Multicenter Study in Iran

Zahra Salari[1], Azadeh Horri[1], Amin Tahmasbi[2], Raziyeh Shojayeepour[1], Fatemeh Jahanimoghadam[3*]

[1]Assistant Professor, Oral and Dental Diseases Research Center, Kerman University of Medical Sciences, Kerman, Iran.
[2]Dentist, Kerman University of Medical Sciences, Kerman, Iran.
[3]Associate Professor, Social Determinants on Oral Health Research Center, Kerman University of Medical Sciences, Kerman, Iran.

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***Corresponding author:**
Social Determinants on Oral Health Research Center, Kerman University of Medical Sciences, Kerman, Iran.
Email: fatemehjahani4@gmail.com

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Abstract

Background: Continuous improvement of the quality of education requires continuous evaluation of the clinical learning environment (CLE) and identification of university students' perceptions and expectations. To this end, higher education must improve its quality and increase student satisfaction for its long-term success and survival.

Objectives: The present study aimed to investigate and compare dental residents' attitudes toward the quality of the CLE.

Methods: The participants in this cross-sectional descriptive study were all dental residents (n = 251) at three dental schools in Tehran, Mashhad, and Kerman who were studying in the academic year 2022-2023. The residents were selected using the census method. The Postgraduate Hospital Educational Environment Measure (PHEEM) was used to examine the quality of the learning environment in three areas: perception of autonomy (POA), perception of teaching (POT), and perception of social support (PSS). The collected data were analyzed using descriptive statistics independent samples t-test, correlation analysis, and linear regression analysis with SPSS software at a P value of less than 0.05 was considered statistically significant.

Results: The mean scores for POA, PSS, and POT assessed by dental residents at Tehran, Mashhad, and Kerman universities were 108.54, 100.61, and 97.42 (out of 152), which were within the acceptable range. In addition, 44.88% of the dental residents had a good assessment of the CLE. Furthermore, all dental residents reported poor or negative attitudes toward POA. In addition, 34.76% of dental residents were positive about SSP and 50.70% of them had very positive attitudes toward POT.

Conclusion: Although a majority of dental residents had positive views about the learning environment and its different educational and social aspects, they had negative assessments of the perception of autonomy (POA) as one of the essential factors in the learning environment. Thus, more attention should be paid to dental residents' perception of autonomy to promote the educational and social quality of dental schools.

Keywords: Perception of Autonomy, Educational Needs, Dental Residents, Educational Assessment

Background

Following new approaches, continuous improvement of quality requires continuous evaluation of education and identification of university students' perceptions and expectations (1). Students, employees, faculty members, community members, and industries are the main stakeholders of higher education. Furthermore, the attitudes of students as the main stakeholders can play a significant role in improving the quality of services. An analysis of the gap between students' expectations and perceptions of educational services can contribute to developing effective programs to improve the quality of educational services (2). Thus, the higher education system can fulfill its functions and goals if it has a high level of educational quality (3). As a result, there is a need for more studies to explore and find ways to increase the quality of educational services. Currently, Iranian universities and higher education institutions need to

move towards qualitative development instead of quantitative development. The learning environment is one of the important determinants of student behavior and is associated with their achievements, satisfaction, and success. Accordingly, assessing various aspects of learning environments can contribute to the further development of educational services and interpretation of the educational programs (4-6). Besides, an awareness of students' attitudes toward teachers and the learning environment can be effective in improving the quality of such environments (7). Assessing students' attitudes and understanding the quality of the learning environment can provide acceptable indicators of the desirability of the learning environment and educational programs (5). Boor et al. stated that the learning environment has a significant effect on the quality of students' learning outcomes and their future success (8). Other studies have also reported the impact of the learning environment on the quality of learners' life and academic achievement (9-11). Successful learning depends on many factors, but a basic step is to engage learners in educational activities and the learning process, which is influenced by learner motivation and perception, which in turn depends on the learners' previous experiences, learning styles, and the environment where learning takes place (11). The learning environment involves all the physical, psychological, emotional, cultural, and social factors that affect the learner's growth and development in an educational institution (9, 11). Bloom defines the educational or learning environment as the conditions, external stimuli, and forces which may be physical, social, as well as intellectual that challenge the individual and influence students' learning outcomes (12). Moreover, the negative clinical training environment will have a significant impact on the quality and safety of patient care and the quality of life of students. Thus, a supportive educational clinical environment will not exist by itself but requires active maintenance and continuous evaluation (13, 14). In recent decades, the dominant approach to learning has changed from information processing theories to postgraduate hospital educational environment measure (PHEEM) placement theories, which do not consider the learning process apart from the context or place where this process happens. Learners, teachers, physical facilities, culture, and relationships governing the learning environment affect thinking and learning processes and the knowledge acquired in the environment (15, 16). Measuring the learning environment from the perspective of students plays a key role in creating and improving the learning environment. The learning environment is one of the important aspects of the medical education program. Many universities in the world use the PHEEM tool and its results as an indicator of the effectiveness of the educational program in the quality management process in their annual evaluation (17, 18). There are 11 measurement tools to evaluate the clinical educational environments in different stages. However, Dundee Ready Educational Environment Measure (DREEM) and PHEEM provide more reliable results than the other tools. Having a suitable index like PHEEM to measure the performance of educational environments and colleges, it is possible to find effective solutions for planning to reduce weaknesses and maintain and enhance strengths by knowing the opportunities and threats ahead. Thus, the evaluation of an educational environment can pave the way for improving the quality of the environment and, subsequently, the quality of the learning process. Medical and dental students have special characteristics due to the type of their workplace and learning environment. Thus, more attention should be paid to their needs when developing medical or dental curricula. Paying attention to the educational needs of students and assessing their expectations and satisfaction with educational programs in an educational environment can reflect the efficiency of educational programs. To make constructive changes, it is necessary to have descriptive information about the current situation and students' evaluation of the learning rate in their courses. Such information can contribute to improving strengths and eliminating weaknesses and enhancing students' satisfaction with their field of study (19). According to the studies carried out in Iran, 19 faculties offer educational courses for dental residents. Taking into account the effective distribution of faculties in Iran as well as the number of specialized courses offered, the faculties of Kerman, Tehran, and Mashhad were selected in this study.

To achieve effective clinical education, it is necessary to continuously evaluate the quality of educational programs, identify their strengths and weaknesses, evaluate the quality of educational services, and measure their efficiency operationally according to the defined standards. In addition, since the assessment of dental residents is of special importance in patient management and the quality of care provided by them, and in most cases, dental residents initiate diagnosis and treatment for patients, the present study aims to examine dental residents' attitudes toward clinical learning environment (CLE) in dental schools of Kerman, Tehran, and Mashhad Universities of Medical Sciences. The insights from this study can contribute to developing some strategies to improve the quality of educational programs provided for dental residents.

Objectives

The present study aimed to investigate and compare dental residents' attitudes toward the quality of the clinical learning environment.

Methods

Using the PHEEM questionnaire, this cross-sectional (descriptive-analytical) study examined the clinical learning environment (CLE) in dental departments (prosthodontics, orthodontics, restorative, endodontics, pediatrics, periodontics, maxillofacial surgery, pathology, radiology, oral diseases, and community-based dental education (CBDE)) in dental schools of Kerman, Tehran, and Mashhad universities of medical sciences. The participants were selected using the census method from the dental residents (n = 251) studying in the aforementioned dental schools. The data were collected using the PHEEM questionnaire, which has been used in several valid studies (20-22). This instrument is most widely used to evaluate the CLE in dental assistance programs. In the present study, a modified version of PHEEM was used. PHEEM was developed by Roff et al. (2005) based on a five-point Likert scale from totally agree to totally disagree (20). The inclusion criteria were dental residents who did not have any educational problems as confirmed by faculty managers and educational officials and had passed their courses according to the faculty schedules. Dental residents with educational or moral problems reported by the disciplinary committee, as well as those dental residents who did not complete their courses following the educational calendar were excluded from the study. Necessary instructions were provided to all the dental residents about the objectives of the study and the research procedure. The residents were also assured that all their data would remain confidential and will not be disclosed, and will only be used for statistical analysis. An informed consent form was also signed by all participants. The protocol for this study was approved by the ethics committee of Kerman University of Medical Sciences with the code of ethics IR.KMU.REC.1401.473.

The data in this study were collected using a demographic information form (gender, marital status, academic year, and being native or non-native). The Persian version of Postgraduate Hospital Educational Environment Measure (PHEEM) whose psychometric properties have been confirmed in different settings (23, 24).

The PHEEM questionnaire has three subscales: perception of autonomy (POA), perception of teaching (POT), and perception of social support (PSS) in the clinical environment. POA is evaluated with 14 items. However, item 7 (There is certain degree of racial/ethnic/cultural prejudice in this post) was removed because all the dental residents in the schools were of the same race, and item 11 was removed because there was no paging system for dental residents in the dental school and the students were residents in the related department. The questionnaire was administered to 30 dental residents and its reliability was confirmed using Cronbach's alpha coefficient of 0.94.

The dental residents' perception of teaching (POT) was evaluated with 15 items, but item 20 was only asked of students of dental surgery as there is no on-call system in dentistry.

The dental residents' perception of social support (PSS) was evaluated with 11 items. The total score on PHEEM ranges from 0 to 152, and the respondent's scores are interpreted as unfavorable (0 to 38), slightly favorable (39-76), favorable (77-114), and very favorable (115-152) (22). The interpretation of the PHEEM scores for the three subscales is shown in Appendix 1.

The collected data were summarized using descriptive statistics including mean, standard deviation, frequency, and percentage. Afterward, the data were analyzed using independent samples t-test, correlation analysis, and linear regression analysis with SPSS software (Version 20, IBM Corporation, Armonk, NY) at the significance level of less than 0.05 ($P < 0.05$).

Results

Of the 300 questionnaires, the data from 251 respondents (83.66%) were evaluated. Besides, 26 students were not willing to cooperate in this study and 23 questionnaires with incomplete responses were excluded from the study.

The participants were 251 dental residents. A total of 103 residents (41%) were from Tehran University, 83 residents (33.1%) from Mashhad University, and 65 students (25.9%) from Kerman University. Moreover, 42.7% of the participants were first-year dental students, 34.4% were second-year students, 18.8% were third-year students, and 4.2% were fourth-year students. Table 1 shows other demographic characteristics of the participants:

Table 1. The participants' demographic characteristics

Variables	Categories	Frequency (%)
Gender	Male	122 (48.6%)
	Female	129 (51.4%)
Marital status	Married	101 (40.3%)
	Single	150 (59.7%)
Place of residence	Native	164 (65.2%)
	Non-native	87 (34.8%)

Although the dental residents who studied at Tehran University obtained higher scores on the PHEEM questionnaire and its three subscales, there was no significant relationship between the dental residents of different universities. The findings showed that all

dental residents had very poor or negative attitudes toward POA. Furthermore, 34.76% of dental residents had very good, 29.05% had good, 23.33% had moderate, and 12.86% had poor attitudes toward PSS. The data also revealed about half of the dental residents (50.70%) showed very positive attitudes, 28.64% had positive attitudes, 19.72% had moderate attitudes, and 0.94% had poor attitudes toward POT.

Table 2. The relationship between gender and the three subscales

Scale	Gender	Mean (SD)	Mean difference	%95 confidence interval		P-value
				Lower boundary	Upper boundary	
POA	Male	23.80 (1.02)	2.37	1.43	3.85	0.0001
	Female	21.43 (2.54)				
POT	Male	50.32 (6.13)	11.87	8.30	15.45	0.0001
	Female	38.45 (11.91)				
PSS	Male	37.83 (6.03)	12.44	8.74	16.14	0.0001
	Female	25.39 (12.33)				
Total	Male	124.25 (14.91)	27.99	19.07	36.91	0.0001
	Female	96.26 (29.20)				

POA: Perception of autonomy; POT: Perception of teaching; PSS: Perception of social support

In addition, 35.12% of the dental residents had very positive attitudes toward the CLE, 44.88% had positive attitudes, 16.10% had moderate attitudes, and only 3.90% had poor attitudes toward the CLE.

According to the findings, male dental residents scored significantly higher than female dental residents (Table 2) and native dental residents gained higher scores on the three subscales compared to non-native dental residents (Table 3), but there was no significant relationship between marital status and the three subscales. Moreover, first-year dental residents obtained higher scores than the students at higher levels.

An analysis of the Pearson correlations between the three subscales (POA, POT, and PSS) revealed a positive significant relationship with the three subscales (P = 0.0001) as shown in Table 4.

Finally, multiple regression analysis was performed to examine the simultaneous effect of the variables on the score for each subscale and PHEEM. The linear regression analysis showed significant relationships between the total PHEEM score and the academic year (B = -11.5; P = 0.001), POA and the academic year (B = -2.87; P = 0.001), and PSS and the academic year (B = -4.28;
P = 0.001). These findings indicated that the students in lower academic years obtained higher POA, PSS, and PHEEM scores. Besides, the academic year (B = -4.35; P = 0.001) and the place of residence had also a significant impact on POT scores, and native students obtained higher POT scores (B = -3.27; P = 0.050). However, the results of the multiple regression analysis did not confirm the findings of the univariate analyses on gender, and although male dental residents had significantly higher scores in the univariate analysis (Table 2), the multiple regression analysis indicated gender had no significant effect on the POA, POT, PSS, and PHEEM scores (Table 5).

Discussion

The results of the present study showed that all dental residents had very poor or negative attitudes toward POA. Moreover, 34.76% of the dental residents reported very positive attitudes toward PSS and 50.70% of them reported very positive attitudes toward POT. This finding indicated that the dental residents were satisfied with the educational and social aspects of the clinical learning environment (CLE), and the quality of educational and social aspects of dental schools can be improved by taking into account dental residents' perspectives as confirmed by Nahar et al. (22) and Alimohammadi (25). Nahar et al. reported a mean PHEEM score of 44. Furthermore, they found that 35.5% of the dental residents had very positive attitudes toward PSS, and half of them had a positive assessment of POT and poor attitudes toward POA (22). Alimohammadi reported that dental residents had the highest and lowest levels of satisfaction with POT and PSS, respectively (25). The data in the present study also showed that 44.88% of dental residents had positive attitudes toward the CLE and only 3.90% had a poor assessment of the CLE, as reported in previous studies in the literature (Badsar et al.; Dehghanzadeh et al.; Al-Hazimi et al.; Placa et al.) (7, 26, 27, 28).

Badsar et al. evaluated the CLE of dental residents using the PHEEM questionnaire and reported that the students had relatively positive attitudes toward the clinical environment (26).

Table 3. The relationship between place of residence and the three subscales

Scale	Place of residence	Mean (SD)	Mean difference	%95 confidence interval		P-value
				Lower boundary	Upper boundary	
POA	Native	23.17 (1.10)	4.67	3.89	5.45	0.0001
	Non-native	18.50 (1.54)				
POT	Native	51.12 (6.63)	8.06	5.09	11.04	0.0001
	Non-native	43.06 (6.95)				
PSS	Native	38.14 (7.19)	7.99	4.59	11.38	0.0001
	Non-native	30.15 (8.54)				
Total	Native	125.87 (16.58)	19.41	11.92	26.90	0.0001
	Non-native	106.46 (17.72)				

POA: Perception of autonomy; POT: Perception of teaching; PSS: Perception of social support

Table 4. The correlations between the three subscales

Subscales	Pearson Correlation	POA	POT	PSS
POA	r	0.959	1	0.969
	P value	0.0001	-	0.0001
POT	r	0.959	1	0.969
	P value	0.0001	-	0.0001
PSS	r	0.935	0.969	1
	P value	0.0001	0.0001	-

POA: Perception of autonomy; POT: Perception of teaching; PSS: Perception of social support

Table 5. The results of multiple regression analysis for the effect of independent variables on POA, POT, and PSS subscales

Variable	POA				POT				PSS				PHEEM			
Statistics	B	SE	t	P value	B	SE	t	P value	B	SE	t	P value	B	SE	t	P value
Gender*	0.16	0.51	0.32	0.750	0.33	0.98	0.33	0.740	-0.06	0.86	-0.07	0.950	0.43	2.10	0.21	0.840
Marital status**	0.37	0.53	0.71	0.480	0.31	1.01	0.30	0.760	-0.08	0.88	-0.09	0.930	0.61	2.15	0.28	0.780
Academic year***	-2.87	0.42	-6.83	0.001	-4.35	0.81	-5.40	0.001	-4.28	0.70	-6.10	0.001	-11.51	1.72	-6.59	0.001
Place of residence****	-0.28	0.83	-0.34	0.740	-3.27	1.59	-2.06	0.050	-1.93	1.38	-1.40	0.170	-5.48	3.39	-1.62	0.120
Faculty*****	0.44	0.54	0.82	0.420	0.11	1.03	0.10	0.920	1.53	0.89	1.71	0.100	2.07	2.19	0.94	0.350

POA: Perception of autonomy; **POT**: Perception of teaching; **PSS**: Perception of social support; **SE**: Standard error
B: Regression coefficient; **t**: t statistics
*Male to female; **married to single; ***higher academic levels to first academic level; ****Non-native to native; *****Tehran to Kerman and Mashhad schools

Dehghanzadeh et al. also reported dental residents' relatively positive assessment of the CLE (27). Similar to the present study, Al-Hazimi et al. reported that 51% of students had a good perception of the CLE (28). Although the present study showed that dental residents at Tehran University had more positive attitudes toward POA, PSS, and POT compared to the students at Kerman and Mashhad universities, no significant difference was observed between the students' attitudes at these three universities. This finding also confirms that although dental residents at Tehran University had more favorable attitudes toward the CLE, there was no significant relationship between the residents' perception of autonomy, perception of teaching, and perception of social support, the clinical learning environment, and the university. Accordingly, it can be argued that dental residents had more positive attitudes toward Tehran University due it its longer history, its location in the capital of the country, and better facilities and services compared to other universities. The results of the multiple regression analysis did not confirm the results of the univariate analysis on gender, and gender did not have a significant effect on the POA, PSS, POT, and PHEEM scores. This finding was in line with the results reported by Alimohammadi (25), Badsar et al. (26), and Jalilian et al. (21), but contrary to the findings reported by Rasulabadi et al. (29). Following the present study, Najafi et al. (30) and Arasteh and Baniasadi (31) showed no significant difference between male and female students' satisfaction with the CLE. Thus, it can be argued that gender has no effect on students' perceptions of social and educational aspects of the CLE and is not a factor in improving or declining educational advantages. Rasulabadi et al. reported a significant difference between male and female students' expectations ($P < 0.001$) (29). These contradictory findings can be attributed to the cultural difference between the studied populations. Furthermore, the findings from the present study showed that the first-year dental residents obtained higher POA, PSS, and

POT scores than the students at higher academic levels. The results of the linear regression analysis showed a significant relationship between the PHEEM score, the academic year, and POQ, and between the academic year and PSS. Thus, we can argue that first-year students are more motivated and have more positive attitudes toward the CLE, but as students get to know the environment, they become more familiar with its problems. This finding was consistent with the results reported by Jain et al. (32) but contradictory to the findings reported by Badsar et al. In fact, Jain et al. compared dental residents' perceptions of the educational climate in the faculty in the preclinical and clinical programs and found that the students in both programs had the lowest assessment of flexibility (the opportunity for students to adjust the learning environment). Generally, the students completing the clinical program had more negative attitudes toward the learning environment than the students in the preclinical program (32). Badsar et al. measured medical interns' perceptions of the CLE using the PHEEM questionnaire and the interns had a relatively positive evaluation of the environment. There was a difference between senior and younger interns, but it was not significant (26). Dehghanzadeh et al. reported that dental residents had relatively favorable attitudes toward the CLE. Moreover, the dental residents in the higher year reported better evaluations compared to the lower-year students (27). Alimohammadi examined dental residents' perceptions of the CLE and found no relationship between dental residents' age, academic year, and satisfaction. Their findings also indicated that native dental residents scored significantly higher in all subscales than non-native dental residents (25). The results of the linear regression analysis in the present study showed a significant difference between the PHEEM and POT scores, the academic years, the place of residence, and native students who scored higher than non-native students. Following this finding, it can be suggested native students have more positive attitudes toward their entire academic studies due to less engagement with student problems and they also live with their families and have more amenities. Dehghanzadeh et al., assessed dental residents' perceptions of the CLE and found that the students had relatively favorable attitudes toward the environment, but a significant difference was observed between different groups of students (27). To make constructive changes, it is necessary to have descriptive information about the current situation and students' evaluation of the learning rate in their courses. Such information can contribute to improving strengths and eliminating weaknesses and enhancing students' satisfaction with their field of study (19). Quality in higher education is related to the achievement of objectives and the achievement or verification of generally accepted standards. Thus, paying attention to the quality of higher education is essential to prevent wasting human capital, material, and financial resources and create coordination between the development of educational systems and their efficiency. Given the growing number of universities in Iran, it is necessary to have a framework to improve and guarantee the quality of universities. Quality is an important issue for educational institutions and service improvement is one of the most important functions of any scientific and academic institution (1, 33).

Studies in North America show that the quality of the learning environment where learning takes place is a predictor of the quality of care provided by graduates for the years after graduation and affects the patterns of prescribing and patient management and the use of healthcare resources (34). Evidence shows that professional satisfaction and patient care will improve if there is encouragement and especially effective supervision and education in the CLE for medical students. Conversely, a negative learning environment may be detrimental to interns and team morale, potentially jeopardizing the multiparty working relationship (35). Moreover, autonomy is one of the recurring subjects with an increasing sense of autonomy, which leads to greater student satisfaction with the clinical learning environment (CLE) (35).

Sawatsky et al. examined the tension between autonomy and supervision through social cognitive theory and emphasized that to create the best learning environments for the formation of the professional identity in physicians, educators should consider a balance between autonomy, supervision, and patient safety (36). One of the important goals of higher education and the Ministry of Health is to train medical staffs that have the necessary ethical, scientific, and practical competencies. Therefore, it is very important to evaluate qualitative indicators effective in improving the quality of education. Accordingly, examining the quality of educational environments from the perspective of dental residents as effective executors and stakeholders in using healthcare and educational environments can help identify strengths and weaknesses and contribute to reforming and improving educational programs and goals (37). The present study evaluated the quality of educational services only in terms of five dimensions and it is possible to evaluate other variables as well. Moreover, among the recipients of academic services, only the attitudes of students were assessed, and the attitudes and views of administrators, teaching staff, faculty members, and professors can also

be assessed in future studies. One of the limitations of survey studies is the use of self-instruments that lead to response bias and errors. Another limitation of the present study was the unwillingness of some of the dental residents to complete the questionnaires accurately. However, the researchers tried to encourage students by providing necessary instructions about the objectives and significance of the study. Finally, qualitative evaluation methods need to be used in universities where the quality of educational services is poor to identify the weaknesses and strengths in offering educational services and continuously improve the quality of services.

Conclusion

The insights from this study can enhance the awareness of educational managers and curriculum planners of the clinical learning environment (CLE) and its influencing factors and help them to know about students' attitudes toward the preferred learning environment so that they can bridge the gap between the actual and preferred learning environments to increase the CLE and students' satisfaction. Overall, given the importance of preclinical and clinical education for dental students in preparing them to start working in the healthcare system, it is essential to pay attention to the quality of educational programs for these students and their satisfaction with these programs. Since the best criterion for measuring the efficiency and quality of education is to measure the feedback received from students, the present study assessed dental residents' perceptions of and satisfaction with the CLE, and the results showed that an increase in the clinical experience led to a decrease in student satisfaction mostly due to students' exposure to clinical cases and a change in their attitudes toward clinical practice. Thus, university officials need to revise clinical programs with a focus on the clinical application of the subjects covered in the programs and create a shift in students' perspectives from theory to practice. Thus, revising clinical programs can enhance students' satisfaction and increase the efficiency of these programs. Moreover, given that the students had a more positive assessment of the dental school at Tehran University compared to other schools, university officials need to hire more academic staff and take effective measures to improve physical facilities and human resources.

Supplementary material(s): is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Appendix 1. PHEEM Score Interpretation

Scales	Scores	Interpretation
Perception of autonomy (POA)	0-12	Very poor
	13-124	Negative view of one's role
	25-36	More positive perception
	37-42	Excellent
Perception of teaching (POT)	0-15	Poor
	16-30	Need retraining
	31-45	Moving right direction
	46-60	Excellent
Perception of social support (PSS)	0-11	Non-existent
	12-22	Not pleasant
	23-33	More pros than cons
	34-44	Good support