Title: Comparison of Quality of Life of Medical Students in Annual and Modular System in Public Sector Medical Colleges in Karachi, Pakistan

Article type: Original article

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Acknowledgment: None.

Financing: None

Conflict of interest statement by authors: None

Compliance with ethical standards: Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

Authors Contribution Statement:

Contributor Role	Role Definition	Authors

		1	2	3	4	5	6
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.					X	
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse.	X	X				
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.					X	
Funding Acquisition	Acquisition of the financial support for the project leading to this publication.						
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.	X	X				
Methodology	Development or design of methodology; creation of models	X	X	X		X	
Project Administration	Management and coordination responsibility for the research activity planning and execution.					X	
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.					X	
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.					X	
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.				X	X	
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.						
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.						
Writing – Original Draft Preparation	Creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).	X	X	X	X		
Writing – Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.	X	X	X	X		

Manuscript word count: 2501

Abstract word count: 245

Number of Figures and Tables: Figures:3. Table:1

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Discussion Points:

- What is the better curriculum system?
- Annual or Modular system, which is better for quality of life?
- Which aspect of life is affected more with clinical studies?
- Pre-clinical or clinical years, which would be better for you?
- Using World Health Organization- Quality of life tool was a great questionnaire to assess quality of life of medical students. #MedicalStudents
- It was exciting knowing about different teaching methods and curriculum trends in different universities of Pakistan!

Dates

Submission: 05/02/2021

Revisions: 09/01/2021, 02/13/2022

Responses: 10/08/2021, 02/16/2022

Acceptance: 04/27/2022

Publication: 04/28/2022

ABSTRACT.

Background: The annual system is regarded as the oldest but foundational trends of teaching, with its curriculum based on subject wise learning and clinical rotations accordingly. The modular system has a curriculum that encompasses modules based on different organ systems and processes, with the basic and clinical sciences taught cohesively.

Methods: A cross-sectional study was carried out, including 404 students of three different public sector medical colleges in Karachi. QoL was measured using the WHOQOL-BREF questionnaire, which comprised of 26 items. Data analysis was done via SPSS v.20. Kruskal Wallis test and Mann-Whitney U test was used to compare scores among different years of medical study and between different curricular systems, respectively.

Results: Out of 404 students, 81.3% were females, 18.3% were males. The mean age of the sample was 21.23±1.29 years. According to the year of study, significant differences were observed in physical health and overall QoL domain ($p<0.05$), with 3rd-year students having the highest scores. When comparing annual and modular systems, the modular system yielded a better QoL with a mean score of 83.34. The overall QoL of students in clinical years was found to be significantly better ($p<0.05$) than the students present in preclinical years.

Conclusion: Overall QoL score in the modular system was slightly higher than the annual system, but a significant difference was noted only in the environmental domain between the two systems. It was also noted that the QoL of students in clinical years was better than preclinical years.

Key Words: WHOQOL-BREF, Medical students; Quality of life (Source: MeSH-NLM).

INTRODUCTION.

The journey through medical school, granted being highly rewarding and prestigious, is still a stressful period for students. Physical health and psychological equilibrium are compromised right from the beginning of medical school.[1] The quality of life (QoL) of health care providers has been a constant focus of concern in recent years, and a thorough understanding of the overall effects of various variables on their QoL is crucial.

A thorough review in the literature revealed that students pursuing medicine come across significantly higher stress and depression when compared to other bachelor degrees.[2,3] Medical students are usually subjected to high amount of workload and financial and professional stressor during their course of study.[2,3] Thus, exploration of medical students' (QoL) has become an essential study area. QoL is defined by World Health Organization (WHO) as "an individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns".[4] Initially, WHO developed a standardized questionnaire called WHOQOL-100 and later the WHOQOL-BREF, a shortened version to evaluate the QoL across different domains including physical, psychological, social, and environmental factors was formulated.[5] Multiple studies have evaluated the QoL of medical students using WHOQOL-BREF, owing to increasing concern towards the QoL of medical students round the globe.[6,7] A vast number of factors, including academic courses, contact with diseases and death, assessment procedures, hectic schedules, and tedious classes, are affecting the QoL of medical students. The amalgam of all these aspects predisposes students to different ailments like stress, depression, anxiety, burnout, and suicidal ideation.[3,6,8,9]

Different medical curricula trends are observed in different universities of Pakistan, which include modular and annual systems. The annual system is regarded as the oldest but foundational trends of teaching, with its curriculum based on subject wise learning and clinical rotations accordingly. According to its curriculum, first two years are based on basic subjects including anatomy (histology and embryology), biochemistry and physiology. Third and fourth years are based on learning of pathology, microbiology, pharmacology. Whereas final year students are taught medicine, surgery, gynaecology, obstetrics, and paediatrics. The modular system has a different approach with innumerable horizontal and vertical integration. The modular system is divided into ten semesters with each having six-month duration. This modular system is usually made of modules where each module is based on organ systems with the basic and clinical sciences being taught in an integrated fashion. Its curriculum encompasses modules based on different organ systems and processes, with the basic and clinical sciences taught cohesively. With recent changes in the education system and many medical universities riveting back to its traditional teaching methods, the impact these two different teaching systems have on students' needs to be addressed more than ever. As the need of the hour, this study was conducted to find the difference in QoL of students in both the semester and annual systems as well as to compare and to identify the system with better outcome. We included students undergoing different systems of examination. The results of the study can assist us in endorsing the well-being of medical students, which will ultimately benefit the profession as well as patient care.

DMC (Dow Medical College)[13] and SMC (Sindh Medical College)[14] follow a modular system, whereas KM&DC(Karachi Medical and Dental College) observes an annual (non-modular) system.[15] The student sample

was defined based on their current year of study and their educational system (annual or modular). Present research aimed to measure and compare the quality of life of medical students undertaking a bachelor's degree in medicine and surgery (MBBS) course in modular or annual (non-modular) systems. Secondarily, we aimed to assess the variations in QoL of students from first to final year in the aforementioned systems.

METHODS

A questionnaire-based cross-sectional study was conducted from October 2019 to March 2020 at Dow Medical College (DMC), Sindh Medical College (SMC), and Karachi Medical and Dental College (KM&DC) associated with public sector Universities of Karachi. Ethical approval was obtained from the Institutional Review Board of Dow University of Health Sciences(IRB-1368) and individual permission was obtained from SMC and KM&DC.

Study tool comprised of two parts, a demographic part and a WHOQOL-BREF part. The demographics part consisted of age, gender, medical school name, and year of study. WHOQOL-BREF questionnaire was used as a data collecting instrument to analyze the QoL of life of medical students.[6,7] Permission to use this questionnaire was obtained from WHO. It consisted of 26 items and measured general QoL as well as QoL in four physical domains, namely, physical health, psychological health, social relationships, environment. The options for each question were scored from 1 (very dissatisfied/very poor) to 5 (very satisfied/very good). A separate question assessed an individual's perception of their overall health. Sample size was calculated by using OpenEpi keeping 80 as power and alpha level. The study by Zhang Y et al. was taken as reference paper for sample size calculation.[16]

There are 350 students in each batch of DMC and SMC while 250 students in each batch of KMDC. The data collected from each college and batch is given in flow chart (Figure 1). The fall out rate was approximately 15%. Any undergraduate medical students studying in DMC, SMC or KMDC who consented to respond voluntarily were included irrespective of the study year. All students from dental and other allied health sciences departments were excluded from the study. Medical students enrolled in private universities were also excluded.

The questionaries were distributed to the students after explaining the study. Informed consent was obtained from all the participants and confidentiality was ensured. Twenty minutes were given to the volunteers to fill up the form in front of Principal investigator to limit the chance of consultation with friends and colleagues.

Total of 404 forms were complete and were included in the analysis. WHOQOL-BREF manual guidelines were used to calculate the scores in each domain. The domain score was calculated using the mean score of items within each domain. Using the below-mentioned formula, scores were converted to a 100-scale. The closer the score to 100 the better the QoL.

Converted score= (Score-4) X (100/16).

SPSS v.20 was used to analyze all the data. Kruskal Wallis test was used to compare scores among different years of study and the Mann-Whitney U test was used to compare scores between different curricular systems. A p-value <0.05 was considered to be statistically significant. Basic variables were analyzed using descriptive methods. Mean with standard deviation was computed to present the QoL scores. Cronbach's alpha coefficient was calculated to assess the reliability of responses of the data.

RESULTS.

A total of 404 students were included in the study. Out of these, the majority of students were female, comprising 81.3%, whereas males were 18.3%. The mean age of the sample was 21.23±1.29 years ranging from 18 to 26 years. The median ages of students from first to final year were 20, 21, 21, 22, and 23 years respectively. The Cronbach's alpha coefficient was computed to assess the reliability of responses of the WHOQoL data. The overall Cronbach's alpha coefficient was 0.778. Random sampling was carried out in students per year from each university.

The responses of the QoL were defined in four domains that are physical, psychological, social, and environmental and were then tabulated according to the academic years as well as the educational system.

Overall QoL score was highest among the third-year and lowest among the fourth-year medical students (Figure 2A). Significant differences were observed in the physical health domain ($p<0.05$) and overall QoL domain ($p<0.05$) according to different years of study. However, no statistically significant difference was noted in the psychological, social relationships, and environmental domains. Third-year students had the highest overall score in each domain. Although statistically non-significant, a consistent lesser score of fourth-year students was found in almost all domains of QoL (Figure 2B).

Comparing between annual and modular systems shows that significant difference was found only in the environmental domain ($p<0.05$) with no marked differences in the other domains (Figure 3). The modular system was found to have a better QoL with a mean score of 83.34, whereas the annual system had a mean score of 82.32 which is not significant.

Table 1 compares different domains of QoL among preclinical and clinical year students. A significant difference was noted in the physical health ($p<0.05$) and environment ($p<0.05$) domains of clinical and preclinical groups of medical students with a better score found in the clinical years. The overall QoL of students in clinical years was also found to be significantly better than the students in preclinical years ($p <0.05$).

DISCUSSION.

Medical students are expected to become proficient in the art of integrating textbook knowledge with clinical skills. Overburdened with academic responsibilities leaves no time to spare for personal well-being. Although several studies have been conducted to measure the QoL in medical students, none have been done to compare QoL in different educational systems observed in medical colleges across Pakistan.

Our study found WHOQOL-BREF reliable in accessing the QoL of Pakistani medical students studying in modular as well as the annual system. Cronbach's alpha coefficient was comparable to that found in other studies done in Thailand and Iran.[6,17] Medical schools in Pakistan either follow the modular or annual educational system. Both the systems vary considerably in clinical hours, teaching techniques, and subjects taught each year. The modular system focuses on an approach that integrates the pathophysiology, pharmacology as well as the management of diseases regarding different organ systems. Thus, students study many subjects at the same time.

The year of study was a significant indicator of overall QoL ($p<0.05$). This was consistent with studies carried out in Asia where the year of study was determined as an important indicator of QoL ($p<0.05$).[16,18] Zhang et al in their study concluded that the scores of different academic years were significantly different in the psychological health and social relations domains ($p<0.05$). Aforementioned study also that the scores of different specialties had significant differences in psychological health and social relations domains ($p<0.05$). Students from clinical medicine had the highest scores.[16]

The QoL of students in third year was the highest. Final year students had the second-highest score in QoL after third-year students (***Figure 2***). We found that third-year medical students had the highest scores in all domains (***Figure 3***), which was opposite to study done in Brazil and China where students of the third year had the lowest QoL.[11,12,16] Zhang Y et al. reasoned the low QoL of third-year Chinese medical students with the presumption that the start of clinical years brought with itself the feeling of inadequate knowledge and skills to interact with patients, especially the terminally ill.[16]

Our contrary findings may be attributed to the fact that in our educational system, the first two years of medical school revolve in gaining knowledge through books with meager clinical exposure. Our study showed that fourth-year medical students had the least score in QoL (Figure 2), which can be reasoned with lengthier curriculum and longer clinical hours. Teachers have considerably higher expectations from students, as this is not their first year in clinical settings. This could be rationalized because medical students face multitudes of stressors such as bullying by teachers, competition for marks, hectic schedules, and difficult examinations,[10] which affect the psychological and mental health of students.

The dilemma of balancing medical school with life outside takes a toll on students' mental as well as physical health. Most students are not able to get adequate sleep, and this adversely affects cognitive ability as well as physical health.[20] Medical students have less physical activity due to long hours of study. Medical students identified a lack of time and exhaustion from academic activities as a contributing factor to their sedentary lifestyle.[21]

No study has compared these two sectors in terms of QoL, to the best of our knowledge. Students of both systems had an equal score in the psychological domain (Figure 3). This may be because despite different subjects per year, the core curricula are the same. The stress factors throughout medical schools are similar.[10] A significant difference was found in the environmental domain ($p<0.05$) of both systems. The environmental domain includes factors such as opportunities for learning new skills and information, physical environment, transport, and participation in leisure and recreational activities.[5] Students from the annual system scored lower in the environmental domain (***Figure 3***), which can be logically explained by the longer clinical hours, evening, and night calls observed.

Integration of clinical and basic sciences achieved in a modular system is proven to increase academic score and reduce anxiety.[22,23] Our study found that students present in clinical years had better QoL scores than preclinical years. Our results were in parallel to the study conducted in New York.[24]

Based on the study, a few recommendations can be made. To improve the QoL of its students, the institute should take measures and arrange supportive seminars and recreational activities for students.[25] Clinical faculty should work on helping students develop communication skills as it is core part of the medical profession.[26] An exercise programme which focuses on reducing stress and improving health personal well-being, can be useful if added to medical school curriculum.[27] Institutions should take adequate measures to resolve the issues faced by the students and support them for example setting up a running student health service where concerns regarding physical and mental health of students could be addressed within the university premises. Teachers should ensure the psychological and physical well-being of students and develop compassionate relations with them. These measures can help students make their life better and lower their burden. They would be able to take care of themselves, be a better version of themselves, and be more productive.

Our study was limited by some factors, such as our research sample consisted of three public-sector medical schools in one city of Pakistan. Thus, results cannot be generalized to all medical schools. We were not able to compare QoL among male and female students because of the low male population in the sample, and the results drawn would have been inaccurate. Our research was not based on randomized sampling, which would have yielded more accurate and reliable results. Also, we did not assess the socio-demographic profile of individuals. Inquiring about factors such as race and ethnicity, family income, and future plans could have yielded some relation with QoL. Finally, our study focused only on medical students.

Conclusion

The primary aim of our study was to measure and compare the QoL of medical students undertaking a bachelor's degree in medicine and surgery (MBBS) course in modular or annual (non-modular) systems. The study showed that third-year students had the highest QOL. Overall QoL score in the modular system was slightly higher than the annual system, but a significant difference was noted only in the environmental domain between the two systems. It was also noted that the QoL of students in clinical years was better than preclinical years. A broader study, including other allied subjects such as nursing or pharmacy, should be carried out.

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WHOQOL: World Health Organization Quality of Life

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SUMMARY - ACCELERATING TRANSLATION

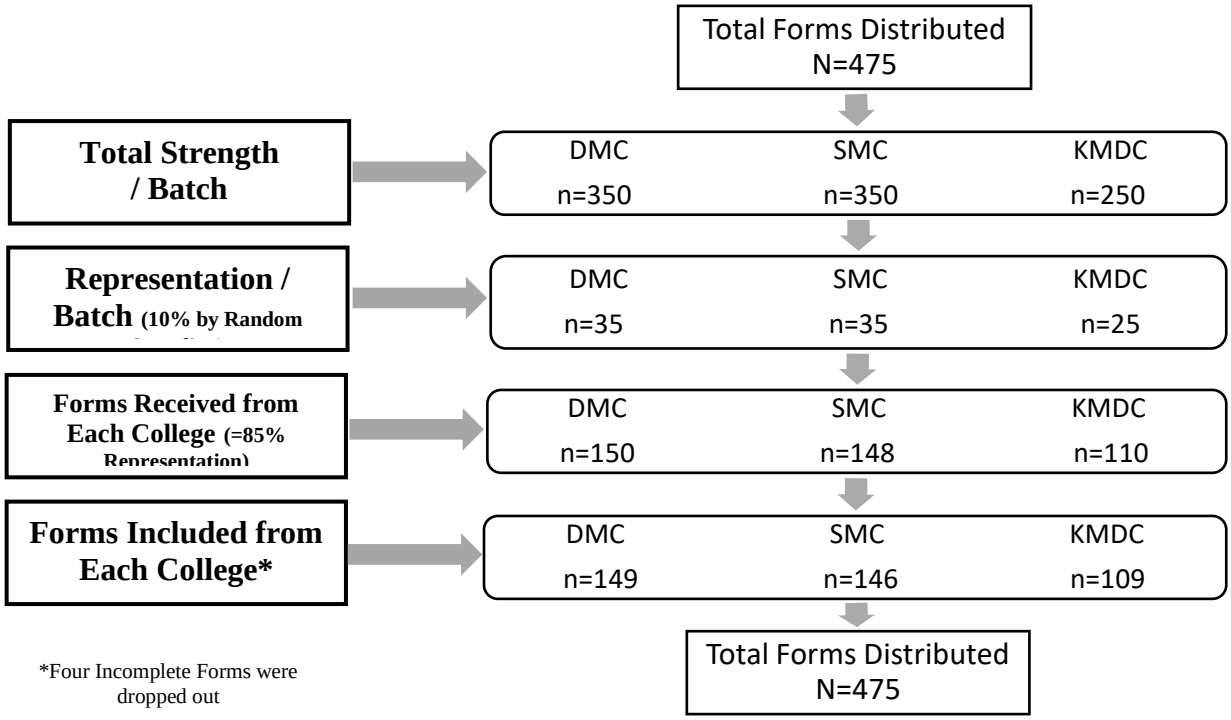
The aim of our research was to measure the quality of life (QoL) of medical students enrolled in MBBS program and compare it among modular vs. annual system of curriculum in public sector medical colleges. We also aimed to assess the variations and changes of QoL throughout the different years of medical school. A cross-sectional study was carried out, including 404 students of three different public sector medical colleges in Karachi. The study was conducted from October 2019 to March 2020. QoL was measured using the WHOQOL-BREF questionnaire, which comprised of 26 items. Data analysis was done using SPSS. According to the year of study, significant differences were observed in physical health and overall QoL domain ($p<0.05$), with 3rd-year students having the highest scores. When comparing annual and modular systems, the modular system yielded a better QoL with a mean score of 83.34. The overall QoL of students in clinical years was found to be significantly better ($p<0.05$) than the students present in preclinical years. The study showed that the overall QoL score in the modular system was better than the annual system. We also conclude that third-year students had the highest, while fourth-year students had the lowest QoL.

FIGURES AND TABLES.

Table 1: QOL Among Clinical and Preclinical Students in DMC, SMC and KMDC

Domains	Type				P-value
	Preclinical		Clinical		
	Mean	Standard Deviation	Mean	Standard Deviation	
Physical health	13.81	2.13	14.29	2.51	0.027
Psychological	13.30	2.55	13.58	2.84	0.200
Social relationships	13.20	2.87	13.53	3.07	0.280
Environment	13.89	2.10	14.33	2.66	0.066
Overall QOL	81.59	10.50	84.04	13.37	0.025

Figure 1: Flowchart showing inclusion of students in the study.



DMC: Dow Medical College
SMC: Sindh Medical College
KMDC: Karachi Medical and Dental College

Figure 2: Quality of life of medical students: (A) Overall scores in different years; (B) Comparison of different domains in each year. X-axis: Year of study

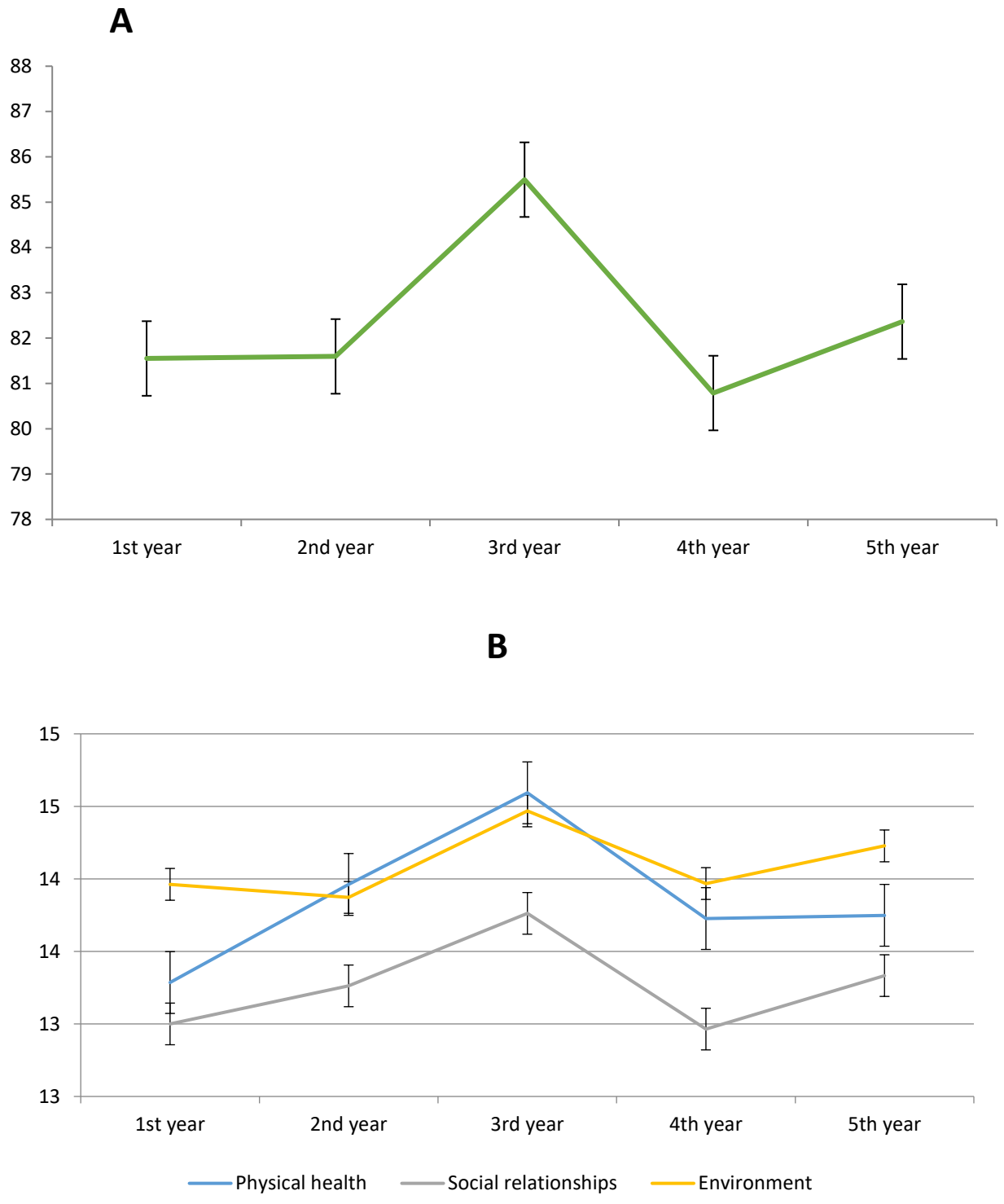


Figure 3: Comparison of scores in different domains in modular and annual (non-modular) system. X-axis: Different domains of Quality of life.