Original Article

The relationship between personality traits and learning styles in medical education students at Iran University of Medical Sciences: A cross-sectional study

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Abstract:

BACKGROUND: The relationship between personality traits and learning styles is an attractive subject for researchers. "Learning Style" indicates on a method of education for effective studying. The Kolb's Learning Style is a known theory in the field of learning style. The Kolb's four learning styles include: Divergent, convergent, assimilating, and accommodating. Furthermore, personality, known as relatively fixed and durable characteristics that distinguish people from each other, and personality contains five broad identified traits of extraversion, agreeableness, openness, conscientiousness, and neuroticism. In this study, we intended to evaluate the relationship between personality traits and learning styles in medical education students.

MATERIALS AND METHODS: This research was an observational analytic cross-sectional study that was conducted on medical education students at Iran University of Medical Sciences, between 2018 and 2019, and 31 students were participated as volunteers. NEO Five-Factor Inventory and the Kolb's learning style inventory (version 3.1) were used to evaluate the students' personality traits and learning styles, respectively. The simple and multiple analysis of multinomial logistic regression were used for statistical analysis.

RESULTS: The results indicated that if one unit would be added to the score of the "Extraversion" personality trait, the estimated odds, by which the student's learning style would become "Accommodating" rather than "Assimilating," is 1.3 times more than the basic condition, in which "Extraversion" score would be remained unchanged ($P = 0.035$).

CONCLUSION: It seems that "Accommodating" learning style might be related to "Extraversion" personality trait in medical education students. However, researches with a larger population are suggested.

Keywords:

Learning style, medical education, personality trait

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Introduction

Medical education is the art of designing a teaching program that can train people, who provide health-related services for the community after graduation.[1] In this regard, the science of education is useful to offer several important insights to find the optimal shape of the teaching program.[1] Although it is not evidenced that teaching according to the learning style can be effective for better learning, the subject of "learning style" cannot be ignored.[2] Indeed, the term of "learning styles" means that individuals differ in regard to their most effective mode of instruction or study.[2] There are several models and classifications

How to cite this article: Sohrabi Z, Bigdeli S, Nadjafi S. The relationship between personality traits and learning styles in medical education students at Iran University of Medical Sciences: A cross-sectional study. J Edu Health Promot 2023;12:7.

for the evaluation of learning styles in the literature, yet most studies have been attentive on Kolb's learning style inventory (LSI), markedly in the field of medical education.[3] As it is cited by Reynolds *et al*. about the Kolb's model, the learning attitudes can be shown as encounters between active experimentation (AE) versus reflective observation (RO) and abstract conceptualization (AC) versus concrete experience (CE).[4] In detail, AE displays a preference for action in contrast to reflective observation, which describes a tendency to think through possibilities before performing an action.[4] Furthermore, AC indicates the development of theories and concepts to explain events; however, CE seriously points up empirical learning.[4] To sum up, Kolb defined four learning styles: "Diverging" (CE with RO), "Assimilating" (AC with RO), "Converging" (AC with AE), and "Accommodating" (CE with AE).[4]

Indeed, there are some reports about the effect of personality on learning styles and the students' academic achievement.[5,6] According to a review by Kamarulzaman, it seems that the big five personality traits (extraversion, neuroticism, openness to experience [openness], agreeableness and conscientiousness), developed by McCrae and Costa in 1983, can be related with the four Kolb's learning styles according to a conceptual framework theory.[5] However, Mozaffari *et al*. found no significant relationship between learning styles and academic achievement in a descriptive-analytical study on 184 dental students.[7] Thus, an independent research on medical education students about the evaluation of relationship between personality traits and learning styles seems to be informative due to the different results of some other studies. In addition, since the number of medical educators with formal training in education is significantly small,[8] it seems beneficial to design the specific basic researches to find the methods for more promotion in education of the medical education students.

In this respect, this study was planned to evaluate the relationship between dominant personality traits and learning styles of the medical education students at Iran University of Medical Sciences between 2018 and 2019. This study was the first study that considered both aspects of psychological and learning in the medical education students at Iran University of Medical Sciences.

Materials and Methods

Study design and setting
The study was designed as an observational analytic study. In detail, the type of study was cross-sectional, and it was conducted on medical education students at Iran University of Medical Sciences, between 2018 and 2019.

The Kolb's LSI (version 3.1) (Hay Group, 116 Huntington Ave., Boston, MA 02116, USA) and NEO Five-Factor Inventory (NEO-FFI) were two questionnaires for measuring the "learning styles" and "personality traits," respectively. The questionnaires were sent to the medical education students by email; then, the volunteers filled the questionnaires by their own choice, and sent it back for analysis.

Study participants and sampling
All the medical education students, studying in the Department of Medical Education at Iran University of Medical Sciences between 2018 and 2019, were invited to contribute in this study. Then, 31 students were participated as volunteers. The demographic information of the participants is shown in Table 1.

Data collection tool and technique
The Kolb's LSI (version 3.1), a 12-item, four-choice questionnaire, was used to classify the participants' learning styles.[4] In the current study, the Kolb's LSI (version 3.1), its usage manual and permission were received from the Hay Group (116 Huntington Ave., Boston, MA 02116) through interpersonal communication of the research team. Therefore, after responding to the Kolb's LSI (version 3.1) by the participants, the scores of the columns were calculated according to the instruction manual to provide total scores for the items, including CE, RO, AC, and AE. As Reynolds *et al*. mentioned, the original model of the Kolb's LSI was formed based on the idea that learning preferences could be described using two planar dimensions: AE versus RO on the x-axis, and AC versus CE on the y-axis.[4] Accordingly, the resulted coordinates of the four learning styles (diverging, assimilating, converging, and accommodating) were plotted into

Table 1: Frequency (percentage) of demographic and educational variables in this study

Characteristics	Categories	*n* (%)
Gender	Male	12 (38.7)
	Female	19 (61.3)
Age (years)	20-29	5 (16.1)
	30-39	17 (54.8)
	40-49	7 (22.6)
	50 and >50	2 (6.5)
Faculty member?	Yes	6 (19.4)
	No	25 (80.6)
Education degree	MD, specialist	2 (6.5)
	MD, sub-specialist	1 (3.2)
	MD, PhD	1 (3.2)
	Doctorate	1 (3.2)
	Master's	18 (58.1)
	Bachelor	2 (6.5)
	PhD	6 (19.4)

a AE-RO (x-axis) versus AC-CE (y-axis) format based on the Kolb's Learning-Style Type Grid (version 3.1).

Besides, NEO-FFI was used to measure "personality traits."[9,10] As Laguna and Purc cited, NEO-FFI consists of 60 statements to which the answers are delivered on a five-point scale from 1– *strongly disagree* to 5– *strongly agree*.[11] The higher the score for each scale indicates the higher level of that trait.[11] Moreover, Laguna and Purc mentioned the Cronbach's α reliability ranges from 0.68 for openness to experience, 0.78 for agreeableness, 0.79 for neuroticism, 0.80 for conscientiousness, to 0.82 for extraversion.[11] Also, Alinejhad *et al.* mentioned a study by Haghshenas, in which the coefficient of test-retest reliability of NEO-FFI was reported between 0.75 and 0.83.[12] In the current study, Persian version of NEO-FFI was used; the reliability and validity of Persian version of NEO-FFI had been assessed by Haghshenas.[13,14] Then, the Persian version of NEO-FFI was prepared from Ravansanji publication that is the source of NEO-FFI in Persian language.[14]

Statistical analysis

Categorical data have been reported using frequency (percentage) in the form of frequency tables. Chi-square of independence or Fisher's exact test was used to investigate the relationship between the dominant personality traits of the students and their learning styles. In order to compare the mean score of each personality trait (variable) based on the NEO-FFI questionnaire, analysis of variance was performed after checking the normality and homogeneity of variance between the levels of the learning style (variable) based on Kolb's Learning Style (version 3.1) questionnaire. Multinomial logistic regression was used to investigate the effect of personality trait scores on learning styles. This analysis was first performed in a single step with the input of a personality trait, then as a multiple with the presence of the five personality traits. Analyses were performed using SPSS Statistics Version 22.0 (IBM Corp., Armonk, NY, USA) and R software Version 4.0.3 (R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria). Significance level was considered 0.05.

Ethical considerations

This study was registered with ethical code of "IR. IUMS.FMD.REC.1398.547" at Iran University of Medical Sciences.

All the participants in this study were volunteers and filled the questionnaires by their own choice. The questionnaires were used after receiving permission; also, the sources of the questionnaires were cited in the article.

Results

Thirty-one students participated in the present study, of which 61.3% were female and 54.8% were in the range of 30–39 years of age. A higher percentage of participants were medical education students, nonfaculty members, and their last educational degree was master's degree. Details of frequency (percentage) of demographic and educational variables in this study are summarized in Table 1. In addition, the frequency (percentage) of dominant personality traits and learning styles are presented in Table 2.

According to the lack of assumption of Chi-square test to examine the relationship between the dominant personality traits of the students and their learning styles, the Fisher's exact test was used; then, the results showed that there was not statistically significant relationship at the significance level of 0.05 ($P = 0.560$).

Analysis of variance was performed to compare the mean scores of each personality trait, as the variable, between the levels of learning styles; consequently, the resulted P values for the mean scores of the agreeableness, conscientiousness, extraversion, neuroticism, and openness were 0.595, 0.332, 0.088, 0.644, and 0.573, respectively. The mean scores of all personality traits were not significantly different between the levels of learning styles [Figure 1].

As the result of the simple analysis of multinomial logistic regression is shown in Table 3, if a unit would be added to the score of the "Extraversion" personality trait, the estimated odds, by which the student's learning style would become "Accommodating" rather than "Assimilating," is 1.2 times more than the baseline condition. This estimated odds ratio is significant ($P = 0.021$).

Moreover, Table 4 shows the result of the multiple analysis of multinomial logistic regression. Accordingly, if one unit would be added to the score of the "Extraversion" personality trait, the estimated odds,

Table 2: Frequency (percentage) of dominant personality traits and learning styles in this study

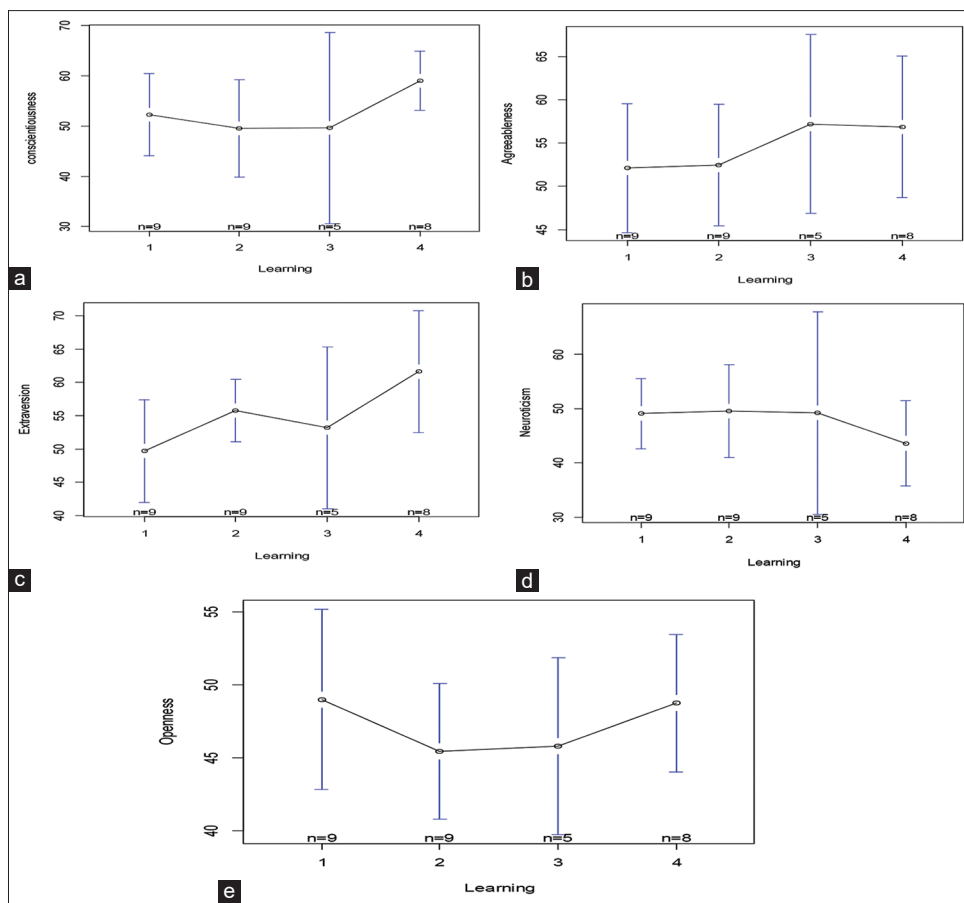|	Categories	*n* (%)
Dominant personality trait	Agreeableness	8 (25.8)
	Conscientiousness	8 (25.8)
	Extraversion	7 (22.6)
	Neuroticism	7 (22.6)
	Openness	1 (3.2)
Learning style	Assimilating	9 (29)
	Converging	9 (29)
	Diverging	5 (16.1)
	Accommodating	8 (25.8)

Figure 1: Mean plots of the personality traits between levels of the learning styles. (a) Comparison of Conscientiousness mean score between levels of learning style. (b) Comparison of Agreeableness mean score between levels of learning style. (c) Comparison of Extraversion mean score between levels of learning style. (d) Comparison of Neuroticism mean score between levels of learning style. (e) Comparison of Openness mean score between levels of learning style. 1: Assimilating (n = 9); 2: Converging (n = 9); 3: Diverging (n = 5); 4: Accommodating (n = 8)

Table 3: The result of the multinomial logistic regression for assimilating versus other learning styles according to personality traits (simple analysis)

Personality traits	OR (95% CI), *P*		
	Accommodating versus assimilating	**Converging versus assimilating**	**Diverging versus assimilating**
Agreeableness	1.1 (0.9-1.2), 0.282	1.0 (0.9-1.1), 0.936	1.1 (0.9-1.2), 0.317
Conscientiousness	1 (1-1.2), 0.179	1 (0.9-1.1), 0.620	0.9 (0.9-1.1), 0.677
Extraversion	1.2 (1-1.3), 0.021*	1.1 (1.0-1.2), 0.178	1.0 (1-1.2), 0.490
Neuroticism	0.9 (0.8-1), 0.267	1 (0.9-1.1), 0.927	1 (0.9-1.1), 0.988
Openness	1 (0.8-1.2), 0.240	0.9 (0.8-1.1), 0.240	0.9 (0.8-1.1), 0.347

OR=Odds ratio, CI=Confidence interval, *Significant: *P* < 0.05

Table 4: The result of the multinomial logistic regression for assimilating versus other learning styles according to personality traits (multiple analysis)

Personality traits	OR (95% CI), *P*		
	Accommodating versus assimilating	**Converging versus assimilating**	**Diverging versus assimilating**
Agreeableness	1 (0.9-1.2), 0.930	1 (0.9-1.1), 0.838	1.1 (0.9-1.4), 0.219
Conscientiousness	1 (0.9-1.2), 0.778	1 (0.8-1.1), 0.704	0.9 (0.7-1.1), 0.280
Extraversion	1.3 (1-1.5), 0.035*	1.2 (1-1.4), 0.087	1 (0.9-1.3), 0.669
Neuroticism	1.1 (0.9-1.3), 0.405	1.1 (0.9-1.3) 0.373	1 (0.8-1.2), 0.834
Openness	1 (0.8-1.3), 0.768	0.9 (0.7-1.1), 0.336	0.9 (0.7-1.1), 0.438

OR=Odds ratio, CI=Confidence interval, *Significant: *P* < 0.05

by which the student's learning style would become "Accommodating" rather than "Assimilating," by

controlling for other personality trait variables, is 1.3 times more than the basic condition, in which

"Extraversion" score would be remained unchanged. This estimated odds ratio is statistically significant at the significance level of 0.05 ($P = 0.035$).

Discussion

According to the results, the dominant learning styles among the medical education students were "Assimilating" and "Converging;" in addition, the dominant personality traits were "Agreeableness" and "Conscientiousness" [Table 2]. Furthermore, the results of multiple analysis of the multinomial logistic regression revealed that although the "Accommodating" learning style was not the dominant learning style among the medical education students in this study [Table 2], "Accommodating" was the only learning style that might be related to "Extraversion" personality trait ($P = 0.035$) [Table 4]. Hence, the findings of this study is in accordance with the statement of a pervious review article, which described that the "Accommodation" type of learning style shows the best correlation with "Extroversion" personality trait.[5] It is defined that an extrovert person is talkative, active and fun-loving, and uses deep and strategic approach in learning; then, this type of personality can be located between CE and AE.[5] In this regard, Scheepers *et al.* conducted a study about the effects of personality traits on teaching performance of attending physicians on 622 attending physicians and 549 residents from eighteen medical centers in the Netherlands.[15] The results of their study indicates that "Extraversion" is positively related to overall teaching performance, and the attending physicians with "Extraversion" personality trait were constantly estimated as better supervisors.[15] Furthermore, it is mentioned that the characteristics of "Accommodating" learning style includes: enjoyment of doing things and participation in new experiences and taking risks.[16] Moreover, an accommodating learning styled person is very outstanding in the situation, which one must adapt to particular abrupt conditions; nevertheless, this person may be seen as impatient and pushy; typically, these features are found in occupations such as marketing or sales, which are action-oriented.[16] Also, it is shown that the predominant learning styles of surgical learners are "Converging" and "Accommodating" that may have significant effects on academic performance and trainee selection.[16] Thus, it is seen that "Extraversion" personality trait and "Accommodating" learning style are noted findings in two other medical-related studies as well as the results of this research.

Considering the studies about the personality traits in medical students and physicians, it is mentioned that personality-attentive medical career counseling and occupation guidance during and after medical education might lead to improve the fitness of job among physicians.[17,18] Besides, it is believed that the personality evaluation should be used by educators to produce plans that result in augmenting appropriate traits, so this would lead to inter-professional cooperation.[17]

On this subject, it can be mentioned that the strong point of this research was the selection of the "medical education students" as the study population instead of "medical students," who are the main participants in the most of medical education researches.[19-21] For instance, "Neuroticism" personality trait had no relation with any of the learning styles based on the findings of this study. Nevertheless, through a study about personality and achievement along medical training, it is reported that some neuroticism may augment medical academic achievement;[22] therefore, it is emphasized on the fact that all personality traits show the bright and the dark-sides at the same time.[22]

In addition, it is essential to consider that the differences in personality traits directly and indirectly play an important role in contributing to the students' academic performance through self-efficacy.[23] As well, based on the research, it is indicated that personality traits are stable features and stay common within individuals even with different cultures and languages;[24] nor time neither situations can change personality traits in people.[24] However, learning styles are changeable properties and dependent on the background, environment, teaching method, rather than a fixed unchangeable innate trait of a student.[25] Moreover, it seems that there is no clear correlation between personality, learning style, and attitude toward Interprofessional Education (IPE), which is a strategy for improving patients' medical outcome and increase patient safety.[26] In fact, some studies have suggested further investigations about the correlation between personality and learning style, up to now.[5,7,26]

Overall, the results of this study revealed that "Accommodating" learning style might be related to "Extraversion" personality trait in medical education students, and this analytic finding could be in consistent with the part of previous critical review that stated the "Accommodation" type of learning style is correlated best with "Extroversion" type of personality.[5] Obviously, increasing number of participants in such studies can lead to reach more accurate results.

Limitations and recommendation
It should be considered that the most important limitation of this study was the low number of participants due to unresponsiveness of a group of learners. Indeed, the COVID-19 pandemic was one of the most main causes of the situation with low number of the participants.

It is recommended to plan similar studies with higher number of study population to get the accurate results.

Conclusion

In conclusion, the results of this study showed that "Agreeableness" and "Conscientiousness" were the dominant personality traits among the medical education students. Moreover, although "Assimilating" and "Converging" were the dominant learning styles, "Accommodating" was the only learning style that might be related to "Extraversion" personality trait. However, the short number of participants might affect the results.

Conflicts of interest

There are no conflicts of interest.

References

1. Scheele F. The art of medical education. Facts Views Vis Obgyn 2012;4:266-9.
2. Buşan AM. Learning styles of medical students – Implications in education. Curr Health Sci J 2014;40:104-10.
3. Farhang R, Zamani Ahari U, Ghasemi S, Kamran A. The relationship between learning styles and career decision-making self-efficacy among medicine and dentistry students of Ardabil university of medical sciences. Educ Res Int 2020;Article ID 6662634, 6pages.
4. Reynolds QJ, Gilliland KO, Smith K, Walker JA, Beck Dallaghan GL. Differences in medical student performance on examinations: Exploring score variance between Kolb's Learning Style Inventory classifications. BMC Med Educ 2020;20:423.
5. Kamarulzaman W. Critical Review on Affect of Personality on Learning Styles. Online Submission, Paper presented at the International Conference on Arts, Social Science & Technology (2nd, Penang, Malaysia, Mar 3-5 2012) 2012;ERIC Number: ED530903,7pages.
6. Abouzeid E, Fouad S, Wasfy NF, Alkhadragy R, Hefny M, Kamal D. Influence of personality traits and learning styles on undergraduate medical students' academic achievement. Adv Med Educ Pract 2021;12:769-77.
7. Mozaffari HR, Janatolmakan M, Sharifi R, Ghandinejad F, Andayeshgar B, Khatony A. The relationship between the VARK learning styles and academic achievement in dental students. Adv Med Educ Pract 2020;11:15-9.
8. Royal KD, C B Rinaldo J. There's education, and then there's education in medicine. J Adv Med Educ Prof 2016;4:150-4.
9. McCrae RR, Costa PT Jr. A contemplated revision of the NEO five-factor inventory. Pers Individ Diff 2004;36:587-96.
10. McCrae RR, Costa PT Jr., Martin TA, Oryol VE, Rukavishnikov AA, Senin IG, *et al*. Consensual validation of personality traits across cultures. J Res Pers 2004;38:179-201.
11. Laguna M, Purc E. Personality traits and training initiation process: Intention, planning, and action initiation. Front Psychol 2016;7:1767.
12. Alinejhad S, Veisani Y, Aibod S, Azizifar A, Alirahmi M, Mohamadian F. Association of demographic, social, and personality factors with early versus late divorce in women: A cross sectional study in Ilam, West of Iran. Shiraz E Med J 2019; 20(10):e85705, 7.
13. Haghshenas H. The Five-Factor Personality Traits. Iran: Shiraz University of Medical Sciences Publications; 2006.
14. Haghshenas H. Five-factor personality scheme: Theory, tests and clinical and consulting applications NEO FFI & NEO PI-R (Persian). Tehran: Ravansanji Publication; 2016.
15. Scheepers RA, Lombarts KM, van Aken MA, Heineman MJ, Arah OA. Personality traits affect teaching performance of attending physicians: Results of a multi-center observational study. PLoS One 2014;9:e98107.
16. Engels PT, de Gara C. Learning styles of medical students, general surgery residents, and general surgeons: Implications for surgical education. BMC Med Educ 2010;10:51.
17. Cordina M, Lauri MA, Buttigieg R, Lauri J. Personality traits of pharmacy and medical students throughout their course of studies. Pharm Pract (Granada) 2015;13:640.
18. Mullola S, Hakulinen C, Presseau J, Gimeno Ruiz de Porras D, Jokela M, Hintsa T, *et al.* Personality traits and career choices among physicians in Finland: Employment sector, clinical patient contact, specialty and change of specialty. BMC Med Educ 2018;18:52.
19. Masic I. Quality assessment of medical education at faculty of medicine of Sarajevo University – Comparison of assessment between students in bologna process and old system of studying. Acta Inform Med 2013;21:76-82.
20. Seeberger A, Lönn A, Hult H, Weurlander M, Wernerson A. Can empathy be preserved in medical education? Int J Med Educ 2020;11:83-9.
21. Dhar P, Rocks T, Samarasinghe RM, Stephenson G, Smith C. Augmented reality in medical education: Students' experiences and learning outcomes. Med Educ Online 2021;26:1953953.
22. Lourinho I, Ferreira MA, Severo M. Personality and achievement along medical training: Evidence from a cross-lagged analysis. PLoS One 2017;12:e0185860.
23. Hayat AA, Kohoulat N, Amini M, Faghihi SA. The predictive role of personality traits on academic performance of medical students: The mediating role of self-efficacy. Med J Islam Repub Iran 2020;34:77.
24. Bjornsdottir G, Jonsson FH, Hansdottir I, Almarsdottir AB, Heimisdottir M, Tyrfingsson T, *et al.* Psychometric properties of the Icelandic NEO-FFI in a general population sample compared to a sample recruited for a study on the genetics of addiction. Pers Individ Dif 2014;58:10.1016/j.paid. 2013.10.010, 15.
25. Koohestani HR, Baghcheghi N. A comparison of learning styles of undergraduate health-care professional students at the beginning, middle, and end of the educational course over a 4-year study period (2015-2018). J Educ Health Promot 2020;9:208.
26. Olsson C, Lachmann H, Kalén S, Ponzer S, Mellstrand Navarro C. Personality and learning styles in relation to attitudes towards interprofessional education: A cross-sectional study on undergraduate medical students during their clinical courses. BMC Med Educ 2020;20:398.