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Research Article

Determining the learning styles of family medicine residents and investigating their relationship with personality traits

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ABSTRACT

Objective: This study aims to define the learning styles and personality traits of family medicine residents and to explore their interrelationships, contributing to a better understanding of how these factors can enhance the effectiveness of residency training. Unlike previous research, this study specifically examines the alignment between learning styles and personality traits within the context of family medicine training, providing new insights into personalized educational strategies.

Methods: This cross-sectional descriptive study was conducted with 97 family medicine residents in Adana City Training and Research Hospital between 15 February 2023 and 15 April 2023. Sociodemographic data questions, Kolb Learning Styles Inventory-3 and Big Five-50 Personality Test (BFPI-50-Tr) were collected through face-to-face interviews with the participants and the data were analyzed with IBM SPSS 24.0 software.

Results: The majority of the participants exhibited a diverging learning style (48.5%), followed by accommodating (29.9%) and assimilating (19.6%) styles. The highest mean score in personality traits was observed in agreeableness (40.11±4.32), while the lowest mean score was found in extraversion (30.23±6.70). There was no statistically significant relationship between personality test results and learning styles ($p > 0.05$).

Conclusion: The findings suggest that the majority of family medicine residents prefer diverging and accommodating learning styles, which emphasize learning through experience, discussion, and practical application. To optimize residency education, training programs should incorporate group discussions, brainstorming activities, and experiential learning methods tailored to these styles. Additionally, considering the high agreeableness scores among residents, fostering collaborative and interactive learning environments may further enhance their professional development.

Keywords: learning, personality, residency

Introduction

Learning, which is an active process, is defined as a means of acquiring knowledge, skills and experience that creates continuous and permanent behavioral change.[1] This behavior change can occur through learning, repetition and experience. In order for this action, which can occur consciously or unconsciously, to be called learning, this change in behavior must not

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be present in the person's memory beforehand.[2] Although there are many theories to understand how learning occurs, behavioral, cognitive and experiential learning theories are widely discussed until now.[3] According to Kolb, experiential learning is a process in which knowledge is created through the transformation of experience; knowledge arises from the combination of comprehension and transformation of experience.[4,5] In the experiential learning model, the two parts associated with experiential comprehension consist of concrete experience and abstract conceptualization. Similarly, the two parts associated with transforming experience are reflective observation and active practice. The relationship between these four learning expressions reveals learning. This process is described as a learning cycle.[4] Concrete experience refers to learning by feeling. It can be said that people who prefer to learn in this way are open-minded learners who act by relying on their intuition while learning.[6] Individuals who use the learning path on the axis of reflective observation preference learn by watching and want to examine and understand the deep thought of situations with why-why questions, they are learners who can look at events from different perspectives. Individuals who prefer the learning path on the axis of abstract conceptualization learn by reasoning. Individuals who prefer active experience-based learning learn actively by performing. They are learners who like to apply and enjoy achieving their goals.[7]

Personality is a concept that distinguishes the individual who interacts in communities from others and characterizes his/her unique uniqueness. It describes the self-conscious individual's ability to realize himself/herself uniquely and permanently.[8] Researchers have obtained results on the five basic dimensions of personality with different data sets, and although there are still debates on the five basic constructs, these factors can be listed as openness, conscientiousness, extraversion, agreeableness, neuroticism / emotional balance according to the majority.[9] Individuals with high extraversion scores are energetic, positive, warm, sociable and prefer to spend time in social environments. It can be said that the neuroticism dimension score is low in individuals whose emotional balance changes frequently and who show reactions that are not compatible with the effect of the situation experienced.[5,10] Individuals with high scores in the openness dimension have developed imagination, are open to new ideas and experiences, and are curious. The basic dimension of conscientiousness is high in individuals who are in control, planned, stable and organized, while it is low in individuals who are easily distracted and have low reliability.[10] Individuals with high agreeableness score prioritize doing business together over competing.[10] An important factor for success in a professional career is the compatibility of personality traits with the characteristics of the chosen profession.[11]

Family medicine residency aims to equip physicians with a broad range of competencies, including problem-solving skills, adaptability, and effective communication, to provide holistic and continuous patient care. Understanding the learning styles and personality traits of family medicine residents is crucial for optimizing medical education. By identifying individual learning preferences, educators can tailor teaching methods to enhance knowledge retention and clinical decision-making skills. In a field where physicians must balance medical expertise with interpersonal skills, a personalized and structured educational approach can significantly enhance the effectiveness of family medicine training. For these reasons, this study was designed to determine learning styles and their relationship with personality traits.

Materials and Methods

Study type

This cross-sectional study was conducted between 15 February 2023 and 15 April 2023 with 97 family medicine residents working in Adana City Training and Research (ACTR) Hospital.

Study group

The population of the research consisted of 130 family medicine residents working in ACTR hospital. In the calculation made with the Epi-Info statistical program, the sample size was found to be 97 people with 80% power, 95% confidence interval and 5% margin of error. Residents who agreed to participate and completed the consent form were included in the study, while participants who did not agree to participate or who later withdrew consent were excluded from the study.

Procedures

Sociodemographic data (age, gender, marital status, mother and father's education level, family type, number of siblings, type of high school graduated from, duration of professional experience, time spent in residency, 5-point Likert questionnaire, branch satisfaction and dream branch, first learning habits, sites where most time is spent on the internet), Kolb Learning Styles Inventory-3 (KLSI-3) and Big Five-50 Personality Test Turkish Form (BFPI-50-Tr) were administered with a structured questionnaire form. The data were completed by face-to-face interviews with the participants. The 3rd version of the KLSI-3 published by Kolb in 1999 was adapted into Turkish by Gencel and consists of 12 questions.[12,13] BFPI-50-Tr test published by Goldberg in 1992 was translated into Turkish and published by Arkun Tatar in 2017. It consists of 50 questions.[14,15]

Statistical analysis

IBM SPSS version 24.0 statistical package program was used to analyze the data obtained. Descriptive statistics related to the socio-demographic characteristics of the participants were performed. Student's t-test was used for two-group comparisons of normally distributed parameters and Mann-Whitney U test was used for two-group comparisons of non-normally distributed parameters. For comparisons of numerical data between more than two groups, Kruskal Wallis test was used for those not showing normal distribution. Categorical data were compared by Chi-square test. Spearman's correlation analysis was used to evaluate the relationships between numerical data. p value <0.05 was considered statistically significant.

Ethical considerations

Before the study was started, written permissions were obtained from the administrations of the universities whose students were to be included in the study's sample. The approval of the Health Sciences University ACTR Hospital Clinical Research Ethics Committee dated 02/02/2023 and numbered 121-2393 was obtained.

Results

Sixty-five percent (n:65) of the participants were female. The mean age of the participants was 31.41 years (standard deviation 6.59). The minimum age was 25 years and the maximum age was 64 years. The mean duration of professional experience of the participants was 6.6 years (standard deviation; 6.14). The minimum duration of professional experience was 1 year, the maximum was 35 years. The mean duration of residency was 2.8 years, with a minimum of 1 and a maximum of 6 years.

When the learning styles of the participants in this study were examined, 48.5 percent were diverging, 29.9 percent were accommodating, 19.6 percent were assimilating, and 2.1 percent were converging.

When the participants were grouped according to sociodemographic data such as gender, type of specialization, father and mother education level, and the answer to the question "Which medical specialization is your priority?", no difference was found between the groups in terms of learning styles (p>0.05) (Table 1).

In the answers to the mobile applications that the participants spent the most time on the internet, it was seen that 40.2% of them used Instagram®, 25.8% used YouTube®, 7.2% used Twitter®, and no statistical significance was found between application usage preference and learning styles and BFPI-50-Tr data (p>0.05).

When asked what would be the first method they would use to learn about a subject they had no prior knowledge of, 84.5% said they would use the Internet, 10.3% would ask a friend who they thought knew the subject, 3.1% would watch a video and 2.1% would read a book.

When the participants were grouped according to gender, specialty type and the answer to the question "Which medical specialty is your priority?", no difference was found between the groups in terms of mean BFPI-50 scores (p>0.05) (Table 2).

BFPI-50-Tr results, extraversion was the most common factor with an average score of 40.11±4.32, while conscientiousness was found to be 38.56±6.65 and openness was found to be 37.41±4.59. The lowest mean scores were found as neuroticism (31.32±7.66) and extraversion (30.23±6.70). When the participants' high school graduation, parental education level, and the mobile applications they spend the most time on the Internet were compared with the BFPI-50-Tr, no statistical difference was found (p>0.05).

In addition, Table 3 summarizes the learning styles that can be associated with personality traits and summarizes the data obtained in the study.

Discussion

Family medicine residency aims to equip physicians with a broad range of competencies, including problem-solving skills, adaptability, and effective communication, to provide holistic and continuous patient care. Understanding the learning styles and personality traits of family medicine residents is crucial for optimizing medical education. In our country, the importance of family medicine residency in the provision of primary health care services and the process of specialization of general practitioners working

Table 1. Distribution of family medicine residents according to learning style (n=97)

Learning Styles	Gender		Types of residencies		Father's education level			Mother's education level			Which medical residency is your priority?			
	F	M	FT	PT	ES	MS	UN	ES	MS	UN	D	P	F	P
Diverging	29	18	35	12	14	17	16	24	9	14	5	4	8	10
Accommodating	24	5	26	3	7	8	14	14	9	6	8	3	0	2
Assimilating	11	8	18	1	3	10	6	8	10	1	1	1	4	1
Converging	1	1	1	1	0	2	0	0	2	0	1	1	0	0
p	.185+		.086*		.357*			.036*			.017*			

F: Female, M: Male, +: χ^2 test, *: Fisher's Exact Test, FT: Full-time residents, PT: Part-time residents, ES: Primary school and below, MS: Middle - high school, UN: University and above, D: Dermatology, P: Psychiatry, F: Physical Medicine and Rehabilitation, PS: Plastic Surgery

Table 2. BFPI-50-Tr assessment of family medicine residents(n=97)

BFPI-50-Tr assessment	Gender				Types of residencies				Which medical residency is your priority?				
	F	M	P+	d'	FT	PT	P^	d'	D	P	F	PS	P*
Extraversion	30.14 ± 6.99	30.44 ± 6.17	.838	.04	30.16 ± 6.94	30.77 ± 5.60	.723	.10	28.60 ± 3.56	32.44 ± 9.33	28.76 ± 8.99	30.54 ± 5.59	.539
Agreeableness	40.61 ± 4.15	39.09 ± 4.55	.104	.35	39.85 ± 4.47	41.35 ± 3.43	.195	.37	39.54 ± 3.42	39.89 ± 4.76	40.75 ± 5.64	40.54 ± 4.20	.890
Conscientiousness	38.87 ± 6.34	37.93 ± 7.33	.516	.13	38.81 ± 6.89	37.41 ± 5.44	.434	.22	36.07 ± 8.77	37.44 ± 8.20	38.42 ± 6.76	38.39 ± 6.10	.826
Neuroticism	30.13 ± 7.10	33.72 ± 8.31	.030	.46	30.18 ± 7.20	36.70 ± 7.69	.001	.87	28.80 ± 5.77	33.00 ± 7.37	28.25 ± 8.57	35.00 ± 5.20	.040
Openness	36.83 ± 4.59	38.59 ± 4.44	.076	.38	37.16 ± 4.43	38.59 ± 5.32	.248	.29	38.08 ± 4.74	36.66 ± 4.61	37.33 ± 4.65	39.15 ± 4.26	.611

+: Anova, *: Kruskal Wallis, ^: İndependent Sample T Test, ': Cohen's d, F: Female, M: Male, FT: Full-time residents, PT: Part-time residents, D: Dermatology, P: Psychiatry, F: Physical Medicine and Rehabilitation, PS: Plastic Surgery

in the field continues rapidly. In 2024, there are 2720 family medicine residency positions in the medical specialization exam. Current family medicine fellows work by optimizing educational opportunities for the increasing number of medical residencies. Determining the learning styles and personality traits of physicians can be considered as a suggestion to relieve the optimization effort. In this study, 48.5% of family medicine residents had a diverging learning style. Individuals with diverging learning styles learn by feeling and watching. This feature is more related to creativity. According to Kolb, those who prefer a diverging learning style have a strong imagination ability. These people are sensitive to meaning and values and perform best in situations that require the generation of alternative ideas and results, such as brainstorming.[4] They can see concrete situations from many perspectives and are multidimensional thinkers.[5] They are open-minded, like to work with others, and have broad cultural interests. They have a high holistic perception and can integrate many relationships into a meaningful whole. The accommodating learning style overlaps with family physicians' style that such as to listen to people, cares about values, can associate symptoms and diseases and evaluate the patient from a holistic perspective, prefers to exchange information and co-operate with colleagues, and can produce alternative ideas in the treatment of patients. Since each physician has a unique way of learning, understanding their strengths and weaknesses in this respect will help educators to develop appropriate learning techniques. For family medicine residents with a diverging learning style, the use of multiple perspectives in education and the diversity of educational materials and activities may be beneficial. Inclusion of creative activities in education, group work in a way that they can discuss, and share can make education more enjoyable for these individuals. Providing feedback to residents during the education process may improve the education of individuals who learn in this style.[2-5]

Table 3. The relationship between BFPI-50-Tr mean scores and the learning styles

BFPI-50 Personality Trait	Related learning style	Explanation		Diverging	Accommodating	Assimilating	Converging
Extraversion	Accommodating or diverging	Extraverted individuals tend to prefer social interactions and active experiences. They are drawn to group work, discussions, and hands-on activities.	r	.060	-.039	-.132	.086
			p	.557	.703	.197	.404
Agreeableness	Diverging	Agreeable individuals are cooperative and empathetic, making them more comfortable with collaborative learning, group discussions, and exploring others' perspectives.	r	-.012	-.084	.000	.071
			p	.911	.412	.997	.491
Conscientiousness	Assimilating or Converging	Highly conscientious individuals prefer structured learning environments with clear goals. They are often inclined toward understanding theoretical models and working systematically.	r	-.063	-.058	-.020	.147
			p	.542	.571	.846	.151
Neuroticism	Diverging or accommodating	Individuals with high neuroticism may prefer supportive and low-pressure learning environments. They tend to feel more comfortable with experiential and flexible learning rather than abstract conceptualization under stress.	r	-.070	.090	.049	-.017
			p	.493	.380	.630	.868
Openness	Diverging or assimilating	Open individuals are curious and creative, often drawn to innovative ideas and novel experiences. They are likely to embrace both abstract thinking and hands-on exploration.	r	-.056	.000	-.067	.095
			p	.588	1.000	.516	.356

29.9% of family medicine residents learn with the accommodating learning style. Accommodating learning style is a style that comes to the forefront in the plan-program making, decision-making and implementation phase. They seek opportunities to lead a community and assume a leadership role. They tend to integrate with society personally. They act on emotional data rather than logical explanations. It coincides with the fact that family physicians are individuals who give importance to the opinions of other colleagues in the multidimensional treatment of patients, who need to lead because they manage a patient in every aspect, who have a high ability to lead other health personnel in their own workplaces, and who require community involvement and integration.[2,4,5]

In this study, in the evaluation of family medicine residents according to the B5PI-50-Tr, it was determined that the highest mean score was in the field of agreeableness factor, followed by the conscientiousness factor, and the lowest means were in the extraversion and neuroticism. Openness factor ranked third in the mean score. In a study conducted by Maron et al. evaluating the specialty choices and personality traits of medical students, students who chose family medicine residents had low scores in neuroticism compared to others.[16] Students who chose family

medicine had higher scores in agreeableness and conscientiousness than those who chose other specialties, but these differences did not reach statistical significance. The personality traits of the researchers in surgical residents were not found to be different from those of the students who chose non-surgical specialties. According to the results of this study, it can be said that personality profiles existing before medical school predict orientation towards some specialties.[16]

In a cross-sectional study conducted in Sweden with physicians who have completed or are about to complete their specialization in various branches on the effect of personality traits on their choice of specialization, it was found that agreeableness trait was dominant among primary care physicians and internists, surgeons scored higher in the conscientiousness factor than psychiatrists and hospital service specialists (forensic medicine, medical genetics, biochemistry, radiology, etc.), but exhibited low scores in agreeableness trait, while psychiatrists were found to be prominent in openness to experience score.[17]

In a study on personality traits and career choices conducted by Mullola et al. in Finland, occupational health clinicians and general practitioners showed higher compatibility compared to other specialists.[18] Openness trait is associated with being more willing to experience, to new ideas, and to accept the unconventional. In addition, a better understanding of dominant personality traits in different disciplines in medical doctors may help interdisciplinary teamwork and patient care by promoting self-reflection and professional development. Personality trait studies to be conducted in different specialties in our country may be useful to see personality differentiation in different specialties.[18]

In a study conducted to examine personality differences between residents in surgical and internal departments in an Asian population, internal medicine residents scored higher on agreeableness.[19] It is known that more agreeable people tend to be more cooperative, polite, sympathetic, as opposed to harsh or rude. In contrast to internal medicine, where open discussion and sharing of ideas are integral to the success of a healthcare team, surgical residents scored higher on the ''extraversion'' factor, which indicates someone who is more enthusiastic, active and assertive rather than timid or shy.[19]

In the review by Borges and Savickas, family physicians were characterized by being agreeable and conscientious, but they differed in terms of openness to experience. For instance, family medicine residents have been shown to be less open to experience than primary care physicians who have completed their residency training. It was concluded that family physicians may show more conscientiousness than physicians in other specialties and that family physicians can be characterized as sympathetic, reassuring, cooperative and altruistic in relation to agreeableness.[20]

In this study, the highest mean score of family medicine residents was found to be agreeableness. The “agreeableness” trait in the BFPI-50-Tr refers to a person’s general tendency to adapt, cooperate and establish harmonious relationships. The ability to adapt quickly to new situations, to show flexibility and adapt to changing conditions, and to have a positive attitude in social relationships are more common in adaptive people. Thanks to these characteristics, well-adjusted individuals are better able to cope with stressful or uncertain situations.[21]

In family medicine practice, agreeableness can support closer and better communication with patients and improve communication skills, collaboration between patient-physician or physician-physician, coping with stress, and increasing patient satisfaction and compliance with treatment. This may result in effective health care delivery and better treatment outcomes.

Higher agreeableness scores were associated with working in the private sector and specializing in occupational health as well as general practice, while lower agreeableness scores were associated with specializing in surgery.[20] Agreeableness was also found to predict clinical competence in medical students. This may facilitate doctor-patient relationships.[18,22]

In this study, the mean conscientiousness scores were high. Conscientiousness score may help family physicians to act within the framework of professional duties and ethical values, adherence to patient care standards and fulfillment of professional responsibilities may help physicians to exhibit strong professional behavior. Like the agreeableness trait, the conscientiousness trait also predicts the ease of working together and establishing cooperation. Conscientiousness has been found to be an important predictor of success in different professional and academic settings, including medical education.[23,24] The qualities associated with conscientiousness, such as efficiency, reliability, and thoroughness, overlap with the requirements of medical practice. Low levels of conscientiousness, which can lead to poor outcomes in some fields, have even been suggested as an exclusion criterion in the evaluation process of medical school applicants.[22] Many studies have shown that personality traits influence the choice of specialty. Therefore, different specialty preferences may be related to different personality traits. For example, in a study conducted by Stilwell et al. it was observed that the choice of surgical specialty in the direction of professional development was strongly positively correlated with the trait of conscientiousness and negatively correlated with the trait of agreeableness.[25] It is assumed that individuals' personality traits being suitable for the criteria of a job is a key point in professional career.[11]

In our study, no relationship was found between learning styles and personality traits. This may be due to the small sample size. Furnham reported in his article that personality metrics, especially extraversion and neuroticism, are strongly associated with learning styles.[26] Ibrahimoglu et al. similarly reported a relationship between learning styles and personality traits.[27]

Lee and Wu reported that personality traits can be used to develop adaptive learning models to increase student learning effectiveness and that people with different personality traits have different problem-solving skills.[28]

Abouzeid et al. reported that the most common personality traits were agreeableness and openness and that they were related to personality traits, although no significant relationship was found between personality traits and academic achievement in a study conducted in medical faculty.[29]

Komarraju et al. reported that conscientiousness and agreeableness were positively related with all four learning styles.[30]

Jensen's research examined many studies in literature comparing personality traits and learning styles and as a result, conscientiousness in particular was found to be related to academic success.[31]

Study limitations and strengths

This study is a cross-sectional study conducted in a single hospital. Therefore, the results may not be generally applicable to all settings and at different time points in the physician's career, and further prospective studies with larger numbers are needed to confirm the associations found in this study. Longitudinal and larger sample size studies that also examine how learning styles and

personality traits change as physicians go through learning processes would greatly benefit the literature.

Conclusion

Determining the dominant learning styles and personality traits of family medicine residents can increase the quality of education, professional efficiency, and branch satisfaction by organizing the environment, educational tools and materials, and curriculum in educational programs. Especially considering that family medicine residents with diverging learning style, which constitutes the majority in this study, learn predominantly by using concrete experience and reflective observation, it may be recommended to prioritize educational activities that emphasize ideas such as group discussions and brainstorming. Curriculum designers and course implementers should create content to utilize all learning modes. Since there will be assistants of all learning styles in an educational environment, the use of all learning modes in education in accordance with the experiential learning cycle can improve the quality of education.

Being aware of the personality traits of individuals, especially before their professional career choices, and exhibiting appropriate behaviors while making their choices can be considered one of the most important points in building a happy and successful future for individuals. Providing counseling and mindfulness training to doctors in their educational lives can be an important step for career structuring.

Ethical approval

This study has been approved by the Health Sciences University ACTR Hospital Clinical Research Ethics Committee (approval date 02.02.2023, number 121-2393). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: RA, MT; data collection: RA; analysis and interpretation of results: RA, MT; draft manuscript preparation: RA, MT. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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