ORIGINAL RESEARCH PAPER
Volume-6 | Issue-11 | November-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THE PREFERRED LEARNING STYLES OF SAUDI FAMILY MEDICINE RESIDENTS

Medicine

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ABSTRACT

Trainers in the family medicine program must have knowledge of the preferred method of education of residents to develop appropriate teaching methods. LS is defined as an individual's unique approach to learning. This study's intent was to determine the preferred learning styles of family medicine residents in the Kingdom of Saudi Arabia, and to compare those styles with sociodemographic personal characteristics. A descriptive cross-sectional study using the VARK questionnaire was conducted among family medicine residents from all training centers in various Saudi Arabian provinces. Results revealed that the unimodal aural LS was the most preferred while the multimodal LS was the least preferred. A significant relation was found between visual LS and residency level (p= 0.045). However, there was no relation between a preferred LS and either sociodemographic characteristics or GPA. These findings can help training programs improve the quality of the teaching process to better fit preferred learning styles.

KEYWORDS

Introduction and Literature Review:

There is a tremendous demand for family physicians in the Kingdom of Saudi Arabia. The Ministry of Health has dealt with this issue by requesting a 14-month training program that included various major and subspecialty rotations (Al-Khaldi et al. 2014). There are more than 2,000 primary healthcare centers in the Kingdom of Saudi Arabia. That number is expected to increase, which will create a continual demand for qualified Family Physicians. The growing number of primary care centers is an issue that prompted authorities (including those in the Saudi Commission for Health Specialties) to meet the subsequent demand for personnel by increasing the number of training centers.

To develop an efficient health care system, family physicians should be professionally trained. The Kingdom of Saudi Arabia opened the family medicine residency training program in 1996. It has been 32 years since the Saudi Board of Family Medicine was established. At the time of this study, the family medicine training program in Saudi Arabia was a four-year program. To improve educational methods during the residency program, trainers should be familiar with the learning style of their residents (scfhs.org.sa 2017).

There are some learning–related concepts that have been the focus of attention when attempting to identify the factors affecting learning performance. One of those factors, learning style (LS), has been the focus of this study. LS refers to the concept that people learn information in a variety of ways (Al-Khaldi et al. 2014).

LS is a theory that positively affirms that learners have distinct preferences for how they process and understand information. A structural LS tends to be stable over time. However, the style may change between experiences or processes. Keefe (1979) defined LS as "the composite of cognitive, affective and physiological characteristics that serve as relatively stable indicators of how a learner perceives, interacts and responds to a learning environment".

Many tools have been developed to understand how a person learns.

These include Vermunt's Inventory of Learning Styles, Kolb's learning styles, the Myers-Briggs Type Indicator, and Fleming's VARK Questionnaire.

Fleming established the VARK mode in 1987. It is based on a categorization of learners by their preferred sensory modalities, i.e., visual (V), aural (A), read/write (R), and kinesthetic (K). Some examples of the VARK learning style preferences (LSPs) are the examination or creation of pictures and animations (visual), discussions and question-answer sessions (aural), taking notes or creating laboratory reports (read/write), and engaging in physical experiences or manipulating objects (kinesthetic). A single learner can have a dominant modality preference for learning (unimodal), or have a preference for a combination of two or more sensory modalities (multimodal) (Almigbal 2015).

The relationship between LS and academic performance has been studied by many academic researchers. Some impressive results were found by the Roger H. Kim study. Kim's study revealed that general surgery residents showed a strong overall preference for a multimodal LS (Kim et al. 2015). In another study, more than two-thirds of medical students preferred a dominant unimodal LS, while the remainder preferred a multimodal LS (Liew et al. 2015). At the International Medical University (IMN) in Kuala Lumper, students who selected a unimodal LS strongly preferred the kinesthetic type (Liew et al. 2015). Another study revealed that one-third of pre-clinical medical students in Oman equally preferred different unimodal LSs, and that the remainder preferred either bimodal or multimodal LSs (Panambur et al. 2014).

Alkhasawneh et al. discovered that a multimodal LS (mostly the kinesthetic type paired with a visual or read/write preference) was dominant for more than half of all nursing students (Al-Khasawneh 2013).

In Saudi Arabia, little is known about the relationship between learning style preference and academic achievement. However, a multimodal LS was discovered to be the most commonly preferred LS among 4th-and-5th-year medical students at the King Saud bin AbdulAziz

University for Health Sciences (Nuzhat et al. 2011). Furthermore, the study revealed that students who preferred a unimodal LS mainly preferred either the aural or kinesthetic types (Nuzhat et al. 2013).

All VARK modalities were found by Almigbal et al. (2015) to be the most commonly preferred LSs among students attending King Saud University in Riyadh.

In the same university, another study was conducted among 1st-year dental students, and revealed that most of those students preferred a multimodal LS that variously consisted of bimodal, tri-modal, and quad-modal styles. Among students preferring a unimodal LS, the aural type was predominant, followed by kinesthetic (Al-Saud LM).

The same study also revealed that there was a statistically significant difference in the mean value of GPA and the students' learning style preferences, but no significant relationship between gender and LS preferences (Al-Saud LM). This evidence contrasts with the study performed by Choudhary et al. (2011), which revealed a significant association between gender and LS preferences.

Objectives:

1. To determine the predominant learning style of family medicine residents in Saudi Arabia.
2. To investigate the predictors of learning style preferences for Saudi family medicine residents.

METHODOLOGY:

Study design:

A cross-sectional study was conducted among Saudi board of family medicine residents in Saudi Arabia.

Study setting and demographics:

Saudi board of family medicine residents are categorized as either level 1 (R1), level 2 (R2), level 3 (R3), or level 4 (R4). Our study involved all R2, R3, and R4 family medicine residents from the central, eastern, western, and southern provinces of the Kingdom of Saudi Arabia. At the time of our survey, R1 residents were new to the training program, and were excluded from the study because there was no database information for them.

The criteria for family medicine residents to be included in the study was the completion of at least one year of residency training, which included both male and female physicians.

Sampling technique:

We contacted 580 residents through their respective chief resident, and asked for their participation in the study. Of those contacted, 328 agreed to participate in the study.

Data collection tools:

Self-administered questionnaires were given to all study participants (Appendix 1.1). The survey consisted of two sections. The first section asked for the participant's sociodemographic data (region of living, training center, age in years, sex, marital status, number of children, residency level, service experience after graduation from university, and university GPA). The second section consisted of the validated VARK questionnaire, version 7.8 (Appendix 1.2), which consists of 16 questions and 4 options for each question. The VARK questionnaire was selected because it is concise and easy to use.

Variable definitions:

The primary outcome of the study was the ability to discern the LSs of family medicine residents. The independent variables were sociodemographic factors such as sex, age in years, marital status, and GPA.

Unimodal LS was defined as a method that contains only one learning style. Bimodal LS was defined as a method that contains two learning styles, and multimodal LS was defined as a method containing more than two learning styles.

For the purpose of this study, we created a variable called major learning style, which is defined as a unimodal learning style that includes the choice of a bimodal or multimodal LS that contains the same learning style. E.g., major Aural (A) = Aural (A) + Aural and Visual (AV) + Aural and Kinesthetic (AK) + Visual and Reading (VR) + Visual, Aural and Kinesthetic (VAK) + Visual, Aural and Reading (VAR) + Visual, Aural, Reading and Kinesthetic (VARK). The same method was applied to the Visual, Kinesthetic, and Reading/Writing styles.

Data management:

Data were encoded into SPSS statistical software, version 21. Descriptive statistics (mean, standard deviation, and percentage) were used to describe the quantitative and categorical variables.

A p-value of less than 0.05 was considered statistically significant. Chi-square, correlation, bivariate analysis, ANOVA, the independent t-test, and the Mann-Whitney test were used. The parametric alternative test was used when appropriate. Missing data were excluded.

Ethical considerations:

Two stages of ethical approval were taken. First, the approval of the eastern province family medicine research committee was obtained. Second, the approval of the eastern provinces regional family medicine training committee was obtained. The use of the VARK questionnaire was approved by Neil D. Fleming (designer of the VARK Questionnaire), who we contacted by e-mail. Consent was obtained from all study participants.

Confidentiality of all gathered information was maintained throughout the study, and will only be used for the survey.

Pilot study:

A pilot study was conducted on a number of R4 family medicine residents in the eastern province. All pilot study participants were excluded from the primary study.

RESULTS:

Out of 328 family medicine residents who formally agreed to participate in the study, 317 residents returned completed questionnaires. The response rate was 97%. The mean age of the study participants was 28+/-2.46 years.

As illustrated in Table 1, just over half of all participants were females (51.4%). Most participants were married (63.1%), followed by single (35%), and divorced (2%).

Among all participants, more than half had no children, 39.4% had 1-2 children, and about 5% had 3-5 children.

Regarding GPA, most (55.1%) held a GPA of 3.1-4, followed by those with a GPA of more than 4 (27.5%), those with a GPA between 2-3 (16.1%), and finally those with a GPA of less than 2 (1.3%). Regarding residency levels, R2, R3, and R4 were distributed at 36.6%, 32.8%, and 30.6% respectively.

This study revealed that the range of years for experience of participants was one to fifteen years with a mean of 4.1+-2.07.

Table 1. Socio-demographic characteristics of study participants.

Characteristics	N= 317	n. (%)
Sex		
Male		154 (48.6%)
Female		163 (51.4%)
Marital status		
Single		111 (35.0%)
Married		200 (63.1%)
Divorced		6 (1.9%)
Number of children		
none		177 (55.8%)
1-2		125 (39.4%)
3-5.		15 (4.7%)
GPA		
Less than 2		4 (1.3%)
2-3		51 (16.1%)
3.1-4		174 (55.1%)
More than 4		87 (27.5%)

In terms of the distribution of study participants among Kingdom of

Saudi Arabia provincial training centers, this study revealed that the western province reported the highest participant number (42.9%), followed by the eastern province (24.6%), southern province (22.4%), and central province (10.1%) (Figure 1).

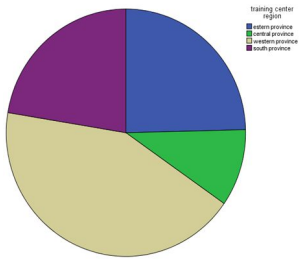

Figure 1: Distributions of study participants among KSA provinces training center

As shown in Figure 2, the aural LS was the most preferred learning style (25.6%), followed by visual LS (24.3%), and the lowest was read/write (11.4%). The bimodal (VR) learning style was the most preferred learning style (4.1%), followed by (AK) (3.2 %).

Multimodal LS was the least-distributed learning style. Furthermore, the VAR LS was the most preferred of the multimodal learning styles (Figure 2).

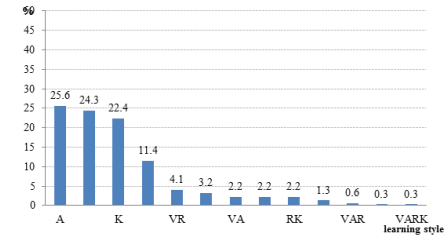

Figure 2: Distribution of residents according to all learning styles

The major aural LS (as defined previously in this study) was the most preferred learning style (34.4%), followed by visual (33.4%), kinesthetic (30.6%), and read/write (19.6) (Figure 3).

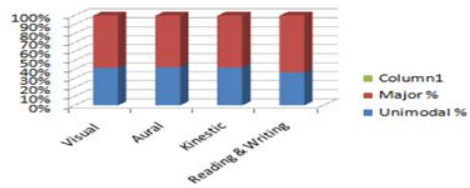

Figure 3: Major learning style distributions among Saudi family medicine residents

Table 2: Correlation between learning styles and the characteristics of study participants.

	oral		Visual		Kinestic		Reading						
		No(%)	X^2		No. (%)	X^2	.	No(%)	X^2,		No(%)	X^2	
training center region	eastern province (n=78)	26	(33.3)	X2: .249	28	(35.9)	X2:1.38	28	(35.9)	X2:6.895	15	(19.2)	X2: 1.202
	central province (n=32)	10	(31.3)		13	(40.6)		5	(15.6)		6	(18.8)	
	western province(n=136)	48	(35.3)		42	(30.9)		47	(34.6)		24	(17.6)	
	south province(n71)	25	(35.2)		23	(32.4)		17	(23.9)		17	(23.9)	
sex	Male (n=154)	55	(35.7)	X2:.235	54	(35.1)	X2:.356	50	(32.5)	X2:.492	25	(16.2)	X2:2.104
	Female (n=163)	54	(33.1)		52	(31.9)		47	(28.8)		37	(22.7)	
marital status	Married (n=200)	71	(35.5)		68	(34.0)		63	31.5%		38	(19.0)	
	Single(n=111)	36	(32.4)	X2:.301	36	(32.4)	X2:.079	33	(29.7)	X2:.664	23	(20.7)	X2:.167
	Divorced(n=6)	2	(33.3)		2	(33.3)		1	(16.7)		1	(16.7)	
	Widowed	0	(0.0)		0	(0.0)		0	(0.0)		0	(0.0)	
GPA	less than 2(n=4)	1	(25.0)		2	(50.0)		1	(25.0)		0	(0.0)	
	2-3(n=51)	19	(37.3)	X2: .485	14	(27.5)	X2:4.481	18	(35.3)	X2:1.378	13	(25.5)	X2:4.120
	3.1-4(n=174)	58	(33.3)		53	(30.5)		55	(31.6)		36	(20.7)	
	more than 4(n=87)	31	(35.6)		36	(41.4)		23	(26.4)		12	(13.8)	
residency level	R2(n= 116)	38	(32.8)	X2: 2.196	42	(36.2)	X2:6.197 *	26	(22.4)	X2: 5.922	24	(20.7)	X2:4.208
	R3(n=104)	32	(30.8)		41	(39.4)		38	(36.5)		14	(13.5)	
	R4(n= 97)	39	(40.2)		23	(23.7)		33	(34.0)		24	(24.7)	

As shown in Table 2, this study revealed a statistically significant difference between participant residency level in terms of visual learning style (p= 0.045), while there was no significant difference found in aural, kinesthetic, and read/write learning styles.

There was no significant statistical difference between learning style and other sociodemographic data, including sex, marital status, number of children, and GPA.

Using the Mann-Whitney Test, the study revealed that there was no statistically significant relationship between learning style and age. Also, there was no statistically significant relationship between learning style and the years of experience of Saudi family medicine residents, as shown in Table 3.

Table 3: The relation between years of experience and different learning styles

L.S		Years of Exp.					Mann-Whitney	
		Mini	Max	Median	Mean	SD	z	P value
Visual	yes	1	11	4	4.03	2.16	-518	-,605
	no	1	15	4	4.12	2.12		
aural	Yes	1	12	4	4.22	2.14	-.857	-.391
	no	1	15	4	4.02	2.12		
Kinesthetic	yes	1	10	4	4.11	1.88	-.777	-.437
	No	1	15	4	4.08	2.23		
Reading	Yes	1	15	4	4.30	2.48	-.593	-.552
	No	1	12	4	4.04	2.04		

Discussion:

Learning style has significant implications for the education of medical residents (Kim et al. 2015). The study sample was of equal distribution for the sex of participants. About one-fourth of study participants had a GPA of more than 4 (27.5%), which could be

explained by levels of high selectivity in the Saudi family medicine residency program selection criteria, as outlined by the Saudi commission for health specialties.

The response rate was high (97%), with participants being predominantly from the western province (42.9%). This variation was likely due to the many training centers and five large cities in the western province.

As a unimodal LS, the aural learning style was the most prominent style among Saudi family residents (25.6%). This finding was consistent with many studies (10, 14, 6, 12). Furthermore, the study's findings contradicted with the findings of other studies, which found that the kinesthetic style was the most preferred (Kim et al. 2015).

Unlike in most studies of the subject (Almigbal et al. 2014; Zeerati et al. 2008), current study participants reported that multimodal LS (all VARK) was least preferred. This contradiction could be due to circumstances in which participants choose a single answer when responding to most questions, and could also be explained by differences in survey samples. Most studies on the subject were conducted on undergraduate medical students, while this study was carried out on post-graduate family medicine residents.

Unlike in other studies, which found that AK was the most preferred bimodal learning style, our study indicated that VR was predominant. The Aural major learning style is defined as a unimodal LS that includes a choice of a bimodal or multimodal LS that contains the same learning style, and was reported as the most preferred learning style by Saudi family medicine residents.

This study revealed that residency level was significantly correlated to learning style preference. This finding was not consistent with the findings of Kim et al., in which there was no significant relation between those variables (Kim et al. 2015). This could be explained by two circumstances. First, each study contained a different design and sample. Second, we hypotheses that R4 participants were considered to be in their final year of training, and were preparing themselves for the Saudi board exam.

As expressed by many other studies, this study indicated that there was no significant association between sex and learning style preference (Zeerati et al. 2008; Nuzhat et al. 2013; Al-Khasawneh 2013; Kim et al. 2015). However, some studies have demonstrated a significant relationship between learning style preference and sex (Dobson 2010; Choudhary et al. 2011; Almigbal 2015).

The main strength of this study was in its large sample size relative to similar studies. In conclusion, aural was the most preferred unimodal LS, and VAR was the most preferred multimodal LS. Also, residency level was significantly related to the visual unimodal LS.

Recommendations:
This study recommends that Saudi family medicine residency program trainers should use more than one learning modality during training. We encourage the trainee, as well as the trainers, to use an LS instrument such as VARK. These instruments allow a more careful consideration of the activities that are effective for comprehensive learning.

Availability of data and materials:
The datasets used and analysed in this study are available from the corresponding author upon reasonable request.

Competeing interests:
There are no conflicts of interest.

Funding: Nil

Authors' contributions:
Dr. Norah Almarri and Dr. Rawan Asiri and Dr.Moataza Abdel Wahab are the corresponding authors; Dr. Bader Al-Mutairi is a Co-author, contributed as a supervisor and participated in writing the research methodology, results, discussion and recommendation.

ACKNOWLEDGMENTS:
We thank Dr.Abdulmajeed Alnejaim for his support of this work . We give special thanks to our families for their patience and continuous support. The authors thank Neil D. Fleming for permission to use the VARK questionnaire © Copyright Version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand.

Also, We would like to thank Editage(www.editage.com) for English language editing.

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