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Learning preferences of surgery residents: a multi-institutional study



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ABSTRACT

Background. The VARK model categorizes learners by preferences for 4 modalities: visual, aural, read/write, and kinesthetic. Previous single-institution studies found that VARK preferences are associated with academic performance. This multi-institutional study was conducted to test the hypothesis that the VARK learning preferences of residents differ from the general population and that they are associated with performance on the American Board of Surgery In-Training Examination (ABSITE).

Methods. The VARK inventory was administered to residents at 5 general surgery programs. The distribution of the VARK preferences of residents was compared with the general population. ABSITE results were analyzed for associations with VARK preferences. χ^2 , Analysis of variance, and multiple linear regression were used for statistical analysis.

Results. A total of 132 residents completed the VARK inventory. The distribution of the VARK preferences of residents was different than the general population ($P < .001$). The number of aural responses on the VARK inventory was an independent predictor of ABSITE percentile rank ($P = .03$), percent of questions correct ($P = .01$), and standard score ($P = .01$).

Conclusion. This study represents the first multi-institutional study to examine VARK preferences among surgery residents. The distribution of preferences among residents was different than that of the general population. Residents with a greater number of aural responses on VARK had greater ABSITE scores. The VARK model may have potential to improve learning efficiency among residents.

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A common experience of surgical educators is an unsuccessful attempt at communicating a concept or transferring knowledge to a trainee. One possible explanation for this type of experience comes from the theory of learning styles, which is based on the premise that learners have distinct preferences for the manner in which they assimilate new information and knowledge.¹ A mismatch between a preferred learning style of a trainee and the teaching method of the instructor can serve as a barrier to learning, analogous to trying to fit the proverbial square peg into a round hole.² This type of mismatch may be the cause for these failed attempts at transfer of knowledge in surgical education and can be responsible for substantial frustration for both the teacher and the learner.

The VARK model developed by Neil Fleming groups learners based on their preferences for sensory modalities: visual (V), aural (A), read/write (R), and kinesthetic (K), or as multimodal (MM).³ The validity of the VARK model has been reported across a diverse spectrum of learners.^{4–10} The VARK learning preferences have been examined previously among surgery residents and applicants interviewing for general surgery residency; these studies found that these groups have different distribution of VARK preferences than that of the general public.^{11,12} In addition, performance on standardized tests, such as the United States Medical Licensing Examination (USMLE) and the American Board of Surgery In-Training Examination (ABSITE), has been found to be associated with the VARK learning preferences.^{12,13} These studies, however, were conducted in single-institution settings; it is unclear if the findings from these studies can be generalized.

To address this issue, investigators from 5 institutions across the United States partnered to form the VARK Collaborative Research Group with the goal of conducting multi-institutional research on VARK preferences in various learner populations. In this study, we, the VARK Collaborative Research Group, report the findings of a

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multi-institutional investigation of VARK learning preferences among general surgery residents in our institutions: Louisiana State University Health Sciences Center—Shreveport, The University of Arizona College of Medicine, Geisinger Medical Center, Ochsner Clinic Foundation, and Tulane University School of Medicine. We hypothesized that the learning style preferences of general surgery residents differ from that of the general population and that ABSITE performance is associated with VARK learning style preferences.

Methods

The study protocol was reviewed and received exempt status from the Institutional Review Board of the Louisiana State University Health Sciences Center—Shreveport. The Fleming VARK learning styles inventory (<http://www.vark-learn.com/>) was administered during the 2014–2015 academic year to residents at 5 general surgery residency programs: 3 university hospital-based and 2 independent programs.

The VARK inventory consisted of 16 multiple choice questions, each with 4 possible responses. The instructions for administration of the VARK inventory involved instructing residents to choose 1, more than 1, or none of the 4 possible responses to each question. Responses to the inventory were scored to determine the learning style preferences for each resident. All VARK inventories were scored centrally by VARK Learn, Ltd (Christchurch, New Zealand). Residents were classified as having a dominant unimodal preference for visual (V), aural (A), read/write (R), or kinesthetic (K) learning styles or as having a multimodal preference (MM). The MM category encompasses all possible combinations of 2, 3, or 4 of the sensory modalities.

Resident performance on the USMLE Step 1 and Step 2 Clinical Knowledge (CK) and ABSITE were collected. Residents with missing data for any individual examination were excluded from the respective analyses. We collected basic demographic data, including gender, categorical versus preliminary residency status, type of residency program, and postgraduate year (PGY) level. All participant data were collected in a de-identified fashion by using identifiers provided by the individual residency programs to link VARK responses to the standardized test performances and other collected data.

Statistical analysis was performed using SPSS Version 21 (IBM Corp, Armonk, NY). χ^2 Analysis, analysis of variance, and multiple linear regression were performed for statistical analysis.

Results

Across the 5 participating general surgery programs, there were a total of 160 residents enrolled at the time of the study. Of these, 132 residents completed the VARK inventory for an overall response rate of 82.5%. Response rates at individual programs ranged from 78% to 92%. The demographic characteristics of the study participants are listed in Table 1. Sixty-six percent of participants were male. Sixty-one percent of participants were at university hospital-based programs and 39% were at independent programs. Seventy-eight percent were categorical residents. Thirty-six percent of residents were in the PGY-1 level, with roughly equal proportions in the remaining years.

The distribution of learning style preferences according to the VARK inventory among residents is shown in Fig 1. The majority of residents had a multimodal (MM) preference (61%). Residents with dominant kinesthetic (K) preferences represented the greatest proportion among those with unimodal preferences (17%). Read/write (R) preferences was the smallest group at 5%. The distribution of learning style preferences of residents and that reported for the general population of VARK respondents (data from VARK website, <http://vark-learn.com/introduction-to-vark/research-statistics/>) are

Table 1
Demographic data of study participants (n = 132).

Characteristic	Residents n (%)
Gender	
Male	87 (66%)
Female	45 (34%)
Program type	
University hospital based	81 (61%)
Independent	51 (39%)
Resident status	
Categorical	103 (78%)
Preliminary	29 (22%)
PGY level	
PGY-1	48 (36%)
PGY-2	25 (19%)
PGY-3	20 (15%)
PGY-4	21 (16%)
PGY-5	18 (14%)

shown in Table 2. The VARK distribution of residents was different from that of the general population ($P = .0007$), with the greatest difference being in the proportion of unimodal R respondents (5.3% of residents vs 10.2% of general population). There were no differences in VARK distribution when analyzed by gender ($P = .70$) or by residency program ($P = .52$).

The mean percentile rank scores of the ABSITE, raw percent correct, and standard scores by learning style preference are shown

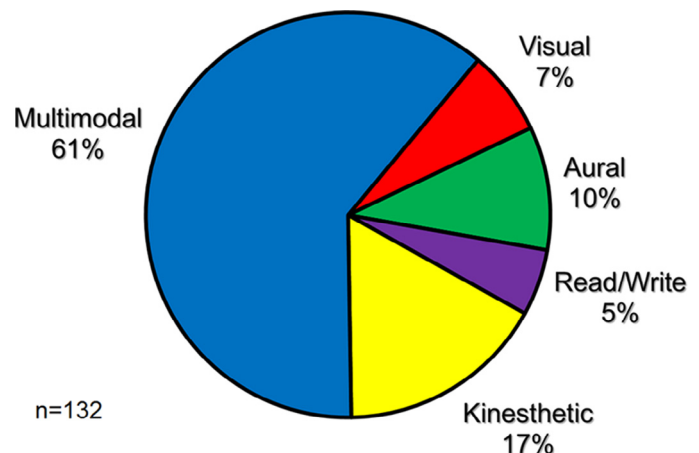


Fig. 1. Distribution of VARK learning style preferences among residents.

Table 2
Distribution of VARK learning style preferences for residents versus general population of VARK respondents.

VARK preference	Residents	General population	P
V	6.8%	3.9%	.0007
A	9.8%	7.5%	
R	5.3%	10.2%	
K	16.7%	14.8%	
VA	1.5%	0.7%	
VR	5.3%	1.2%	
VK	2.3%	3.0%	
AR	1.5%	2.1%	
AK	3.0%	5.8%	
RK	2.3%	2.5%	
VAR	0.8%	0.9%	
VAK	8.3%	4.2%	
ARK	3.8%	4.9%	
VRK	0.8%	2.5%	
VARK	31.8%	35.7%	

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