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Research Article

Measurement of critical thinking dispositions and comparison of critical approaches to information sources in medical residents: A cross-sectional study*

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*This article is derived from Fuat Görgün's master's thesis entitled "Measurement of critical thinking disposition and comparison of critical approaches to information sources among resident physicians", conducted under the supervision of Merthan Tunay.

ABSTRACT

Objective: Critical thinking is the questioning of whether the information presented is real, reliable, evidence-based and unbiased. It provides a deeper understanding of the information and reaches the right conclusions by eliminating biases, erroneous and false data. Our study aimed to measure the critical thinking dispositions of medical residents and to determine the effect of this ability on the evaluation of the reliability of information sources.

Methods: Our cross-sectional study was conducted with the participation of 197 medical residents from different branches working in Adana City Training & Research Hospital after ethical approval. Sociodemographic data, results of the critical thinking disposition scale and data obtained after the evaluation of two different information sources using the DISCERN measurement tool were analyzed.

Results: Among the participants, 171 (86.8%) were working in clinical sciences and 26 (13.2%) were working in surgery. The mean score of the critical thinking disposition scale was 43.52±5.49. The mean scores of the Critical Openness subscale (27.51±3.65) and reflective skepticism (16.02±2.44) subscales were found to be significantly higher ($p<0.001$). There was no significant correlation between critical thinking dispositions and scores on the DISCERN measurement tool, which assesses the reliability and quality of information sources. ($p=0.550$)

Conclusions: In our study, although the critical thinking disposition scale scores of resident physicians were found to be high, no relationship was found on the evaluation of the quality of medical information sources. Critical thinking, which is a metacognitive ability that future health professionals should possess, should be further examined in medical education and supported by practical applications.

Keywords: Internship and residency, thinking, DISCERN questionnaire

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Introduction

The concept of critical thinking has been extensively studied in both philosophy and education throughout history. Its most common use is the process of questioning whether the information presented is true, reliable, evidence-based and unbiased, and the process of analyzing, evaluating, interpreting and drawing logical conclusions.[1] Emphasizing the importance of critical thinking in physicians, the World Federation for Medical Education (WFME) has recognized critical thinking as one of the basic standards and competencies of medical education.[2] Similarly, the International Institute of Medical Education (IIME) has defined critical thinking as one of the seven main topics of knowledge, skills, professional attitudes and ethics that all physicians should possess.[3] According to WONCA (World Organization of Family Doctors), context, attitude and science competencies emphasize the importance of critical thinking.[4]

Healthcare providers should be able to evaluate the accuracy of information sources and distinguish fake news from real news, evaluate constantly renewed scientific data correctly and master up-to-date information, develop effective clinical skills and decide on the most appropriate diagnosis and treatment, They need to have a high level of critical thinking skills in order to analyze and solve complex medical cases by developing systematic problem solving skills, to identify problems in unexpected situations and complications, to cope with problems by evaluating solutions and reaching the most effective solution, to communicate effectively with patients and to involve patients in the treatment process. Inadequate critical thinking skills negatively affect medical care quality, professionalism and autonomy.

The necessity of critical thinking skills in physicians is obvious. Despite this reality, research on the critical thinking dispositions of resident physicians, including physicians from other branches, is very limited. In our study, we aimed to evaluate and understand the critical thinking dispositions of resident physicians; to examine the effect of sociodemographic variables and some personal attitudes we questioned on critical thinking dispositions. We aimed to measure the quality and reliability of the educational materials we offer and to compare the differences in evaluations that may occur with critical thinking dispositions, sociodemographic data and personal attitudes we questioned, and thus contribute to the development of strategies to improve the quality of health services.

Materials and Methods

Study type

Our cross-sectional study was conducted between 01 March 2024 and 15 May 2024 with 197 resident physicians working in Adana City Training and Research Hospital.

Study group

The population of the research consisted of 600 resident physicians working in Adana City Training & Research Hospital. In the calculation made with the Epi-Info statistical program, the sample size was found to be 195 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

In our study, we used the Critical Thinking Disposition Scale (CTDS) developed by Sosu[5], Akın et al. conducted the validity and reliability of the Turkish version in 2015.[6] This scale consists of 11 questions. The answers are five-point Likert type (1=strongly disagree, 5=strongly agree). It has two subscales: reflective skepticism and critical

openness. Questions (1-7) determine the critical openness subscale, while the last four questions (8-11) determine the reflective skepticism subscale.

These two subscales aim to assess individuals' critical thinking processes from different perspectives. While Critical Openness emphasizes being open to new knowledge and change, Reflective Skepticism emphasizes evaluating existing knowledge in depth and critically. These two dimensions are used to determine whether an individual has both a flexible and analytical mindset.[6]

A training video titled "How to treat arthritis in the knee", which lasted 1 minute and 28 seconds, was shown on YouTube. The video was selected based on its accessibility to the general public, relevance to medical education, and position among the top search results for "knee arthritis treatment" on the platform. Participants watched the video individually, without any commentary or guidance, and were then instructed to evaluate it using the DISCERN measurement tool. Afterwards, a newspaper article titled "What are the harms of screen addiction in children?" was presented and similarly assessed with the DISCERN tool to measure the content quality of both educational resources. DISCERN is a short questionnaire that provides users with a valid and reliable way to quickly assess the quality of information about treatment options for a health problem. It was compiled by Deborah Charnock and Sasha Shepperd and published by Radcliffe Online.[7] The DISCERN measurement tool consists of three parts. The first eight questions assess reliability, while the last seven questions measure the quality of the data analyzed. The last section provides an overall quality rating based on the answers to the first two sections. Each of the 15 key questions of the first two sections represents a separate criterion. They are an essential characteristic or standard that is an important part of quality information on treatment options.

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 Adana City Training and Research Hospital Clinical Research Ethics Committee dated 29/02/2024 and numbered 3195 was obtained.

Results

The participants scored 43.52±5.49 on the critical thinking disposition scale and 27.51±3.65 on the critical openness subscale and 16.02±2.44 on the reflective skepticism subscale (Table 1).

No statistically significant difference was found between the groups formed by the subscales of the critical thinking scale and sociodemographic findings [age groups (p=0.796, p=0.718), gender (p=0.577, p=0.613), marital status (p=0.346, p=0.970), specialty of practice (p=0.577, p=0.290), educational level of parents (p=0.781, p=0.537, p=0.876, p=0.993), economic level (p=0.838, p=0.422), academic career planning (p=0.880, p=0.553), membership to physician associations,

Table 1. Participants' Critical Thinking Disposition Scale data

	n	Mean±SD	Min-Max
Critical Thinking Disposition	197	43.52±5.49	17-55
Critical Openness		27.51±3.65	12-35
Reflective Skepticism		16.02±2.44	5-20

planning to work abroad (p=0.537, p=0.384), having the thought of resigning from the profession (p=0.690, p=0.365) and frequently used social media instrument (p=0.855, p=0.689)].

The newspaper article and YouTube video, which we presented to the resident physicians for reliability and quality assessment with the DISCERN measurement tool, were scored lower than the average in terms of reliability, quality and general quality assessment data, similar to the results of studies conducted with experts in the field in the literature (Table 2).

No significant relationship was found between the results of the resident physicians' assessment of sociodemographic findings.

No significant correlation was found between the critical thinking dispositions of resident physicians and their scores on the DISCERN measurement tool, which evaluates the reliability and quality of information sources (YouTube p=0.736-Newspaper p=0.975). When evaluating information sources, physicians working in surgical branches gave higher scores to the reliability (p=0.039) and quality (p=0.002) of YouTube video and the quality (p=0.015) of newspaper news information source than resident physicians working in internal branches (Table 3). In our study, as the years of seniority increased, the mean scores given for the evaluations of both news sources decreased (YouTube p<0.001, Newspaper p=0.002).

Table 2. Results of participants' evaluation of newspapers and YouTube as information sources (n=197)

	Newspaper	YouTube
DISCERN Part 1-2	**Mean±SD**	**Mean±SD**
Reliability	19.89±8.02	21.20±6.61
Quality	15.85±7.51	15.87±6.64
Total	35.74±10.98	37.07±9.37
DISCERN Part 3	**n (%)**	**n (%)**
Low	46 (23.4)	25 (12.7)
Moderate	141 (71.6)	164 (83.3)
High	10 (5.1)	8 (4.1)

Table 3. Comparison of the results of the evaluation of information medical materials according to participants' branch

Category	Branch	n	Mean±SD	p*
Reliability of the YouTube information source	IS	171	20.82±6.59	0.039
	SS	26	23.69±6.35	
Quality of the YouTube information source	IS	171	15.29±6.63	0.001
	SS	26	19.65±5.47	
Reliability of the newspaper information source	IS	171	19.50±7.99	0.081
	SS	26	22.46±70.92	
Quality of the newspaper information source	IS	171	15.35±7.38	0.015
	SS	26	19.19±7.67	

*: MannWhitney U test, IS: Internal Sciences, SS: Surgical Sciences.

Discussion

In our study, the mean scores obtained by the resident physicians from the critical thinking disposition scale and the scores obtained from its subscales were found to be higher than the mean values. Mehrpour et al. reported in their study with 284 resident physicians from internal and surgical branches that having the ability to think critically is a very valuable tool for resident physicians who assume serious responsibilities in the health system as health team leaders after graduation and that although there are efforts to increase critical thinking skills in medical programs in the country, the critical thinking scores of physicians in their study remained below the optimum average.[8]

In their study, Yurdal et al. found that medical education in Türkiye focuses on training physicians who can approach cases critically and reflect on the information they obtain, and that students' critical thinking tendencies and reflective learning understandings are generally they stated that it was high.[9]

In another study conducted in our country, Şahin investigated the critical thinking tendencies of medical students and found that 7.4% of the students had high critical thinking disposition, 51.9% had moderate critical thinking disposition and 40.7% had low critical thinking disposition.[10] In a research study conducted by Zia and Dar in Pakistan, it was found that medical students had a positive perception of the concept of critical thinking but were not predisposed to critical thinking.[11] Yurdal et al. reported that medical school students had high critical thinking dispositions and that there was a low, positive and significant relationship between the scores obtained from the sub-dimensions of critical thinking disposition and the overall total score of the critical thinking disposition scale.[9]

Huang et al. In their study with 1241 student participants including medical students in China and investigating critical thinking dispositions, they reported that the high mean scores obtained in the measurements decreased in the later years of medical education.[12] Similarly, in our study, critical thinking disposition scale scores decreased with increasing seniority and age. In their study with family physicians, Ross et al. reported that critical thinking disposition decreased with increasing age and family medicine residents had higher scores compared to family physicians. In another study by the same author, it was reported that family physicians with a high disposition for critical thinking were more successful in recertification exams.[13,14]

Although seniority was found to be unrelated to the disposition to think critically in our study, the results obtained in the studies in literature may be associated with the assumption that the need for critical thinking may decrease due to the high level of continuous learning and self-improvement efforts of residents with lower seniority and the automatized behaviors caused by experience as seniority increases.

In our study, there was no significant difference in critical thinking disposition according to gender in both the main scale and the two subscales. In a study conducted with medical school students, no gender-related difference in critical thinking disposition was observed, which is consistent with our study.[9] In a thesis study in which teachers participated, it was reported that the general scale score of critical thinking disposition did not show a significant difference according to gender.[15]

In our study, although it was assumed that there might be a difference in the critical thinking disposition of resident physicians according to the branches in which they worked, no statistically significant results were obtained. In a study conducted in Iran with 284 resident physicians

from internal and surgical branches, internal branch residents had higher critical thinking disposition scores.[8] The fact that the number of surgical branch residents was lower than the number of internal branch residents in our study may have led to this result.

Similarly, although it is thought that there may be a relationship between the parental education level of the participants and their critical thinking disposition scale scores, no significant relationship was found in the studies in the literature, similar to our study.[16]

Although there are studies in the literature reporting a positive relationship between academic achievement and critical thinking disposition[13,17] no statistically significant results were found when evaluated by comparing the three groups with, without undecided academic career plans in our study.

Considering that 70% of the world's population connects to the internet every day, internet-based sources of misinformation, biased news, disinformation cause serious problems in the field of health and endanger public health while degrading the quality of information in all fields. There are many studies that report that most of these data are of low quality by examining the sources of information provided in some sources such as YouTube.[18-21] In our study, the DISCERN tool, which is frequently preferred in the literature, was used to evaluate these information sources of physicians. Participants gave below-average scores to the reliability and quality sub-items of the newspaper news information source. The evaluation of the reliability sub-item of the information source of YouTube video was at the average score level, and the evaluation of the quality sub-item of the information source was below the average score.

Physicians should explain to their patients that the quality and reliability of educational materials that are open to everyone and have unlimited access are not always sufficient and that these educational materials should not be used in diagnosis and treatment.

A negative moderate relationship was found between the seniority of our participants in the profession and the evaluation scores of the quality of the educational material, the quality score of the YouTube information source and the reliability and quality scores of the newspaper information source. It may be due to the increase in their knowledge and experience in the profession as their seniority in their profession increases.

According to the branch differences of the participants, when evaluating the reliability and quality of the YouTube video information source and the quality of the newspaper news information source, residents working in surgical clinics gave higher scores and stated that the quality of the educational material was higher.

The fact that surgical branch residents gave higher scores to these educational materials may be due to the fact that they use these materials more in their daily practice, their familiarity with audio-visual learning materials and their higher perception of the direct usefulness of these materials in practice. These differences may explain their more positive perspective when evaluating such resources. Although it was thought that participants with high critical thinking tendencies would have lower scores in evaluating information sources with the DISCERN scale, there was no statistically significant difference.

The fact that our study was conducted with residents working in the same hospital was considered as a limitation. In addition, the low participation rate of surgical department residents similarly prevented generalization of the results.

Conclusion

The concept of critical thinking, which is essential for avoiding medical/clinical errors, identifying better alternatives for diagnosis and treatment, and better clinical decision-making skills, should be included more in the curricula of both educators and medical students. Both undergraduate and residency training in physicians is based on memorization of technical knowledge and application of what has been learned by rote. It is important to include in the curricula topics on critical thinking and the ability to distinguish between fake and real science. Heavy working conditions, an education system that is more oriented towards rote memorization, weak interactive teaching methods and low student motivation reduce students' ability to think critically. In order to prevent this, the number of case discussions should be increased, feedback should be received, education should be interactive and methods such as brainstorming should be used, and attention should be paid to the fact that workloads should not be too intense to allow students to think, especially during the residency training process.

Ethical approval

This study has been approved by the Adana City Training and Research Hospital Clinical Research Ethics Committee (approval date 29.02.2024, number 3195). Written informed consent was obtained from the participants.

Author contribution

Study conception and design: FG, MT; data collection: FG; analysis and interpretation of results: FG, MT; draft manuscript preparation: FG, 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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