

Art in Medical Education: A Review

Yoseph Dalia, MD, MBA

Emily C. Milam, MD

Evan A. Rieder, MD

ABSTRACT

Background The use of fine art in medical education has a long history. Numerous studies have investigated the potential benefits of incorporating art in medical education; however, there are gaps in knowledge regarding the efficacy, methodology, and clinical significance of these studies.

Objective This scoping review of the literature aims to describe the available literature on the incorporation of art education in medical school and residency.

Methods PubMed, Google Scholar, and MedEDPortal were queried from their inception dates through December 2019. English-language studies providing a detailed methodology and detailed analysis were included. A total of 37 studies were identified. Upon further screening of the studies' methodologies and results, 16 studies describing art education implemented with medical students and 12 studies describing art education implemented with residents were included for final review.

Results Various methods of art education exist, including Visual Thinking Strategies (VTS), rigorous curricula, and unstructured roundtable discussions with art curators or artistically minded clinicians. Studies range in duration, art media, and type of analysis.

Conclusions There has been an increasing effort to incorporate fine art education into medical training, primarily to enhance visual perception skills and empathy. Although there is limited research on its efficacy, and wide variations in study methodologies exist, results consistently indicate that participants find the incorporation of art into curricula beneficial. Further research analyzing which methodologies are most likely to yield statistically and clinically significant improvements in visual perception and empathy may lead to increased utilization of this teaching method.

Introduction

Physicians utilize pattern recognition and visual acuity skills to recognize physical examination findings and associate them with diagnoses. Examining and studying fine art could theoretically supplement a resident's training in this task. In the modern era of medical training, art has not been a curricular focus, despite having a role in the early days of medical training.¹ Recently, however, there has been an effort to incorporate the use of fine art into medical training. Proponents purport that learning how to analyze fine art may improve not only clinicians' intellectual curiosity and critical thinking, but also their diagnostic skills and ability to empathize with patients.²

Observational skills may be especially useful in visually oriented specialties. Dermatologists must be skilled in pattern recognition in order to distinguish and diagnose cutaneous diseases, some with subtle differences in examination findings. Similar skills are required for radiologists in their examination of a variety of imaging modalities. With increasing use of telemedicine, it is important for physicians to be able to appreciate clinical situations in the absence of a full physical examination.

While there are numerous studies investigating art in medical education, there remain gaps in knowledge regarding the efficacy, methodology, and clinical significance of these courses. We discuss the results of a scoping review of the literature on the use of art education in medical training, highlighting the results of a few representative studies.

Methods

PubMed, Google Scholar, and MedEdPortal were queried from their inception dates through December 2019 using variable combinations of the keywords: art, art education, medical education, residency, and medical residency. Only articles published in English were included. Titles were then filtered for relevance, as the broad search terms yielded results that were not related to the research topic (FIGURE). Studies were excluded if they were reviews, lacked a postintervention assessment, the methodology was not described well enough to appropriately replicate, or the article was inaccessible via the institutional library. For example, some articles were excluded as the type of art intervention was not specified. This process was primarily performed by 1 author (Y.D.), with oversight by the other 2 authors (E.C.M. and E.A.R.).

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Results

A total of 37 curricular interventions that discussed the implementation of art in medical education were identified for full-text screening. Upon further review, 28 articles^{3–30} were selected for inclusion owing to their detailed methodologies and analyses, including 16 describing art education with medical students (TABLE 1)^{3–11,13–19} and 12 involving residents (TABLE 2).^{12,20–30} Some interventions relied on professional art curators to teach fine art to participants, while others used artistically minded clinicians. The duration of the projects ranged from 1 to 17 sessions. The media of art also greatly varied.^{3,4} While most programs utilized art as a vehicle to increase observational skills, other interventions used art to directly depict medical conditions.^{31,32} The data were separated into 2 categories: interventions implemented among medical students and interventions implemented among residents. Details on research design, endpoints, and results are outlined in TABLES 1 and 2.

Visual Art Implementation in Medical School

A variety of fine art curricula have been integrated into medical school education (TABLE 1). Four of the 12 student-based interventions utilized control groups.^{6,8,16,18} Three of these 4 achieved a statistically significant increase in observational skills.^{6,8,16} Thirteen^{3–7,9–11,13–15,17,19} of the 16 were led by art educators and were primarily qualitative in nature, while 9 incorporated a quantitative component.^{5–8,11,13,16–18} Two interventions (one quantitative and one qualitative) showed a dose-dependent response between the number of art sessions participants attended and the level of improvement in observational skills.^{5,6}

In 2001, Bardes et al published the first study examining the use of fine arts in medical education.⁷ Their qualitative study demonstrated that students who participated in an art intervention improved their objective observational skills as well as their subjective ability to interpret facial expressions of patients.⁷ Subsequently, Dolev et al provided quantitative evidence of the benefits of fine art education in medical students.⁸ In this study, students described a photograph of a person with a medical disease both before and after an arts curriculum intervention, and responses were graded on a predefined objective scale. After the intervention, students made more detailed observations and less observational mistakes.⁸

Elder et al described an integrated program in which medical students attended a real patient-physician encounter, and then sketched a picture of the encounter.⁹ Bentwich and Gilbey investigated other effects of art education, such as increased

empathy, tolerance of ambiguity, and teamwork.¹⁰ Their findings showed an increased tolerance for ambiguity among participants. They also found that the inherent ambiguity of fine art and the resultant “acceptance of multiple meanings” understood by students was the strongest factor correlated with the intervention, even more so than increased visual skills.¹⁰ Additional projects also demonstrated the benefits of fine arts interventions improving mindfulness, identification of patient story, and emotional awareness among participants.^{4,7,11} Across most interventions, medical student participants voiced satisfaction with the art programming.

Visual Art Implementation in Residency

There have been few studies evaluating the efficacy of fine arts education specifically in residency (TABLE 2). Three of the interventions used control groups, and one of those achieved a statistically significant increase in observational skills.^{32–34} Nine of the 12 contained a quantitative component, and 9 were led by professional art educators.

Some medical educators utilized Visual Thinking Strategies (VTS), a teaching paradigm to improve the visual literacy of both experienced and inexperienced art observers.^{35,36} VTS-trained educators encouraged participants to think in a structured format when viewing images by asking simple questions, such as “What is going on in this picture?” “What do you see that makes you say that?” and “What more can we find?”³⁷ Curricula implemented at Harvard University utilized VTS-trained instructors from the Museum of Fine Arts, Boston, to teach dermatology residents, who attended 4 sessions each training year.^{12,38,39} The goal was to improve residents’ observational skills and program camaraderie, and to gain more insight into their own observational biases. In a pilot study of this program by Huang et al, a test was administered prior to and after the intervention.¹² The test asked participants to list as many observations about certain images as they could recall, and the responses were objectively graded to determine if there was a statistically significant change between pre- and post-intervention observations.¹² The results did demonstrate a dose-dependent improvement in pre-test and posttest scores, as residents who attended less than 3 sessions did not show a statistically significant improvement in the number of details they recalled, while those who attended 3 or 4 did ($P < .034$).¹²

Discussion

As described in the literature, various methods of utilizing fine art to advance medical student and resident education appear to be effective.

TABLE 1
Studies of Medical Students

Author(s), (y)	No. of Subjects	Participants	No. of Sessions	Goal	Art Medium and Intervention Style	Measurement	Results	Control Group
Bardes et al, ⁷ (2001)	8	MS(1, 2, 4)	3	OS, descriptive skills, and interpretive skills	Visit to museum and discussion of FA, patient faces	Comparison of descriptions on pre- and posttests	Improved OS on subjective analysis of descriptions	No
Dolev et al, ⁸ (2001)	176	MS(1)	1	CS	Visit to museum and discussion of FA	Comparison of descriptions on pre- and posttests	Increase in OS ^a	Yes
Elder et al, ⁹ (2006)	17	MS(2)	15–17	CS	Visit to museum and discussion of art (genre not specified)	Subjective participant feedback	Improved CS and personal development	No
Shapiro et al, ⁴ (2006)	38	MS(3)	3	OS and pattern recognition	Classroom discussion of FA, mixed media art, and clinical images	Subjective participant feedback	Improved OS, pattern recognition, and emotional recognition	No
Naghshineh et al, ⁶ (2008)	58	MS(1, 2)	9	OS	Visit to museum and discussion of FA followed by simulated physical diagnosis lab	Comparison of descriptions and performance on pre- and posttests	Increased OS and analytical skills on subjective analysis of student feedback Improvement in number of observations made, sophistication of descriptions of artistic and clinical imagery ^a Improvement in participants who attended 8 or more sessions compared to 7 or fewer ^a	Yes
Klugman et al, ⁵ (2011)	32	Medical and nursing students	3	OS, tolerance for ambiguity, interest in learning communication skills	Visit to museum and discussion of FA	Comparison of performance on pre- and posttests	Improvement in time spent looking at, number of words used to describe, and number of observations made in art and patient images ^a	No
Schaff et al, ³ (2011)	N/A	MS(1, 2)	Not specified	Abstract thinking	Visit to museum and discussion of contemporary art	Subjective participant feedback	Students claimed the experience “very highly” fulfilled its objectives	No

TABLE 1
Studies of Medical Students (Continued)

Author(s), (y)	No. of Subjects	Participants	No. of Sessions	Goal	Art Medium and Intervention Style	Measurement	Results	Control Group
Jasani and Saks, ¹¹ (2013)	70	MS(2)	1	OS	Classroom discussion of FA	Comparison of descriptions and performance on pre- and posttests	Increased OS on student feedback, and no statistically significant improvement in OS between pre and posttests	No
Klugman and Beckmann-Mendez, ¹³ (2015)	19	Medical and nursing students	5	OS	Classroom discussions of FA, clinical images, and audio recordings; participants also created their own artwork	Comparison of descriptions and performance on pre- and posttests	Improved communication and patience according to participant feedback. Improvement in the number of observations made and number of words used between pre- and post-test ^a	No
Bramstedt, ¹⁴ (2016)	66	MS(2)	^b	OS	Classroom discussion of FA, mixed media art, and essays	Subjective participant feedback	Improved reflective and OS	No
Kidd et al, ¹⁵ (2016)	12	Various health care providers	1	Increasing empathy, respecting vulnerable persons	Discussion of “Sticky” by Margaret Sutherland at a conference	Subjective participant feedback	Increased tolerance of ambiguity and awareness of personal biases	No
Bentwich and Gilbey, ¹⁰ (2017)	67/120	MS(1)	1	Tolerance of ambiguity, increasing empathy	Classroom discussion of FA	Subjective participant feedback	Increase in multiple domains, including OS and acceptance of multiple meanings in the post-intervention survey. Correlation between increased acceptance of multiple meanings and increased empathy ^a	No
Gurwin et al, ¹⁶ (2018)	36	MS(1)	6	OS	Visit to museum and discussion of FA led by art instructors	Comparison of descriptions on pre- and posttests	Improvement in OS ^a	Yes

TABLE 1
Studies of Medical Students (Continued)

Author(s), (y)	No. of Subjects	Participants	No. of Sessions	Goal	Art Medium and Intervention Style	Measurement	Results	Control Group
Gowda et al, ¹⁷ (2018)	47	MS(1)	6	OS, reflective skills, and self-care	Visit to museum and discussion of art led by art instructors	Comparison of pre- and post-self-assessment	Improvement in reflective ability ^a Improvement in OS, TOA on subjective analysis of descriptions	No
Cracolici et al, ¹⁸ (2019)	89	MS(1)	N/A	Learning tool	Provided art supplies and encouragement to draw histological images	Comparison of descriptions on pre- and posttests	Increased desire to use art as a learning tool	Yes
Visscher et al, ¹⁹ (2019)	50	MS(3)	1	Improve MS understanding of radiologists and radiology profession	VTS-led analysis of paintings depicting radiology encounters	Post-intervention survey	Reduced negative stereotypes by medical students of the radiology profession and of radiologists	No

Abbreviations: MS, medical student (year); OS, observational skills; FA, fine arts; CS, clinical skills; N/A, no answer.

^a Indicates statistical significance.

^b Comprised a 50-minute workshop, written assignment, medical humanities week, and attendance of an art exhibit.

TABLE 2
Studies of Residents in Training

Author (y)	No. of Subjects	Participants	No. of Sessions	Goal	Art Medium and Intervention Style	Measurement	Results	Control Group
Reilly et al, ²⁰ (2005)	N/A	Family medicine residents and faculty	1	Team building	Visit to museum and discussion of FA	Subjective participant feedback	Improved team building and analytical thinking	No
Kirklín et al, ²¹ (2007)	68	General practitioners and nurses	1	OS	Workshop where blindfolded participants described the feeling of household objects	Comparison of descriptions on pre- and posttests	Improvement in OS ^a	Yes
Huang et al, ¹² (2016)	27	Dermatology residents	4	Observational skills, description skills, awareness of assumptions, and tolerance of ambiguity	Visit to museum and discussion of FA and clinical images	Comparison of descriptions on pre- and posttests	Improvement between mean number of observations ^a	No
Goodman and Kelleher, ²² (2017)	15	Radiology residents	1	OS	Visit to museum and discussion of FA	Comparison of abnormality detections on pre- and posttests	Improvement detecting abnormalities on radiographs ^a	No
Griffin et al, ²³ (2017)	7	Dermatology residents	5	OS	Visit to museum and discussion of FA	Comparison of descriptions on pre- and posttests and subjective feedback	Improvement in OS according to participant feedback; no statistically significant improvement in pre and posttests scores that tested for OS	Yes
Zazulak et al, ²⁴ (2017)	15	OB-GYN and family medicine residents	4	Increase empathy, compassion, and mindfulness	Visit to museum and discussion of various art and dance led by art instructors; participants also created their own artwork	Comparison of pre- and post-surveys, and subjective participant feedback	No significant increase in overall empathy, compassion, or mindfulness Increase in subdomains of mindfulness ^a	Yes

TABLE 2
Studies of Residents in Training (Continued)

Author (y)	No. of Subjects	Participants	No. of Sessions	Goal	Art Medium and Intervention Style	Measurement	Results	Control Group
Pristach et al, ²⁵ (2018)	N/A	Psychiatry residents	1	Increase OS, specifically regarding psychological themes	Visit to museum and discussion of various art led by art instructors	Subjective participant feedback	Increased OS that participants feel will be applicable in clinical setting	No
Yakhforoshha et al, ²⁶ (2018)	19	Oncology fellows	1	Communication skills	Lecture on communication skills, role playing, reflective writing, and small group discussion of art, music, film	Comparison of pre- and post-objective assessment	Improvement in 3 of 7 domains of the checklist ^a	No
Harrison and Chioti-McCollum, ²⁷ (2019)	18	Neurology residents	11	Communication skills, OS, awareness of point of view, and appreciation of the narrative context of illness	Classroom discussion of various visual art and works of literature	Comparison of pre- and post-self-assessment	Increased CS, OS, and understanding of narrative medicine	No
Emami et al, ²⁸ (2019)	19	Oncology fellows	1	Communication skills	Various mediums and lectures by art and medical faculty	Comparison of pre- and post-self-assessment	Improved in all domains, with notable importance of communication in medical context and learning ^a	No
Marr et al, ²⁹ (2019)	17	Emergency medicine attendings, residents, midlevel providers	2	Reduce implicit bias, improve clinical skills with pain patients	Visit to museum and discussion of FA led by art and medical faculty	Subjective participant feedback	Positive change in how they make observations and communicate with patients	No
Orr et al, ³⁰ (2019)	17	Internal medicine residents	1	Combat burnout	Visit to museum and discussion of FA led by art instructors	Comparison of pre- and post-self-assessments	Decreased emotional exhaustion and depersonalization and increased sense of personal accomplishment	No

Abbreviations: N/A, no answer; OS, observational skills; CS, clinical skills; OB-GYN, obstetrics and gynecology.

^a Indicates statistical significance.

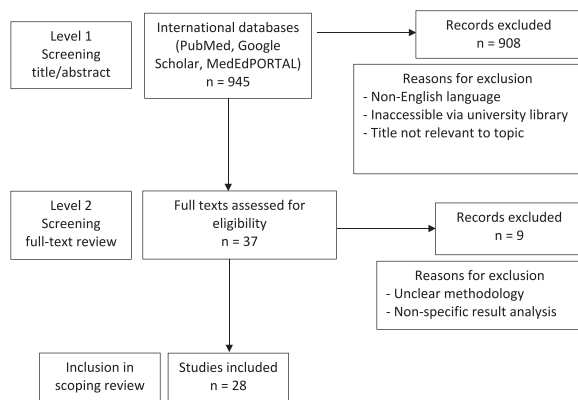


FIGURE
Flowchart of Identified Studies

Incorporating art into medical education appears to improve visual perception skills, empathy, and personal reflection among students. Such an intervention could improve diagnostic accuracy, ethical competency, identity formation, and psychological functioning in students and physicians.^{40,41} Despite the variation in these interventions, satisfaction-level outcomes have been generally positive: students have noted wide appreciation for fine art courses and advocated for their continued use.

This scoping review was limited by the keywords and databases used, exclusion of non-English studies, accessibility of the journal articles, and overall quality of the studies available. Many studies had small sample sizes, lacked control groups, and did not incorporate quantitative data. A more comprehensive systematic review was not pursued given the variable study populations and the highly heterogeneous study designs, methodologies, and reported outcome measures, making inter-study comparisons and conclusions difficult to draw.

With increased use of technology and imaging in medicine, there is a growing need for physicians to observe minute differences in examination findings. Additionally, in aesthetic fields like dermatology, ophthalmology, and plastic surgery, many physicians perform cosmetic procedures that require a keen eye for observing fine details. Beyond enhancing visual perception, available research demonstrates that art education improves empathy among participants and may be a way for budding physicians to better connect with patients. Despite the growing available literature, there remain several unanswered questions regarding the benefit of art education interventions in medical training. Further research analyzing which methodologies are most likely to yield statistically and clinically significant improvements in visual perception and empathy may lead to increased utilization of

this teaching method. Specifically, identifying the optimum point of intervention during medical education, as well as conducting follow-up studies to elucidate whether positive effects are lasting, would be beneficial.

In reviewing the current literature, best practices on how to incorporate fine arts in medical education appear to emerge. An ideal curriculum should encompass 4 domains: pattern recognition, deep seeing, facial expression, and pertinent negatives. These domains could be modified or adapted to suit curricula in visually intensive fields (eg, dermatology, radiology, endoscopic gastroenterology).

Pattern recognition is an experience-based process of perceptual learning whereby trainees recognize physical examination findings and associate them with diagnoses. Traditionally this is developed through studying countless clinical images and managing thousands of patients. Fine art curricula incorporating pattern recognition skills could help enhance diagnostic acumen and efficiency. Deep seeing involves the ability to perceive textures and colors that may not be immediately distinguishable. This can translate clinically to observing details beyond the most prominent colors and textures. Moreover, with the increasing use of telemedicine, it is important for residents to be able to “see” the textures in the absence of a full physical examination. Interpretation of facial expressions of a painting’s subject(s) often helps identify the artist’s intent or message. In medicine, similarly, accurate interpretation of facial expressions is likely to enhance empathy and quality of care. Finally, pertinent negatives are a critical aspect to forming a diagnosis as what is *not* found on physical examination can affect the differential diagnosis of the patient. When studying fine art, students are often encouraged to observe what the artist intentionally did *not* depict.

The framework of VTS seems to be effective, and the evidence suggests that instructors comprise both clinicians and art curators. Future efforts would benefit from a standardized curriculum and assessment guidelines.

Conclusions

An increasing effort to incorporate fine art education into medical training has yielded early data that suggest the possibility of enhanced visual perception skills and empathy. Although substantial limitations characterize the data and further work is needed, studies consistently indicated that participants found the incorporation of an art curriculum to be beneficial to medical education.

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Yoseph Dalia, MD, MBA, is a Dermatology Resident, Department of Dermatology, University of Tennessee Health Science Center; **Emily C. Milam, MD**, is a Clinical Instructor, Ronald O. Perleman Department of Dermatology, New York University Langone Health; and **Evan A. Rieder, MD**, is an Assistant Professor, Ronald O. Perleman Department of Dermatology, New York University Langone Health.

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Corresponding author: Evan A. Rieder, MD, Ronald O. Perleman Department of Dermatology, New York University Langone Health, 240 E 38th Street, 11th Floor, New York, NY 10016, 212.263.5015, evan.rieder@nyulangone.org

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