



Perspectives of Resident and Attending Ophthalmologists on Common Ethical Dilemmas in Research

Sarah C. Miller, MD^{1,*} Brittany C. Tsou, MD^{1,*,+} Michael J. Fliotics, MD² Gary L. Legault, MD^{3,4}
 Jiangxia Wang, MS^{1,5} Todd J. Mondzelewski, MD⁶ Patrick D. Munson, MD⁷ Alice Lorch, MD⁸
 Laura K. Green, MD⁹ Won I. Kim, MD¹⁰ Ron W. Pelton, MD, PhD¹¹ Fasika A. Woreta, MD, MPH¹
 Grant A. Justin, MD^{10,12}

¹ Department of Ophthalmology, Wilmer Eye Institute, Johns Hopkins School of Medicine, Baltimore, Maryland

² Department of Ophthalmology, Yale New Haven Hospital, New Haven, Connecticut

³ Department of Ophthalmology, San Antonio Military Medical Center, San Antonio, Texas

⁴ Department of Surgery, Uniformed Services University of the Health Sciences, Bethesda, Maryland

⁵ Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland

⁶ Department of Ophthalmology, Balboa Naval Hospital, San Diego, California

⁷ Department of Ophthalmology, Madigan Army Medical Center, Base Lewis-McChord, Washington,

Address for correspondence Sarah C. Miller, MD, Johns Hopkins Hospital, 600 N. Wolfe Street, Baltimore, Maryland 21287 (e-mail: miller.sarah517@gmail.com).

⁸ Department of Ophthalmology, Massachusetts Eye and Ear Infirmary, Harvard Medical School, Boston, Massachusetts

⁹ Department of Ophthalmology, Krieger Eye Institute, Sinai Hospital of Baltimore, Baltimore, Maryland

¹⁰ Department of Ophthalmology, Walter Reed National Military Medical Center, Bethesda, Maryland

¹¹ Oculo-Facial Cosmetic and Reconstructive Surgery, Colorado Springs, Colorado

¹² Department of Vitreoretinal Surgery, Duke University, Durham, North Carolina

J Acad Ophthalmol 2023;15:e237–e242.

Abstract

Keywords

- ▶ ophthalmology
- ▶ academic ophthalmology
- ▶ research
- ▶ ethics
- ▶ residency
- ▶ ophthalmology residency
- ▶ authorship

Purpose To assess how resident and attending ophthalmologists perceive and evaluate ethically controversial scenarios regarding mentorship, authorship, and ethics compliance that may occur during research involving residents.

Methods An online survey was developed and contained 14 controversial vignettes based on common research scenarios that can occur when conducting research with trainees. The scenarios were designed to capture issues regarding three themes: mentorship, authorship, and compliance with ethical guidelines. Resident and attending ophthalmologists at eight military and civilian academic residency programs in the United States were invited to participate. Respondents used a Likert scale to assess the ethicality of the situations in addition to self-reported demographic characteristics.

Results The response rate was 35.6% (77/216), consisting of 37.7% ($n = 29$) residents and 62.3% ($n = 48$) attendings. More attending ophthalmologists responded than residents ($p = 0.004$). Many respondents identified controversies around compliance (67.3%) and authorship (57.1%) as unethical, whereas situations regarding mentorship

* These authors contributed equally as co-first authors.

+ Dr. Tsou is currently in residency at Albany Medical College.

received

November 8, 2022

accepted after revision

August 10, 2023

DOI <https://doi.org/>

10.1055/s-0043-1774394.

ISSN 2475-4757.

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were largely viewed as neutral to ethical (68.0%). Responses to two scenarios, one regarding mentorship and one regarding authorship, significantly differed between residents and attendings ($p = 0.001$ and $p = 0.022$, respectively).

Conclusion Academic ophthalmologists' perceptions of the ethicality of common research scenarios varied. There is a need for more prescriptive guidelines for authorship and mentorship ethics at all training levels to ensure consistency, fairness, and integrity of research.

Planning, executing, and coordinating research projects is a foundational principle of academic ophthalmology that begins early in training. The Accreditation Council for Graduate Medical Education requires ophthalmology residency education to advance residents' knowledge of basic principles of scientific inquiry.¹ Further, faculties of residency programs are required to demonstrate accomplishments in scholarly activity.² Researchers are often required to complete research ethics training, especially when involving human subjects. The National Institute of Health's Responsible Conduct of Research certification modules and Collaborative Institutional Training Initiative modules are two programs commonly utilized by institutions to provide a foundational education on the definition of research misconduct and mentor-mentee and data management best practices.^{3,4} Despite these, ethical "gray areas" often arise, requiring researchers to use individual perspectives when prescriptive guidelines are unavailable.

Ethical issues around authorship are common, more than 10-fold more prevalent than research misconduct in fabrication, falsification, or data modification.^{5,6} Although major ophthalmology journals, including *Ophthalmology*, *American Journal of Ophthalmology*, and *Journal of the American Medical Association Ophthalmology*, use the International Committee of Medical Journal Editors (ICMJE) criteria to define authorship, ethically controversial authorship practices, such as honorary and ghost authorship, are relatively prevalent, even in ophthalmology.^{7,8} Further, the rise in multi-author papers raises the issue of authorship order and has been accompanied by increases in the inappropriate assignment of authorship.⁹

In addition to authorship, research mentorship can present ethical challenges, as trainees' career development may often depend at least in part on the cultivation and maintenance of relationships with mentors.¹⁰ Indeed, trainees with mentors are more productive in terms of number of publications and grants than their independent counterparts.¹¹ While the mentor-mentee relationship is often mutually beneficial, the power dynamic is inherently unbalanced, and there is the unfortunate possibility that mentors can act in ways that may hinder mentees' academic careers, a phenomenon known as mentorship malpractice.¹² This can be active, characterized by blatant, dysfunctional behavior of the mentor, or passive, which is more insidious and characterized by the inaction of the mentor.¹²

Lastly, researchers may encounter controversies in compliance with ethical guidelines. Institutional review boards

(IRBs) ensure that research projects protect experimental subjects and maintain academic and investigative integrity.¹³ Obtaining IRB approval and compliance with journal-specific ethical requirements, such as conflict-of-interest disclosures and ICMJE form submissions, is the responsibility of both trainees and supervisors but can often be completed by individuals without direct oversight. Furthermore, within these guidelines, there are ambiguities that are open to interpretation, such as uncertainty on what projects qualify for exemption and equivocality on the practical impact of incremental risk for treatment groups.¹⁴

Given the various types of controversial scenarios that may arise in research involving trainees, the purpose of our study was to evaluate how ophthalmologists of different levels of training assessed such common ethical situations.

Methods

The research study protocol was reviewed by the Johns Hopkins University School of Medicine IRB and deemed exempt. All study activities adhered to the principles of the Declaration of Helsinki. The study adhered to all regulations outlined in the Health Information Portability and Accountability Act. Participants provided informed consent in completing the questionnaire.

A series of 18 controversial vignettes were developed by authors G.L.L., R.W.P., G.A.J., M.J.F., and F.A.W. based on ethically controversial research scenarios regarding mentorship, authorship, and compliance that the authors have encountered throughout their tenure as academic ophthalmology residents and attendings. An online questionnaire of these vignettes was distributed to residents and core faculty members at eight ophthalmology residency programs: Balboa Naval Hospital (Detroit, MI), Madigan Army Medical Center (Base Lewis-McChord, WA), Massachusetts Eye and Ear Infirmary (MEEI, Boston, MA), San Antonio Military Medical Center (SAMMC, San Antonio, TX), Wills Eye Hospital (Philadelphia, PA), Wilmer Eye Institute (Baltimore, MD), Krieger Eye Institute (Baltimore, MD), and Walter Reed National Military Medical Center (WRNMMC, Bethesda, MD). Partial responses were excluded from the analysis. Respondents assessed the ethicality of the situations on a Likert scale in addition to providing information about demographic characteristics. Following the presentation of each scenario was a statement on whether the scenario was ethical or unethical. Respondents then selected one of the following responses: "strongly agree," "agree," "neutral,"

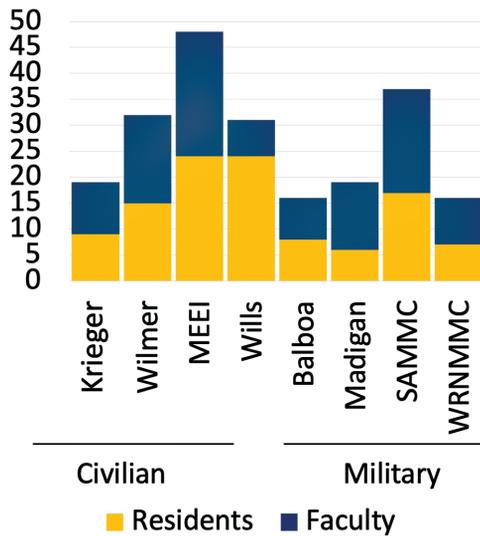


Fig. 1 Questionnaire invitees by institution. The number of residents and attending ophthalmologists who were invited to participate in the survey are shown by institution. Data on respondent institution was not obtained to maintain anonymity, so institutional response rates could not be calculated.

“disagree,” or “strongly disagree.” The exact wording of questions and response options is available in the **►Supplementary Material S1** (available in the online version).

All statistical analysis was completed using Stata version 17.0 (StataCorp, College Station, TX) and Microsoft Excel (Microsoft Inc., Seattle, WA). Significance was defined as $p < 0.05$ and tests of significance are denoted after each p -value.

Results

A total of 216 online questionnaires were distributed to 110 (50.9% of total invitees) residents and 106 (49.1% of total invitees) core faculty members at 8 ophthalmology residency programs (**►Fig. 1**). The overall response rate was 35.6% (77/216); 26 partial responses were excluded. Of the 110 residents, 29 (26.4%) completed the entire questionnaire, whereas of the 106 core faculty members, 48 (45.3%) completed the entire questionnaire. The attending response rate was significantly higher than the resident response rate ($p = 0.004$, chi-squared test). Of all 77 respondents, 47 (61.0%) were male and 48 (62.3%) identified as Caucasian (**►Table 1**). The distribution of responses for race/ethnicity was significantly different between residents and attendings ($p = 0.03$, Fisher’s exact test, Supplementary **►Table S1** [available in the online version]). There was no significant difference in the demographic characteristics of partial and complete respondents (Supplementary **►Table S2** [available in the online version]), Fisher’s exact test).

Responses for each scenario were categorized as “unethical” versus “neutral to ethical” and summarized in **►Fig. 2**. The scenarios that generated the most controversy and consensus amongst responses were identified. There was a

Table 1 Characteristics of survey respondents

Characteristics	N (%)	Total N
Residents	29 (37.7%)	77
PGY-1	1 (3.4%)	29
PGY-2	11 (37.9%)	
PGY-3	5 (17.2%)	
PGY-4	12 (41.4%)	
Attendings	48 (62.3%)	77
<5 years from residency	5 (10.4%)	48
5–10 years from residency	13 (27.1%)	
>10 years from residency	30 (62.5%)	
Race/ethnic background		77
Caucasian/White	48 (62.3%)	77
Asian	16 (20.8%)	
Prefer not to answer	6 (7.8%)	
Other	4 (5.2%)	
African American/Black	2 (2.6%)	
Hispanic/Latino/Latina	1 (1.3%)	
Gender		
Male	47 (61.0%)	77
Female	29 (37.7%)	
Prefer not to answer	1 (1.3%)	

significant difference in the distribution of unethical versus neutral–ethical responses across all categories ($p < 0.001$, chi-squared test); this significant difference, however, may have been driven by specific questions, as shown in **►Fig. 2**.

Responses from residents and attendings were also compared (Supplementary **►Table S3** [available in the online version]). Of all responses received from residents, 54.8% (286/522) considered vignettes unethical compared with 48.8% (422/864) responses received from attendings. However, the proportion of responses that considered scenarios unethical for each respondent was compared between residents and attendings and did not show a significant difference ($p = 0.77$, Mann–Whitney test). For questions regarding mentorship, 25.4% (85/335) responses from attendings considered vignettes as unethical compared with 34.5% (70/203) responses from residents ($p = 0.02$, chi-squared test). However, when this was corrected for individual response bias, the difference was no longer significant ($p = 0.65$, Mann–Whitney test). There were no significant differences in responses from attendings versus residents for vignettes regarding authorship or compliance ($p = 0.14$ and $p = 0.92$, respectively, chi-squared test), which persisted after adjustment ($p = 0.99$ and $p = 0.09$, Mann–Whitney test).

All (100%, 29/29) residents believed starting a research project but not subsequently being recognized on a corresponding manuscript after graduation was unethical compared with 83.3% of attendings (40/48, $p = 0.02$, chi-squared test) (Supplementary **►Table S3** [available in the online version]). In addition, a significantly higher proportion of

	Scenario (%)	Unethical	Neutral-Ethical
Mentorship	1 An attending has agreed to mentor a resident through a research project. The resident finishes the manuscript and sends it to the attending to review. The attending returns the manuscript with only five small grammatical edits. ^A	46.8%	53.2%
	2 A medical student approaches an attending for a project, and he gives the student an IRB to write.	22.1%	77.9%
	3 An ophthalmologist's son is starting residency. The ophthalmologist wants to assist his son and gives him a partially written manuscript to finish. ^A	35.1%	64.9%
	4 An attending has just received funding for a research project but can only support one resident. Two residents approach him. One has done multiple research projects and is known for being a "doer." The other doesn't have any research experience and but has expressed that he is "super" interested. He decides to choose the "doer." ^B	14.3%	85.7%
	5 A resident approaches an attending for mentorship on a research topic. The attending agrees and the resident starts his project. Two months later the resident approaches the attending with a finished IRB and is requesting assistance prior to submission of the IRB. The attending tells the resident that he is now too busy to help with the project. ^A	63.6%	36.4%
	6 A faculty member and a resident are working on a research project. After multiple emails over several months, the resident hasn't made any progress. The attending gives the project to another resident. ^B	10.4%	89.6%
Authorship	7 In the same scenario as the previous question, it is now time to publish the manuscript. The faculty member decides to not include the first resident on the manuscript.	19.5%	80.5%
	8 The same resident from the previous question convinces his attending to let him be senior author, but a prestigious journal agrees to publish the manuscript only if an attending is the senior author.	74.0%	26.0%
	9 A medical student develops a research project with a resident and faculty member. The resident collected the data for manuscript, but the medical student writes the complete article. The resident places himself as first author. ^A	62.3%	37.7%
	10 A program director notices that a group of residents are collaborating. He is concerned that they aren't meeting ICMJE criteria to be on the paper and are just including each other to boost their publications.	67.5%	32.5%
	11 A resident develops a research project and has written the manuscript with a medical student. He plans on publishing the manuscript and had the medical student as first author and himself as senior author. An attending who reviewed the project demands to be first author. The residency program director intervenes for the resident. ^B	5.2%	94.8%
	12 A resident writes a paper on penetrating keratoplasty and notes that every time he publishes a cornea paper, he has to place all three cornea attendings on the author list even though only one reviews the paper.	81.8%	18.2%
Compliance	13 A resident has started a research project, but graduates from the program prior to finishing it. The attending finishes the project but leaves the resident off of the manuscript. ^B	89.6%	10.4%
	14 A resident wants to try a new surgical technique. One of his co-residents has Institutional Animal Care and Use Committees (IUCAC) approval for a different project on pigs. The resident does a few of the surgical techniques on those pigs. ^B	90.9%	9.1%
	15 A resident submits an abstract to a meeting but never notified the attending he was working with on the project.	81.8%	18.2%
	16 A resident is getting ready to publish a manuscript and notes that the journal wants both ICJME and a conflict-of-interest forms filled out by individual authors. He goes ahead and completes the form for all the authors.	80.5%	19.5%
	17 A resident starts collecting retrospective data prior to IRB approval. ^A	61.0%	39.0%
	18 A faculty member and a resident meet resistance from an IRB for approval, they call a colleague at another location to help get IRB approval at the other location.	22.1%	77.9%

Fig. 2 Summary of responses for questionnaire scenarios. Responses are shown as percentage of total. Higher percentages of responses are identified in red, and lower percentages are identified in blue. Scenario wording was modified for brevity but still accurately reflects the questionnaire. Exact wording can be found in the Supplementary Materials. ^AAreas of controversy were identified as scenarios in which the difference between response categories was less than the first quartile value of the differences between response categories of the entire dataset. ^BAreas of consensus were identified as scenarios in which the difference between response categories was greater than the third quartile value of the differences between response categories of the entire dataset.

residents believed a clinical vignette involving an ophthalmologist giving their immediate family member a partially written manuscript in an effort to help his career was unethical compared with attendings (59 vs. 21%, $p = 0.001$, chi-squared test).

Responses were also compared by reported gender and tenure of residents (PGY-1 and -2 vs. PGY-3 and -4) and attendings (\leq or ≥ 10 years as an attending, Supplementary ▶ Tables S4–S6 [available in the online version]). A significantly higher proportion of females than males believed the aforementioned clinical vignette involving the ophthalmologist providing their son with a partially written paper was unethical (52 vs. 23%, $p = 0.01$, chi-squared test).

Discussion

Ethical conduct in research is important not only for the protection and privacy of participants but also to ensure equitable opportunity and recognition of researchers.¹⁵ While many institutions require ethics training for those participating in research, training is variable and often excludes practical guidelines.^{16,17} Because research can be integral to the career development of physicians-in-training, ethical controversies involving resident research are common. Trainees are particularly vulnerable to unethical treatment and ethical guidelines

around mentoring and collaborating with trainees are often unclear. We found that there were considerable variations amongst responses, suggesting inter-respondent diversity of opinion. However, assessments of the ethicality of controversial scenarios were largely consistent when stratified by gender, tenure, and years practicing.

Many of the scenarios assessed in our study involved mismatches between the expected role of a mentor and the actual mentorship provided, including expectations about time commitment. Chopra and colleagues defined a specific type of mentorship malpractice that encapsulates time commitment with their "Bottleneck" label, in which a mentor who has overcommitted themselves hinders the productivity of a trainee by waiting extended periods of time to advise the mentee.¹² Interestingly, questionnaire respondents viewed the underperformances in commitment by residents and attendings differently. Respondents were split on scenario 5, in which a verbal commitment was made by an attending who was unable to follow through with their role as a mentor (63.6% deemed this unethical, and 34.6% considered this neutral to ethical). However, 89.6% of respondents supported an attending giving a research project to a new trainee after an original resident was not making progress in scenario 6. Additionally, respondents were divided on scenario 1, which probed the requirements of

serving as a mentor (46.8% responded unethical, 53.2% responded ethical). In this scenario, a mentor's revision of a manuscript consisted of "five small grammatical edits." A separate investigation outlined the features of an effective mentor-mentee relationship, which included collaboratively defined objectives for both parties, and clear delineation of how the mentor can support the mentee's goals.¹⁸ While the mentor providing few edits is not inherently unethical, the trainee may infer that the mentor has not critically reviewed the project. For this reason, the participation of both parties is crucial to this discussion to establish requirements and eliminate unreasonable expectations.¹²

Further highlighting a gap in expectations between mentors and mentees, we observed variation in responses specifically by physician rank. In particular, all residents believed that starting a research project but not being included on a resulting manuscript after they had graduated from residency was unethical (scenario 13), while 17% of responding attendings deemed this as neutral to ethical ($p=0.02$). ICMJE requirements for authorship may serve as a guide in this instance to clarify whether the resident in question deserved authorship. However, the rates of ghost authorship, in which researchers who qualify for authorship are not recognized, in ophthalmology have been observed to be up to 16%.⁸ Even more concerning for trainees, a previous study found that inappropriate authorship was approximately three times more prone to be committed by faculty than by learners.¹⁹ The fact that a larger proportion of residents indicated that it was unethical for a resident's work to go unrecognized suggests that they may place more importance on research output that supports their careers. It is therefore prudent for mentors and mentees to establish clear expectations for recognition in accordance with ICMJE requirements before manuscript preparation is begun.

Other scenarios probed the ethics surrounding trainee recruitment and assignment to projects. Most respondents (85.7%) agreed that an attending is within bounds to select a trainee based on demonstrated productivity over stated interest (scenario 4), implying that identifying collaborators based on merit was valued by our respondents. However, it has been reported that nepotism has a large influence on medical research and career development.^{20,21} Scenario 3 queried this concept; respondents were divided on the situation, in which an ophthalmologist's son was provided a partially written manuscript to propel his career (35.1% unethical, 64.9% neutral-ethical). Interestingly, when analyzed by training level, a significantly higher proportion of residents than attendings believed this clinical vignette was unethical ($p < 0.01$). This may be because attendings are empathic to the position of the ophthalmologist and have more cumulative research opportunity than residents. Additionally, more female respondents than males identified this as unethical ($p = 0.01$). This may have been influenced by the wording of "son" in this scenario, which further highlighted gender disparities that may exist within the field of ophthalmology and merit further investigation. While some have argued the onus of preventing nepotism in research and hiring is on those with decision-making power,²¹ systemic interventions, such as antinepotism policy

from governments and universities, have resulted in declines in the practice.²² It has been argued that a formal mentorship program in ophthalmology may help address issues with mentorship by increasing access to mentors, setting clear expectations for their commitments, and establishing a foundation of communication.²³

International mandates, particularly the Declaration of Helsinki, require ethics committee approval of research protocols that are written before the initiation of research.²⁴ While the vast majority of institutions require procedures that adhere to the declaration, personal views on and compliance with IRB approval vary.²⁴ This can be compounded by delays in IRB review that hinder research initiation and progress; for example, in one institution, IRB approval took on average 38.6 days when revisions to the application were needed.²⁵ Scenario 17 addresses this concept; respondents' opinions differed on whether it was unethical for a resident to begin collecting data before IRB approval (61.0% unethical, 39.0% neutral-ethical), even though this practice is an explicit violation of the Declaration of Helsinki. Although it may be perceived as innocuous, there may be critical components objected to by the ethics board that put subjects at risk. Similar principles were surveyed in scenario 14. Interestingly, subverting ethics approval was closer to a consensus of unethical responses (90.9%), even when nonhuman subjects were considered. Reiteration of the role of ethics committee approval and its importance of abiding by procedures for approval may help researchers understand why the bureaucracy of approval is necessary.

The generalizability of our study is limited by small sample size and relatively low response rate; therefore, our results may be affected by nonresponse bias. Of note, a multifactor analysis was not completed due to this being a pilot study with a relatively small respondent volume and an emphasis on trends. Therefore, individual response paradigms may have impacted the significance of multiple question comparisons and statistically significant comparisons may be false-positive results. In addition to this, 26 individuals began the questionnaire but did not complete it. Partial respondents may have further contributed to nonresponse bias. Additionally, previous training in research ethics may have contributed to the perspective of respondents on these controversial scenarios; this potential confounder was not addressed in an effort to limit questionnaire length and maximize response rate. It is also possible that respondents may respond to these hypothetical ethical scenarios in a manner that they believe is socially desirable, which may differ from their actual behavior. To address this concern, questionnaires were anonymized and aggregated. Lastly, an inherent limitation of this study design is that the information captured here is descriptive rather than providing an intervention. Additional investigations are needed to derive practical ethical guidelines for resident research.

Overall, there was considerable variation in the assessment of controversial vignettes among ophthalmologists. In particular, attendings and residents perceived the ethicality of certain mentorship and authorship vignettes differently. Given this lack of consensus, there is an opportunity to

develop and standardize ethical guidelines for authorship, mentorship, and compliance in ophthalmology research to ensure equitable recognition of individual research activity and more transparent regulations for collaborations in research. The vignettes presented here may serve as discussion points for engagement between residents and attendings on joint expectations on the ethical conduction of research involving residents.

Financial Disclosures

R.W.P. is on the Board of Trustees at the AAO and Colorado Society of Eye Physicians and Surgeons and served as a consultant for Ophthalmic Mutual Insurance Company. A.L. is a consultant for Regeneron. Otherwise, all authors have no conflicts to disclose. The preliminary analyses of these data were presented at the Annual American Academy of Ophthalmology Meeting in 2021.

Funding/Support

This work was supported by the National Eye Institute (P30EY001765, Wilmer Biostats Core, to J.W.). The sponsor or funding organization had no role in the design or conduct of this research.

Conflict of Interest

None declared.

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