

Preface



The Jefferson Longitudinal Study of Medical Education: 50 Years of Research and Service

The Jefferson Longitudinal Study of Medical Education (JLSMED) came into existence 50 years ago. To date, it is the most comprehensive, extensive, and uninterrupted longitudinal study of medical students and graduates maintained in a single medical school. The study was based on the conviction that medical schools have a social responsibility and ethical obligation to monitor the quality of their educational programs, to assess their educational outcomes, and to ensure that their educational goals have been achieved for the purposes of public safety. The title of “longitudinal study” was chosen because of the intention to follow all medical students from the time of matriculation to the time of graduation, through graduate medical training, and throughout their entire active professional careers to monitor the short- and long-term effects of medical education.

A Historical Perspective

The original home of the JLSMED was the *Office of Medical Education*, later renamed the *Center for Research in Medical Education and Health Care*. In 2019, it became the *Asano-Gonnella Center for Research in Medical Education and Health Care* in recognition of the generosity of Dr. Yoshihisa Asano, the founder and chairman emeritus of the Noguchi Medical Research Institute, Tokyo, Japan, in supporting our research in the humanities and the art of medicine, and in appreciation of Joseph S. Gonnella, M.D., the founder of the Center, for his leadership role in medical education research.

Although the JLSMED was initiated in 1970, pertinent data were collected retrospectively throughout the early 1970s for students who had entered Jefferson Medical College beginning in 1964. The database expanded, beginning with the entering class of 1966 (graduating class of 1970), to include measures of clinical competence at Jefferson and after graduation at the end of the first residency year. During the early phases, both retrospective data (for graduates prior to 1970) and prospective data (for students and graduates enrolled in 1970 and thereafter) were maintained in one comprehensive database. At the present time (January 2021), this database contains academic information and career outcomes for 13,343 medical students and graduates of Sidney Kimmel (formerly Jefferson) Medical College of Thomas Jefferson University. There are presently 502 variables in the JLSMED analytic database that encompass more than 6 million data points. Data security is guided by policies developed in the Center to maintain strict confidentiality of individual data. The JLSMED data are password protected and only a few authorized professional staff of the Center can access the database.

The Accreditation Team that reviewed Thomas Jefferson University for the Middle States Commission on Higher Education praised the University for the JLSMED and made the following comment that the Center and the College are “... *to be commended for their academic interest in outcome data, responsiveness to faculty and department needs, and the clear use of data to modify the curriculum and teaching environment ...The Center continues to track data from a large number of sources before, during, and after students’ tenure at the College. Their use of this data has impacted many components of the curriculum, the learning environment, individual student development, and program planning*”

Goals of the Jefferson Longitudinal Study

The general goals of the JLSMED can be described in two words: *service* and *research*. Service is rendered to the college’s administration, faculty, and academic committees by providing them with information to assist their decision-making regarding academic programs. Service is also provided to students by identifying those who may need remedial assistance to perform at their fullest potential.

Information from the database is also used in conducting research. Specific goals of the JLSMED are described as follows:

1. To provide data to the College's administration, for example by preparing statistics for the Center's annual report; retrieving information on an individual student's performance compared to class performance for inclusion in the Dean's Medical School Performance Evaluation; assessing the College's educational programs and policies; preparing self-evaluation information as requested by the Liaison Committee on Medical Education for accreditation; and responding to inquiries by faculty and senior administrators
2. To provide objective information to the College's academic committees (e.g., Admissions, Student Promotion, and Curriculum) and to respond in a timely manner to the faculty members' inquiries related to their institutional and academic interests
3. To provide up-to-date information to the Office of Student Affairs and Career Counseling and to prepare predictions about students who may need supplementary education, in order to better prepare them for licensure examinations and the challenges of medical school
4. To address empirically and systematically a variety of complex and contemporary issues raised by researchers
5. To disseminate research findings through presentations at national and international professional meetings and publications in peer-reviewed journals for a broader audience

The Scope of the Jefferson Longitudinal Study Database

The information encoded in the database is routinely updated. Variables have been added or archived in response to changes in curriculum. Despite this dynamic nature, some central constructs (e.g., performance measures prior to, during, and beyond medical school) and their corresponding variables have remained relatively unaltered. Examples of such variables are performance scores on the nationally administered standardized tests or examinations taken before medical school (e.g., the Scholastic Aptitude Test [SAT], the Medical College Admission Test [MCAT]), during medical school (e.g., assessments of acquisition of clinical knowledge and rating of clinical competence in third-year core clerkships, performance on medical licensing examinations), and after medical school (e.g., specialty choice, licensing, and board certification status).

Some medical schools have expressed interest in learning more about the JLSMED, requesting copies of the questionnaires used in the study and information about how to set up a longitudinal study and needed resources. In response to a request from *Academic Medicine* in 2011, we prepared and published in that journal a schematic snapshot of the JLSMED for those interested in a model for the development of a longitudinal study of medical students and graduates (Appendix A).

An important feature of the JLSMED is the collection of clinical competence ratings of graduates made by the program director at the end of the first year of residency training. This point in time, the end of the first postgraduate training year, was deliberately chosen to capture the impact of medical school education while minimizing the inevitable effect of the residency experience on competence ratings. Furthermore, at this point, the directors of residency programs would have had sufficient opportunities to observe a resident's professional behavior in a variety of clinical situations to make an informed judgment. The Postgraduate Competence Rating Form was developed to assess graduates' competence in the science and the art of medicine and demonstration of the three roles of physicians, as a *clinician, teacher, and manager of resources* (a copy of the Postgraduate Competence Rating Form is shown in Appendix B).

All the variables in the JLSMED database can be grouped into three categories:

1. *Data before education at Jefferson*, which include demographic, academic, and other admission data.
2. *Data during education at Jefferson*, which include course grades; ratings of clinical competence in the third-year clerkships; hospitals of clerkships; performance on Steps 1 and 2 of the United States Medical Licensing Examination (USMLE, formerly the National Board of Medical Examiners' examinations); coded reasons for any change in academic status (transfer, dismissal, delayed graduation); and responses to the entrance and exit questionnaires on attitudes, personal qualities, future plans, and preferences.
3. *Data after graduation from Jefferson*, which include geographic location and hospitals of residency, specialties pursued in residency training, ratings of postgraduate clinical competence, performance on Step 3 of the USMLE (formerly Part III of the National Board of Medical Examiners' examination), geographic location and specialty after residency, board certification status, types of professional activities, faculty appointments, changes of practice and location, etc. In addition, follow-up questionnaires have solicited graduates' evaluation of their education at Jefferson, their professional concerns, perceived problems, types of activities, types of patients, and research productivities. The scope of the JLSMED database is depicted in Appendix A.

Current Faculty and Staff of the Center Involved in the Jefferson Longitudinal Study

- **Joseph S. Gonnella, M.D.**, Founder, Dean Emeritus, and Distinguished Professor of Medicine
- **Clara A. Callahan, M.D.**, Emeritus Director of the Center, and the Lillian H. Brent Dean of Student and Admission, and Professor of Pediatrics

- **Vittorio Maio, Pharm.D.**, Managing Director of the Center, Research Professor, Jefferson College of Population Health, Director, Health Economics and Outcomes Research Fellowship, Jefferson College of Population Health
- **J. Jon Veloski, M.S.**, Director of Medical Education Research, Instructor, Department of Psychiatry and Human Behavior
- **Mohammadreza Hojat, Ph.D.**, Director of the Jefferson Longitudinal Study, Research Professor, Department of Psychiatry and Human Behavior
- **Aaron Douglas, Ph.D.**, Associate Director of the Jefferson Longitudinal Study
- **Jennifer DeSantis, M.Ed.**, Senior Research Study Analyst
- **Lifan He, M.S.**, Programmer/Analyst
- **Phyllis M. Accetta**, Administrative Assistant
- **Shira Carroll**, Administrative Assistant
- **Edward Nicks, Jr.**, Statistical Data Coordinator

The JLSMED could not have survived without the willingness and participation of those who cooperated and shared information with us. First and foremost, we gratefully appreciate the cooperation of thousands of our students and graduates who have participated in the study by completing our surveys and granting us permission to collect clinical competence ratings on their behalf from their postgraduate program directors. The offices of Admissions, Registrar, and Alumni have always been helpful in providing us with data. Professional organizations such as the Association of American Medical Colleges (AAMC) and the American Medical Association (AMA) have routinely and continuously provided us with information about our graduates. Finally, we would like to express our sincere gratitude to the directors of residency training programs in more than 700 hospitals and residency training institutions all over the USA who have completed our postgraduate rating form on behalf of our graduates.

Grouping the Jefferson Longitudinal Study Publications in Different Chapters

The JLSMED has been used to address a variety of issues in medical education. Because of this variety, the grouping of the studies into homogeneous chapters was not an easy task. After considering several options, we decided to classify the published studies into the following seven chapters:

1. *Admissions* (e.g., standardized tests, academic preparation, and other admission variables)
2. *Demographics* (e.g., gender, age, race)
3. *Medical School Evaluations* (preclinical and clinical)
4. *Postgraduate and Career* (e.g., clinical competence, specialization, professional activities)

5. *Psychosocial Attributes* (e.g., personal qualities, personality measures, indicators of well-being, and early life experiences)
6. *Professionalism* (e.g., measuring empathic orientation in patient care, interprofessional collaboration, and lifelong learning)
7. Miscellaneous (publications that could not be grouped into the aforementioned categories, such as interviews, letters to the editors, commentaries, and editorials)

Some of the studies could have been included in more than one chapter (e.g., gender difference on academic performance or psychosocial attributes). Despite this overlap, the abstract of each study in this book appears in only one chapter, based on the main focus of the study. Abstracts of the studies that have been published in professional journals are presented in alphabetical order by the authors' names in each subsection. Overall, there were a total of 204 publications relevant to the JLSMED. The book authors were listed as coauthors of 194 of these publications. The majority of these abstract entries reported ($n = 167$) are indeed reprints of the published articles in peer-reviewed journals. We obtained permission from journal publishers through Copyright Clearance Center to reprint the abstracts. We would like to thank the Copyright Clearance Center for providing us with the facility to contact journal publishers and also publishers that kindly granted us permission to reprint the published abstracts. Some journal publishers required that the link to the article be printed and/or copyright acknowledgment appear along with the abstract. We had difficulties in obtaining permission or in contacting publishers of five articles; abstracts of these articles were rewritten by us. Some publications did not have abstracts in their original publication (e.g., interviews, letters to the editor, editorials, commentaries ($n = 28$)). We drafted brief abstracts for such publications for the book.

Productivity of the Jefferson Longitudinal Study

The JLSMED is the most prolific longitudinal study of medical students and graduates of a single medical school. This longitudinal study has resulted in 204 publications (as of January 2021) in peer-reviewed journals, listed in the bibliography section at the end of this book. Some of those studies were also presented before national or international professional meetings prior to their publication. We (JSG, JJV, MH, and James B. Erdmann, Ph.D.) served as the invited editors for a thematic issue of *Academic Medicine* on "Assessment Measures in Medical School, Residency, and Beyond: The Connections" (*Academic Medicine*, Supplement No. 2, Volume 68, February 1993). This supplement subsequently was published as an independent book by Springer Publishing Company. Also, in 1999, we (JSG, JJV, MH, and Gang Xu) were invited to serve as the guest editors of a special section of *Evaluation & the Health Professions* on the topic of "Medical Education and the Changes in Health Care" (Volume 22, No. 2, June 1999). We (JJV, MH) were also invited to write a chapter on the measurement of professionalism in medicine in a book edited

by Dr. David Stern of the University of Michigan, in which we describe three scales, developed as offshoots of the JLSMED (*Jefferson Scale of Empathy*, *Jefferson Scale of Physician-Nurse Collaboration*, and *Jefferson Scale of Physician Lifelong Learning*) to be operational measures of core elements of professionalism in medicine (Veloski & Hojat, 2006).

Information about the JLSMED is routinely updated and posted on the website of the Asano-Gonnella Center for Research in Medical Education and Health Care.

- Click on the following link for updated general information about the Asano-Gonnella Center for Research in Medical Education and Health Care: <http://www.jefferson.edu/university/skmc/research/research-medical-education.html>. Jefferson.edu/CRMEHC
- Click on the following link for updated information on the Jefferson Longitudinal Study: <https://www.jefferson.edu/academics/colleges-schools-institutes/skmc/research/research-medical-education/longitudinal-study-medical-education.html>
- Click on the following link for updated information about the Jefferson Scale of Empathy and related research findings: <https://www.jefferson.edu/academics/colleges-schools-institutes/skmc/research/research-medical-education/jefferson-scale-of-empathy.html>

We have developed the following ten psychometrically sound instruments as by-products of the JLSMED for the assessment of medical education outcomes, professional development of physicians in training and in practice, and patient outcomes. We have reported convincing evidence to support the psychometrics (e.g., validity and reliability) of these instruments:

1. **Jefferson Scale of Empathy (JSE-S** version for administration to medical students, 20 items)
2. **Jefferson Scale of Empathy (JSE-HPS** version for administration to all health professions students other than medicine, 20 items)
3. **Jefferson Scale of Empathy (JSE-HP** version, for administration to all practicing health professionals, 20 items)
4. **Jefferson Scale of Patient Perception of Physician Empathy (JSPPPE**, for administration to patients, 5 items)
5. **Jefferson Scale of Attitudes Toward Physician-Nurse Collaboration** (15 items)
6. **Scale of Attitudes Toward Physician-Pharmacist Collaboration** (16 items)
7. **Jefferson Scale of Attitudes Toward Interprofessional Collaboration (JeffSATIC**, 20 items)
8. **Jefferson Scale of Physician Lifelong Learning (JeffSPLL**, for administration to physicians, 14 items)
9. **Jefferson Scale of Physician Lifelong Learning (JeffSPLL-MS** version for administration to medical students, 14 items)
10. **Scale of Overall Satisfaction with Primary Care Physicians** (10 items)

These instruments have already attracted the attention of many researchers from the USA and abroad, evidenced by the increasing number of requests we have been receiving for permission to use them. For example, as of January 2021, we have received over 2200 requests by researchers from 89 countries for permission to use the Jefferson Scale of Empathy. This scale has already been translated into 56 languages, and we have a list of 424 publications from national and international researchers outside of Jefferson (as of January 2021) in the English language in peer-reviewed journals in which the Jefferson Scale of Empathy has been used or reviewed, and the list is growing. This list is posted on the following link: https://www.jefferson.edu/content/dam/academic/skmc/crmehc/8.27.21_Bibliography_Natl-Intl%20researchers.pdf.

Final Remarks

In summary, medical schools should be responsible for collecting pertinent data with which to monitor their educational programs and to assess their educational outcomes for public safety and advancement of the science and art of medicine. We hope that this book can help medical schools to recognize the value of longitudinal research as a means to discharge the aforementioned responsibilities. The quality of the medical education and the cost should always be monitored. Our recent 50th anniversary review of the Penn State-Jefferson accelerated combined BS-MD degree program (Gonnella et al., 2021) indicates that it is possible to reduce the length of the journey to obtain an MD degree and thereby the cost without compromising the quality of medical education outcomes. To honor the principle of social accountability, assessments of medical education outcomes should be seen as a core mandate that must be acted upon.

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References

- Gonnella, J. S., Callahan, C. A., Erdmann, J. B., Veloski, J. J., Jafari, N., Markle, R. A., & Hojat, M. (2021). Preparing for the MD: How long, at what cost, and with what outcomes? *Academic Medicine*, 96(1), 101–107. <https://doi.org/10.1097/ACM0000000000003298>.
- Veloski, J., & Hojat, M. (2006). Measuring specific elements of professionalism: Empathy, teamwork, and lifelong learning. In D.T. Stern (Ed.). *Measuring medical professionalism*. (pp. 117–145). Oxford: Oxford University Press.

Appendix A

AM Last Page: The Jefferson Longitudinal Study of Medical Education

Joseph S. Gonnella, MD, founder and director, Center for Research in Medical Education and Health Care; Mohammadreza Hojat, PhD, director, Jefferson Longitudinal Study; Jon Veloski, MS, director, Medical Education Division, Center for Research in Medical Education and Health Care, Jefferson Medical College of Thomas Jefferson University

Data Available by Matriculating Class	1964	1970	1980	1990	2000	2010
Demographic and academic*						
Clinical clerkship						
Residency						
Career outcomes						
Psychosocial						
Jefferson Scale of Empathy						

*Demographic and academic data for the classes of 1964-1969 were extracted retrospectively.

Scope of Database

Before Medical School

- Demographics
- SAT scores
- GPA science
- GPA nonscience
- MCAT scores

During Medical School

- Matriculation surveys
- Course grades
- GPA

1st Year
2nd Year

- Course grades
- GPA
- NBE/USMLE 1

3rd Year
4th Year

- Examination grades
- Clerkship ratings
- Hospitals of clerkships
- GPA

PGY-

- NBE/USMLE 2
- Graduation survey
- Permission form

After Medical School

- Residency specialty
- Residency institution
- Geographic location
- Rating of competency
- NBE/USMLE 3

Career

- Specialty
- Geographic location
- Board certification
- Faculty appointment
- Type of practice
- Active status
- Follow-up surveys

Reason for initiating the study: The Jefferson Longitudinal Study (JLS) at Jefferson Medical College of Thomas Jefferson University was initiated in 1970 based on the premise that medical schools have an obligation to society to monitor their educational outcomes.^{1,2}

History: The JLS was implemented with an intention to track every Jefferson medical student throughout his or her entire professional career. Data for the JLS are routinely updated for all entering classes from 1964 to the present using information from the Association of American Medical Colleges, American Medical Association, American Board of Medical Specialties, National Board of Medical Examiners, and in-house sources. The JLS retrieves information from the most comprehensive, extensive, and uninterrupted longitudinal database of medical students and graduates maintained in a single medical school.

Goals

Service to

- Faculty (e.g., responding to inquiries)
- Academic committees (e.g., providing data to analyze admissions trends, to evaluate programs, or to examine success/failure factors in students' performance)
- College/dean's office/administrators (e.g., providing data for the annual report, dean's letters of evaluations, or accreditation)
- Students (e.g., guiding academic and career development)

Research

- Data analyses in collaboration with faculty to support their scholarship and address issues in medical education for publication and presentation at professional meetings

By the Numbers

As of December 2010, the JLS

- Contained approximately 6 million pieces of data
- Tracked 10,600 students
- Garnered data from 573 postgraduate training hospitals
- Inspired 179 peer-reviewed publications* (56 in *Academic Medicine*)

* Abstracts of 155 publications of the JLS are posted at <http://ijdc.jefferson.edu/jlsme>.

New Instruments

The JLS has led to the development of the following instruments for measuring educational outcomes:

- Jefferson Scale of Empathy³
- Jefferson Scale of Attitudes Toward Physician–Nurse Collaboration⁴
- Jefferson Scale of Physician Lifelong Learning⁵
- Scale of Attitudes Toward Physician–Pharmacist Collaboration⁶

References

1. Hojat M, Gonnella JS, Veloski JJ, Erdmann JB. Jefferson Medical College Longitudinal Study: A prototype for evaluation of changes. *Educ Health*. 1996;9:99-113.
2. Gonnella JS, Hojat M, Erdmann JB, Veloski JJ, eds. *Assessment Measures in Medical School, Residency, and Practice: The Connections*. New York, NY: Springer; 1993.
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4. Hojat M, Gonnella JS, Nasca TJ, et al. Comparisons of American, Israeli, Italian, and Mexican physicians and nurses on the total and factor scores of four dimensions of the Jefferson Scale of Attitudes Toward Physician–Nurse Collaboration. *Int J Nurs Stud*. 2003;40:426–435.
5. Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. *Acad Med*. 2009;84:1066–1074. Available at: http://journals.tww.com/academicmedicine/Fulltext/2009/08000/Measurement_and_Correlates_of_Physicians_Lifelong_Learning_21.aspx; Accessed November 9, 2010.
6. Hojat M, Gonnella JS. An instrument for measuring pharmacist and physician attitudes towards collaboration. Preliminary psychometric data. *J Interprof Care*. 2011;25:66-72.

Appendix B

POSTGRADUATE RATING FORM

I. Please rate the resident in each of the following items by circling the appropriate number. In making the ratings please compare this resident with all residents you have supervised, not just with those in your recent group.

	Top Quarter	Upper Middle Quarter	Lower Middle Quarter	Bottom Quarter	Insignificant Information to Judge
1. Attention to collection of data related to health risks	4	3	2	1	X
2. Collection of history of the present illness from the patient or family	4	3	2	1	X
3. Ability to communicate effectively with patients and their families	4	3	2	1	X
4. Ability to act effectively in an emergency	4	3	2	1	X
5. Competence in performing physical examination	4	3	2	1	X
6. Willingness to ask for help when needed	4	3	2	1	X
7. Attention to psychological and emotional factors related to the patient's health	4	3	2	1	X
8. Use of literature in diagnosis and treatment	4	3	2	1	X
9. Documentation of reasons for obtaining laboratory data	4	3	2	1	X
10. Counseling patients about preventive care and wellness	4	3	2	1	X
11. Thoroughness of differential diagnosis	4	3	2	1	X
12. Awareness of socio-psychological factors affecting patient's condition	4	3	2	1	X
13. Ability to handle anxiety-producing situations	4	3	2	1	X
14. Adherence to professional ethical standards	4	3	2	1	X
15. Knowledge of basic science areas most closely related to postgraduate program	4	3	2	1	X
16. Judgment in implementing care	4	3	2	1	X
17. Effectiveness as a teacher of medical students and/or other health professionals	4	3	2	1	X
18. Willingness to admit an error in judgment	4	3	2	1	X
19. Willingness to proceed independently when appropriate	4	3	2	1	X
20. Relationships with other health care personnel	4	3	2	1	X
21. Thoroughness in collection of pertinent past history of the patient	4	3	2	1	X
22. Thoroughness and organization of medical records	4	3	2	1	X
23. Collection of the patient's family history	4	3	2	1	X
24. Thoroughness in obtaining information from patients or families related to the patient's chief complaint	4	3	2	1	X
II. Please rate the resident's overall performance in the following areas:					
1. Knowledge	4	3	2	1	X
2. Data-Gathering Skills	4	3	2	1	X
3. Clinical Judgment	4	3	2	1	X
4. Professional Attitudes	4	3	2	1	X
III. If one assumes that a physician serves not only as a clinician, but also as a patient educator and a manager of health care resources, how would you rate this resident in these areas:					
1. Clinician	4	3	2	1	X
2. Patient educator	4	3	2	1	X
3. Manager of health care resources	4	3	2	1	X

Please see other side-

IV. How do you rate this resident's empathetic behavior (defined as an understanding of the patients' inner experiences and perspective, and a capability to communicate this understanding) on the following 10-point scale:

Not empathetic at all	Very empathetic all the time
1.....2.....3.....4.....5.....6.....7.....8.....9.....10	

V. Does your hospital offer a program in this resident's specialty?

Yes-If Yes, was this resident offered further postgraduate training at your hospital? Yes No.

No-If No, if your hospital had a program in this specialty, would he or she have been offered a place at your institution? Yes No.

Other, please comment _____

VI. Was the resident's performance consistent with the hospital's expectation at the time of acceptance?

Yes, (describe) _____

No, (describe) _____

VII. Was the dean's letter of recommendation predictive of the resident's performance?

Yes, (describe) _____

No, (describe) _____

VIII. Does this resident have qualities you would like to see in your own physician?

Yes, (describe) _____

No, (describe) _____

Thank you again for your help with this IRB approved evaluation.
If you have any questions concerning this form, or suggestions for improvement, please contact:

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Please return this form to:
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