Approved by the Regents
May 18, 2023

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health

Kelly Bakulski, assistant professor of epidemiology, School of Public Health, is recommended for promotion to associate professor of epidemiology, with tenure, School of Public Health

Academic Degrees:

Ph.D.	2012	University of Michigan, Ann Arbor, MI
B.A.	2007	Colby College, Waterville, ME

Professional Record:

2020 - Present	Data Management and Statistical Core Leader, Michigan Alzheimer's Disease Research Center, Michigan Medicine, University of Michigan, Ann Arbor, MI
2019 - Present	Assistant Professor, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI
2018 - 2019	Adjunct Lecturer, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI
2016 - 2018	Intermittent Lecturer, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI
2016 - 2018	Research Assistant Professor, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI
2013 - 2015	Post-Doctoral Fellow, Department of Epidemiology, Center for Epigenetics, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD

Summary of Evaluation:

Teaching: Professor Bakulski has taught three courses at the rank of assistant professor since Fall 2019. These courses include EPID 512 (Biologic Basis of Disease), a required course for epidemiology master's students, EPID 674 (Epidemiologic Data Analysis Using R), an elective computer laboratory course, and PHYSIOL 541 (Mammalian Reproductive Physiology), an elective course taught in the University of Michigan Medical School. She made several innovations to EPID 512 that emphasize application of concepts and to EPID 674 to accommodate a rapidly changing programming environment for R, e.g., introducing RStudio Cloud and switching to the tidyverse coding style. Professor Bakulski recently adapted this course for the online master's program, which involved a significant redesign of course materials and recording of lectures. Student evaluation scores since September 2019 largely range from 4.8 to 5.0 across the six evaluation questions. In addition to her University of Michigan teaching activities, Professor Bakulski has served as instructor or co-instructor for six different short courses on epigenetic applications and data analysis. In recognition of her innovative teaching techniques, Professor Bakulski was invited by the School of Public Health Instructional Services team to host seminars on interactive class polling technologies and electronic exams. In 2019, she was nominated for the University of Michigan Golden Apple Teaching Award, and she received the Excellence in Teaching award from the School of Public Health.

During her time in rank, Professor Bakulski has chaired five doctoral dissertation committees and served on the dissertation committees of an additional seven students. She has mentored 32 master's students and two post-doctoral fellows. To-date, she has co-authored 27 peer-reviewed publications with a student or post-doctoral fellow as first author. Her trainees also have received multiple awards, including a National Institutes of Health (NIH) F31 fellowship, the National Institute of Environmental Health Sciences (NIEHS) Wetterhahn Award, and a NIH Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) K99 award.

Research: Professor Bakulski's research program integrates epidemiology and toxicology approaches to identify neurological disease etiologies throughout the life course. Her research is conducted primarily among prospective human cohorts that are well-characterized for neurological outcomes, chemical exposures, and 'omic measures (including DNA methylation, RNA expression, and genetic sequence). Additionally, she uses model systems, including cell culture, rodent models, and computational models to consider molecular effects in target tissues. Her research on risk factors for neurologic disorders focuses on three specific lines of inquiry: 1) identifying modifiable environmental, genetic, and epigenetic risk for neurodegenerative disease; 2) characterizing perinatal exposure, genetic, and epigenetic risk factors for neurodevelopmental disorders; and 3) improving biologic inferences, rigor, and replication in 'omics studies of neurological disorders. Across these themes, she incorporates multiple genome- and exposure-wide measures to understand risk for several increasingly prevalent neurological disorders of high public health importance, e.g., Alzheimer's disease and related dementias, amyotrophic lateral sclerosis (ALS), and autism spectrum disorders (ASD).

Professor Bakulski has authored a total of 69 peer-reviewed manuscripts and three book chapters. Since 2019, she has published 50 papers (seven as first, seven as second, and 13 as senior author). Professor Bakulski's work has been published in highly ranked journals in health and aging and environmental health, including *Circulation*, *Nature Communications*, and *Environmental Health Perspectives*. Her Google Scholar h-index is 26, i-10 index is 35, and her publications have been cited 3,740 times as of December 8, 2022. Professor Bakulski has an outstanding record of external funding for her research. Currently she is a multiple principal investigator (MPI) of five NIH R01 awards that advance key themes in her research program described above. Through her R01 investigating cumulative genetic risk of dementia in the Health and Retirement Study, she found that genome-wide cumulative genetic risk for Alzheimer's disease was a predictor of dementia, and that dyslipidemia and smoking (but not type 2 diabetes) were causal risk factors for dementia. Through her second R01 as MPI, Professor Bakulski built upon her previous research linking lead and cadmium exposure to adverse neurological outcomes to examine associations of >250 types of chemical biomarkers with incident dementia in the National Health and Nutrition Examination Survey. With her third R01 as MPI, which includes a Diversity Supplement for an epidemiology doctoral student, Professor Bakulski uses data from the Health and Retirement Study to examine blood-based DNA methylation as a biomarker of dementia. In addition to her NIH-funded work on dementia, Professor Bakulski is MPI of a recently funded three-year award from the ALS Association to explore environmental and genetic risk factors for ALS. She also just received a fourth R01 as MPI to study molecular consequences of in utero lead exposure. Professor Balulski currently is a co-investigator on nine active externally funded projects related to neurological diseases and/or

environmental epigenomics. Among these, she is the Data Management and Statistical Core Lead for the flagship National Institute of Aging (NIA)-funded P30 Michigan Alzheimer's Disease Research Center.

Recent and Significant Publications:

Bakulski, K.M., Dou, J.F., Thompson, R.C., Lee, C., Middleton, L.Y., Perera, B.P.U., Ferris, S.P., Jones, T.R., Neier, K., Zhou, X., Sartor, M.A., Hammoud, S.S., Dolinoy, D.C., Colacino, J.A. (2020) Single-Cell Analysis of the Gene Expression Effects of Developmental Lead (Pb) Exposure on the Mouse Hippocampus. *Toxicol Sci.* Aug 1;176(2):396-409. doi: 10.1093/toxsci/kfaa069. PMID: 32458983; PMCID: PMC7416319.

Bakulski, K.M., Dou, J.F., Feinberg, J.I., Brieger, K.K., Croen, L.A., Hertz-Picciotto, I., Newschaffer, C.J., Schmidt, R.J., Fallin, M.D. (2020) Prenatal Multivitamin Use and MTHFR Genotype Are Associated with Newborn Cord Blood DNA Methylation. *Int J Environ Res Public Health*. Dec 9;17(24):9190. doi: 10.3390/ijerph17249190. PMID: 33317014; PMCID: PMC7764679.

Bakulski, K.M., Vadari, H.S., Faul, J.D., Heeringa, S.G., Kardia, S.L.R., Langa, K.M., Smith, J.A., Manly, J.J., Mitchell, C.M., Benke, K.S., Ware, E.B. (2021) Cumulative Genetic Risk and APOE ε4 Are Independently Associated With Dementia Status in a Multiethnic, Population-Based Cohort. *Neurol Genet.* Mar 5;7(2):e576. doi: 10.1212/NXG.0000000000000576. PMID: 33688582; PMCID: PMC7938646.

Middleton, L.Y.M., Dou, J., Fisher, J., Heiss, J.A., Nguyen, V.K., Just, A.C., Faul, J., Ware, E.B., Mitchell, C., Colacino, J.A., Bakulski, K. (2021) Saliva cell type DNA methylation reference panel for epidemiological studies in children. *Epigenetics*. 2022 Jan-Feb;17(2):161-177. doi: 10.1080/15592294.2021.1890874. Epub Feb 22. PMID: 33588693; PMCID: PMC8865319.

Bakulski, K.M., Fisher, J.D., Dou, J.F., Gard, A., Schneper, L., Notterman, D.A., Ware, E.B., Mitchell, C. (2021) Prenatal Particulate Matter Exposure Is Associated with Saliva DNA Methylation at Age 15: Applying Cumulative DNA Methylation Scores as an Exposure Biomarker. *Toxics*. Oct 13;9(10):262. doi: 10.3390/toxics9100262. PMID: 34678958; PMCID: PMC8538839.

Service: Professor Bakulski has a strong record of service at the department and school level. Within the department, she has served on the recruitment committee, the admissions committee, and the strategic planning committee. At the school level, she was a founding and elected member of the Junior Faculty Advisory Board (JFAB), which has made significant contributions to the school and its junior faculty. Professor Bakulski's state and national service includes co-organizing the Michigan Alliance for Reproductive Technologies conference in 2021, which included 54 abstracts and more than 250 attendees. She has extensive experience as an ad hoc reviewer for the NIH, including for the specialized mechanisms of R35 outstanding investigator grants, U19 cooperative center grants, and K01/K99 career development grants, as well as for the standing study sections Neurological Aging and Musculoskeletal Epidemiology (NAME), Neurotoxicology and Alcohol (NAL), and Cellular and Molecular Medicine (CAMM). She also has served as an ad hoc reviewer for the Michael J. Fox Foundation and Graduate Women in Science. Professor Bakulski is an editorial board member at *Environmental Health Perspectives* and the associate editor for the interdisciplinary *Journal of Alzheimer's Disease*. In 2020, she was recognized as serving in the top 15% of reviewers for *Environmental Health Perspectives*,

the highest ranked journal in environmental health sciences. Professor Bakulski has also served as an ad hoc reviewer for numerous high-impact journals, including *JAMA Neurology*, *Alzheimer's & Dementia*, and *Nature Human Behavior*.

External Reviewers:
Reviewer A: "In research, Dr. Bakulski has demonstrated excellence in multiple ways. She is highly productive, both in terms of grants submitted and received as well as in terms of manuscript publications. She publishes frequently in high quality journals, and she often publishes with her trainees as first author. She is a frequently invited guest speaker. In addition to the multiple NIH R grants where Dr. Bakulski serves as PI or MPI, her appointment as the Leader of the Data Management and Statistics Core of the Michigan ADRC while an Assistant Professor reflects the respect and confidence that her colleagues must have in her abilities and judgment. It is clear that Dr. Bakulski has met and exceeded the benchmarks for promotion in this domain."

Reviewer B: "Among Dr. Bakulski's noteworthy articles are Harris et al., 2022 published in *Reproductive Sciences*. This innovative study applied a data mining approach to identify chemicals present at high levels in non-Hispanic Black women that target preterm birth genes and pathways. As a reflection of its impact, this paper was selected as a paper of the month by the National Institute of Environmental Sciences (NIEHS). A second noteworthy study was Bakulski et al., 2021 published in *Frontiers in Molecular Neuroscience*. This study focused on the identification of autism-associated DNA methylation at birth from multiple tissues. These are just two of the numerous, high quality studies that are part of Dr. Bakulski's portfolio. Dr. Bakulski's achievements in regard to her publication quality and impact are exceptional…After reviewing Dr. Bakulski's scholarly accomplishments, I can state unequivocally that Dr. Bakulski is an outstanding scientist who is most certainly qualified for promotion to the rank of associate professor with tenure."

Reviewer C: "Dr. Bakulski has established herself as a strong epidemiologist leading important and high quality research in the determinants and biology of dementia and Alzheimer's Disease (AD)…Dr. Bakulski's work has addressed important challenges in the field, such as understanding how cell composition influences epigenetic patterns and variations in genetic risk for Alzheimer's Disease between European and African ancestry individuals…In summary, Dr. Bakulski is a strong scientist and an asset to the Department. Based on her scientific accomplishments, teaching, and service, she appears to more than meet criteria for the proposed promotion to Associate Professor with tenure."

Reviewer D: "...I find the quality, quantity, focus and scholarly impact of Dr. Bakulski's works to be very strong. Of her published work, I would consider her 2016 postdoctoral work publication, DNA methylation of cord blood cell types: Applications for mixed cell birth studies, to be her most impactful – it provided an ingenious solution for people studying DNA methylation in cord blood, an ingenious and practical solution that has garnered many citations to date…I am therefore strongly supportive of the promotion of Dr. Kelly Bakulski to the rank of Associate Professor with tenure at the School of Public Health, Department of Epidemiology, at the University of Michigan. I see her as a future leader in her field of research and internally in her institution, she appears to be a strong asset for the University."

Reviewer E: “I am also impressed with both the quantity and quality of her publications. In particular, her work on reference data sets for deconvolution of DNA methylation measurements is most impressive, including those from cord blood (PMID: 27019159, and the accompanying resource FlowSorted.Cord.Blood.450k on Bioconductor), as well as in saliva (PMID: 33588693). The DNA methylation literature often suffers from artifacts due to cell population shifts, and her work provides invaluable resources for the environmental epigenetics community to overcome such artifacts in placenta- and saliva[-]based studies. Her work certainly meets and even exceeds the requirements for someone being considered for promotion to associate professor at our institution. Therefore, I strongly endorse her promotion.”

Summary of Recommendation: Professor Bakulski is a leading researcher in the field of neurologic disease etiologies throughout the life course using population health approaches and molecular studies. She has an excellent record in teaching and service. It is with the support of the School of Public Health Executive Committee that I recommend Kelly Bakulski for promotion to associate professor of epidemiology, with tenure, School of Public Health.

F. DuBois Bowman, Ph.D.
Dean, School of Public Health

May 2023