Jongyun Jung

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Research Interest

- **Statistical Methodology for Complex Data**: Developing and applying innovative statistical modeling for longitudinal, time-to-event, and hierarchical data, with applications in chronic disease (Osteoporosis and Sarcopenia) and Aging research.

- **Genetic and Genomic Data Analysis**: Integrating advanced biostatistics and computational methods for genome-wide association studies (GWAS) and genetic risk prediction using large-scale cohorts.

- **Machine Learning and Predictive Modeling**: Application of Machine Learning techniques for building and validating robust predictive models in clinical and public health settings.

- **Evidence Synthesis and Meta-Analysis**: Conducting systematic reviews and meta-analyses to synthesize evidence from heterogeneous sources, including clinical trials, observational studies, and AI applications.

- **Precision and Patient-Centered Care**: Integrating methodological advances with real-world data (RWD) to inform shared decision-making and advance personalized medicine.

Education

The Ohio State University, Columbus, Ohio

PhD in Biomedical Science (Biomedical Informatics Track), August 2022 - Present (Expected May 2026)

Advisor: Dr. Qing Wu

University of Nevada, Las Vegas, Las Vegas, Nevada

Public Health - Certificate (Epidemiology and Biostatistics), August, 2022

Advisor: Dr. Qing Wu

Minnesota State University Mankato, Mankato, Minnesota ***Cum Laude***

Master of Science, Mathematics and Statistics, Spring 2019

Advisor: Dr. Mezbah Rahman

Thesis: A Statistical Analysis and Machine Learning of Genomic Data

Minnesota State University Mankato, Mankato, Minnesota ***Cum Laude***

Bachelor of Arts, Economics and Mathematics, Spring 2013

Publications

Published

1. Qing Wu, **Jongyun Jung**. "Uncovering Racial and Genetic Disparities in FRAX Performance for Fracture Risk Assessment in Postmenopausal Women" https://doi.org/10.1093/jbmr/zjaf160, Journal of Bone Mineral Research (IF: 6.2), 10/30/2025.
2. Qing Wu, **Jongyun Jung** , "Precision fracture risk assessment: leveraging genomic and clinical data for personalized care" https://doi.org/10.1007/s00198-025-07517-x, Osteoporosis International (IF: 4.7), 05/06/2025.
3. Qing Wu, **Jongyun Jung** , "Ensemble-Learning Approach Improves Fracture Prediction Using Genomic and Phenotypic Data" https://doi.org/10.1007/s00198-025-07437-w, Osteoporosis International (IF: 4.7), 03/07/2025.
4. **Jongyun Jung**, Qing Wu, "Identification of bone mineral density associated genes with shared genetic architectures across multiple tissues: Functional insights for EPDR1, PKDCC, and SPTBN1" https://doi.org/10.1371/journal.pone.0300535, PLOS One (IF: 3.7), 04/29/2024.
5. **Jongyun Jung**, J. Dai, B. Liu, and Q. Wu, "Artificial Intelligence in Fracture Detection with Different Image Modalities and Data Types: A Systematic Review and Meta-Analysis" https://doi.org/10.1371/journal.pdig.0000438, PLOS Digital Health (IF: 4.4), 01/30/2024.
6. Qing Wu, **Jongyun Jung**. Genome-wide polygenic risk score for major osteoporotic fractures in postmenopausal women using associated single nucleotide polymorphisms. 21, 127 (2023). https://doi.org/10.1186/s12967-023-03974-2, Journal of Translational Medicine (IF: 8.4), 02/27/2023
7. Qing Wu, Fatma Nasoz, **Jongyun Jung**, Bibek Bhattarai, Robert A. Greenes, Kenneth G. Saag. Machine learning approaches for the prediction bone mineral density by using genomic and phenotypic data of 5,130 older men, doi: https://doi.org/10.1038/s41598-021-83828-3, Scientific Reports (IF: 4.9), 2021/02/24
8. Qing Wu, Fatma Nasoz, **Jongyun Jung**, Bibek Bhattarai, Mira V Han. Machine Learning Approaches for Fracture Risk Assessment: A Comparative Analysis of Genomic and Phenotypic Data in 5130 Older Men, doi: https://doi.org/10.1007/s00223-020-00734-y, Calcified Tissue International (IF: 4.0), 2020/07/29
9. **Jongyun Jung**, Qing Wu . "Contribution of Rare Variant(s) to the genetic risk score," Genetic Epidemiology (IF: 2.3), vol. 44, no. 5, pp. 469–533, 2020.
10. **Jongyun Jung** (2019). A statistical analysis and machine learning of genomic data [Master's thesis, Minnesota State University, Mankato]. Cornerstone: A Collection of Scholarly and Creative Works for Minnesota State University, Mankato. https://cornerstone.lib.mnsu.edu/etds/899/
11. **Jongyun (Formerly, Jongha) Jung**, Kwangwoo (Ken) Park. Industrial Systematic Risks and Business Cycles in US economy 2014 October, *Journal of International Finance and Economics* http://dx.doi.org/10.18374/JIFE-14-4.13 .

Under Review

1. **Jongyun Jung**, Qing Wu. "Longitudinal GWAS Identifies *SPTBN1* as a Novel Determinant of BMD Trajectories in Diverse Postmenopausal Women", Nature Aging (IF: 19.4)
2. **Jongyun Jung**, Qing Wu. "Underestimation of Fracture Risk Assessment in Sarcopenic Women with High Genetic Susceptibility in Diverse Populations", Journal of Bone Mineral Research (IF: 6.2)

3. Jianing Liu, **Jongyun Jung**, Qiangwei Li, Lang Wu, Qing Wu. "How do Social Determinants of Health Influence Bone Mineral Density? A Machine Learning Analysis in Adults Aged 50 Years and Older", Journal of Clinical Medicine (IF: 4.9)

In Preparation

1. **Jongyun Jung**, Qing Wu. "Beyond FRAX: Personalized Fracture Trajectory Model Using Genetic, Muscle, and Longitudinal Data"
2. **Jongyun Jung**, Benjamin Kirchhoff, Qing Wu. "Predicting Bone Mineral Density Residuals Using Machine Learning and High-Dimensional Data"
3. **Jongyun Jung**, Qing Wu. "A Standardized Protocol for Genotype Data Preparation and High-Quality Imputation via the Michigan Imputation Server"
4. Qing Wu, **Jongyun Jung**. "Does using model-based precision thresholds enhance the ability of a single bone mineral density measure to predict fractures in African-American women?"
5. Qing Wu, **Jongyun Jung**. "Assessment of Model-Based Precision Threshold Versus T-Score for Fracture Risk Prediction in Hispanic Womenr"

Presentation

Invited Oral Presentation

1. **HyTrax: A Hybrid Trajectory-Based Model for Personalized Fracture Risk Prediction** at 2025 ASBMR Muscle and Bone Virtual Abstract Presentation Webinar, November 19. 2025

Oral Presentation

1. **Transforming Fracture Prediction in Older Men: A Genomics-AI Synergy** at ASBMR, September 29. 2024
2. **Exploring the Interconnected Genetic Landscape: Insights into Shared Architecture between Muscle and Bone, and Mechanisms of Bone Fracture-Related Variants Explored through Single Cell RNA Sequencingn** at OSU The Discovery Postbaccalaureate Research Education Program, December 11. 2023
3. **Machine learning approaches for the prediction of bone mineral density by using genomic and phenotypic data of 5130 older men** at 23rd Annual Graduate and Professional Student Research Forum, UNLV, April 3. 2021
4. **Genome-wide polygenic scores for Major Osteoporotic Fractures in Postmenopausal Women using Associated Single Nucleotide Polymorphisms** at Annual NIPM Symposium, March 4, 2021
5. Introduction to Fourier Analysis from R.L. Herman's An Introduction to Fourier and Complex Analysis with Applications to the Spectral Analysis of Signals at the Seminar of **"An Introduction to Fourier and Complex Analysis with Applications to the Spectral Analysis of Signals"**, Spring 2019
6. **Industrial Systematic Risks and Business Cycles in US economy** at Minnesota Undergraduate Research Symposium, April 2013

Poster

1. **Beyond FRAX: Personalized Fracture Trajectory Model Using Genetic, Muscle, and Longitudinal Data** at ASBMR, September 5 (Plenary Poster Session)-6 (Basic and Translational). 2025
2. **Personalized Fracture Trajectory Model Integrating Genetic, Clinical, and Longitudinal Risk Factors** at the 2025 US-Korea Conference on Science, Technology, and Entrepreneurship, August 8. 2025
3. **Deciphering Bone Health: A Comprehensive Machine Learning Analysis of Socio-Biological Determinants** at ASBMR, September 29. 2024
4. **Machine Learning Approaches Improve The Prediction of Total Body Bone Mineral Density Using Genomic and Phenotypic Data of 1,432 European-American Premenopausal Women** at Department of Biomedical Informatics Internships, The Ohio State University, August 1. 2024
5. **Functional genomic analysis identifies three new genes that shared genetic regulatory mechanisms between bone and muscle** at 2023 Edward F. Hayes Advanced Research Forum, February 25. 2023
6. **A comparison of machine learning and deep learning performance in the classification of osteoporotic fracture from medical imaging and tabular data: a systematic review and meta- analysis** at Annual NIPM Sympoisum, March 10. 2022
7. **Machine learning approaches for the prediction of bone mineral density by using genomic and phenotypic data of 5130 older men** at Annual NIPM Sympoisum, March 4. 2021
8. **Machine learning approaches improve the prediction of the major osteoporotic fracture using genomic and phenotypic data of 25,772 postmenopausal women** at Annual NIPM Sympoisum, March 4. 2021
9. **Genomic Prediction of Osteoporotic Fracture Risk using Machine Learning Techniques on 1,103 SNPs of 5,133 Individuals in the Cohort Study of Osteoporotic Fractures in Men** at Annual NIPM Sympoisum, March 4. 2021
10. **Polygenic Prediction of Major Osteoporotic Fracture in Postmenopausal Women using Associated Single Nucleotide Polymorphisms and a Machine Learning Algorithm** at ASHG (Virtual) 2020, Oct, 2020
11. **Machine learning approaches improve the prediction of the major osteoporotic fracture using genomic and phenotypic data of 25,772 postmenopausal women** at ASBMR (Virtual) 2020, Sep, 2020
12. **Genomic Prediction of Osteoporotic Fracture Risk using Machine Learning Techniques on 1,103 SNPs of 5,133 Individuals in the Cohort Study of Osteoporotic Fractures in Men** at ASHG, 2019
13. **A Statistical Analysis and Machine Learning of Genomic Data** at the 2nd Midwest Statistical Machine Learning Colloquium, May/13, 2019
14. **Machine Learning *meets* Survival Analysis for the personalized medicine** at 2019 Symposium on Data Science and Statistics, May/31, 2019
15. **Survival Analysis in Lung Cancer Study** at Michigan State Symposium on Mathematical Statistics and Applications, September 2018

Teaching Experience

1. The Ohio State University

   - **BMI 7050: Meta-Analysis** (Autumn 2024, Summer 2025): Presented the published work (Artificial Intelligence in Fracture Detection with Different Image Modalities and Data Types: A Systematic Review and Meta-Analysis, 2024) as a case-study. Worked as a course designer to take care of Carmen. Helped students with the data analysis.

   - **BMI 5780: Programming for Biomedical Informatics** (Autumn 2023): Prepared the case-study demonstration of machine learning models (Homeworks and Python Code).

2. Minnesota State University, Mankato, Minnesota (Jan 2017 - May 2019)

   - **College Algebra (Math 112)**, Spring 2017, Fall 2017. - **Elementary Statistics (Stat 154)**, Spring 2018, Fall 2018, Spring 2019.

Industry Experience

1. Secondary Data Analyst, IMS Health (Jul 2013 – Dec 2015), Seoul, South Korea

   - Developed business intelligence and data warehousing tools using SQL to support pharmaceutical marketing analytics.
   - Designed automated reporting systems and promotional dashboards using Excel VBA and SQL, delivering actionable insights and periodic market newsletters to major pharmaceutical clients.

Awards and Honors

1. 2025 June - Present: **Graduate Research Associate** from Department of Biomedical Informatics, The Ohio State University
2. 2022 August - 2025 May: **Graduate Research Assistant** from Department of Biomedical Informatics, The Ohio State University
3. 2025 July **ASBMR 2025** Annual Meeting Young Investigator Travel Grant
4. 2025 January - Present: **2025 ASBMR Student Cohort Program** from The American Society for Bone and Mineral Research
5. 2025 May: **OSU Career Development Grant** from The Council of Graduate Students at the Ohio State University
6. 2025 May: **2025 KSEA-KUSCO Graduate Scholarship** from The Korean-American Scientist and Engineer Association - Korea-U.S. Science Cooperation Center
7. 2020 April: **Outstanding Graduate Student Award** from Department of Epidemiology and Biostatistics of Public Health, University of Nevada, Las Vegas
8. 2019 June - 2022 August: **Graduate Research Assistant** from Nevada Institute of Personalized Medicine, University of Nevada, Las Vegas
9. 2019 May: **Student & Early Career Travel Award for 2019 Symposium on Data Science & Statistics**($500) from American Statistical Association
10. 2019 May: **Certificate of Achievement** from Symposium on Data Science & Statistics Date Challenge of American Statistical Association

11. 2019 May: **Travel Funding** from the Iowa State University for presenting at the 2nd Midwest Statistical Machine Learning Colloquium
12. 2017 Spring - 2019 Spring: **Teaching Assistant** at Minnesota State University Mankato, Department of Mathematics and Statistics
13. 2018 Septembeer: **Travel Funding** from College of Science, Engineering and Technology for presenting at Michigan State Symposium on Mathematical Statistics and Applications
14. 2018 September: **Travel Funding** from Michigan State University for presenting at Michigan State Symposium on Mathematical Statistics and Applications
15. 2018 August: **Travel Funding** from American Statistical Association for Preparing to Teach Workshop

Software Skills

1. **Computing/Statistical Software:** R (Proficient), Matlab (Intermediate), SAS (Proficient), Python (Proficient), C (Intermediate), C++ (Intermediate), Julia (Beginner)
2. **Genomic Data Tools:** Plink, GCTA, BCFtools, NANO, VIM, Command Lines
3. **High Performance Computing**: AWS, Cherry-Creek, OpenMP, MPI, GPU
4. **Document Preparation:** LaTeX, Markdown
5. **Computer Skills:** Microsoft Office
6. **Reference Program:** Zotero, Mendeley

Certification

1. "**Center for Ethics and Human Values (CEHV) Conversations About Research Ethics Training Programs**" by Center for Bioethics at the Ohio State University. Certificate earned at Apr 10, 2025"
   • To provide 8 training sessions per semester, with real-time discussion, led and moderated by CEHV ethicists with expertise in research ethics and integrity.
   • Discussions are based on the NIH's Training in the Responsible Conduct of Research Guidelines.
2. "**Bioinformatics Bootcamp Single Cell Analysis Webinar Series**" by 10x GENOMICS. Certificate earned at May 17, 2024"
3. "**Statistical Genetics**" by University of Washington, Seattle, 27th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 20, 2022"
4. "**Advanced Quantitative Genetics**" by University of Washington, Seattle, 27th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 22, 2022"
5. "**Multivariate Analysis for Genetics Data**" by University of Washington, Seattle, 27th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 29, 2022"
6. "**Gene Expression Profiling**" by University of Washington, Seattle, 26th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 23, 2021"
7. "**Pathway & Network Analysis for Omics Data**" by University of Washington, Seattle, 26th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 23, 2021"

8. "**GRAD REBEL WRITING BOOT CAMP**" by University of Nevada, Las Vegas, January 2021 Session. Certificate earned at Jan 08, 2021"
9. "**Bayesian Statistics for Genetics**" by University of Washington, Seattle, 25th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 22, 2020"
10. "**MCMC for Genetics**" by University of Washington, Seattle, 25th Summer Institute in Statistical Genetics (SISG). Certificate earned at July 29, 2020"
11. "**Computational Pipeline for WGS Data**" by University of Washington, Seattle, 25th Summer Institute in Statistical Genetics (SISG). Certificate earned at August 1, 2020"
12. "**Building R Packages**" by Johns Hopkins University on Coursera. Certificate earned at Thursday, August 23, 2018 12:20 PM GMT"
13. "**Advanced R Programming**" by Johns Hopkins University on Coursera. Certificate earned at Tuesday, August 21, 2018 4:24 PM GMT"
14. "**The R Programming Environment**" by Johns Hopkins University on Coursera. Certificate earned at Friday, August 10, 2018 5:22 PM GMT"
15. "**Introduction to Genomic Technologies**" by Johns Hopkins University on Coursera. Certificate earned December 2018"

Volunteer & Leadership Experience

1. **President, Ohio Korean-American Scientists and Engineers Association Young Generation Group**, January 2024 – Present

   - Founded and led a new KSEA YG chapter at OSU, securing a $3,000 university grant and organizing academic panels, networking events, and mentorship programs connecting students with Korean-heritage faculty.

   - Expanded membership and collaborations with national KSEA chapters, fostering an inclusive and professional community for Korean-American and international students in science and engineering.

2. **Membership Engagement Committee, American Statistical Association (ASA) Section on Genetics and Genomics**, January 2021 – December 2022

   - Managed member outreach, maintained social-media presence, and posted monthly webinars and newsletters to strengthen section engagement.

   - Analyzed membership data and contributed to communication strategies for sustained participation.

3. **Journal Club Organizer**, University of Nevada, Las Vegas (2019 – 2021)

   - Organized weekly lab journal clubs, created schedules, and coordinated paper distribution among presenters.

4. **Founder and President, ASA Student Chapter and Statistics Club, Minnesota State University Mankato**, 2018 – 2019

   - Established campus ASA chapter, arranged invited talks and workshops on statistical methods and career development.

5. **Volunteer**, Education & History Booth, Joint Statistical Meetings (2018)

6. Organized seminar "An Introduction to Fourier and Complex Analysis with Applications to the Spectral Analysis of Signals," supervised by Dr. In-Jae Kim, MSU (2019)

Community Services

1. **President, KSEA Young Generation (YG) Group at The Ohio State University**, 2024–Present

   - Founded the OSU KSEA YG chapter to build a professional and cultural network for Korean-American and international students, organizing campus events, faculty panels, and mentorship programs.

   - Secured funding and led recruitment efforts to expand membership, promote inclusivity, and enhance engagement with national KSEA chapters.

2. **Reviewer, Richard J. and Martha D. Denman Undergraduate Research Forum**, March 4, 2025

   - Evaluated 20 research posters in the Pediatric and Family Health section and provided constructive feedback on study design and presentation quality.

3. **Judge, ASHG DNA Day Essay Contest**, March 2020–2021

   - Reviewed and scored over 80 essays across two judging rounds, assessing scientific accuracy and clarity of communication.

4. **Reviewer, SciPy 2020 Conference Abstracts**, March 2020

   - Reviewed and evaluated six abstracts for relevance and quality in computational science submissions.

5. **Instructor, "Editing Mendeley Styles" Workshop**, University of Nevada, Las Vegas (2020)

   - Assisted the main instructor in teaching reference style customization using the Mendeley CSL Editor at UNLV Lied Library.

Summary of General Skills

1. Have extensive experience in human genetic at both statistical genetics and bioinformatics level
2. Have strong background in human genetics, biostatistics and database management analyses including IRB applications, external data request approvals (downloading and analyses such as UK-Biobank, dbGap)

Grant Submission

1. Submitted the NIA F99/K00: Transition to Aging Research for Predoctoral Students (October, 2024)
2. Helped with the submission of AWS research credit for Dr. Qing Wu, April, 2020 ($9,000)
3. Have experienced in grant writing for the data preliminary analysis, budgeting of cloud services and completion of the research performance progress report

Professional Membership

- American Statistical Association, since 2018

- American Society for Bone and Mineral Research, since 2022

- Korean-American Scientists and Engineers Association, since 2023

Journal Reviewer

- Clinical and Translational Metabolism (IF: 7.9), Lipids in Health and Disease (IF: 3.9), Journal of Orthopaedic Surgery and Research (IF: 2.5), Scientific Reports (IF: 3.8), Journal of Big Data (IF: 7.8), Clinical Proteomics (IF: 3.3), PeerJ Life & Environment (IF: 2.7), npj Digital Medicine (IF:15.1)

References

- **Dr. Qing Wu**
Professor, Department of Biomedical Informatics, The Ohio State University
Email: Qing.Wu@osumc.edu

- **Dr. Dongjun Chung**
Associate Professor, Department of Biomedical Informatics, The Ohio State University
Email: Dongjun.Chung@osumc.edu

- **Dr. Andy Ai Ni**
Assistant Professor, Biostatistics, College of Public Health, The Ohio State University
Email: ni.304@osu.edu

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