

Kaiqiong Zhao – Curriculum Vitae

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Research Interests

High-dimensional data, flexible modeling, measurement error, statistical computing, statistical genetics, multi-omics data integration

Education

- 2016- Ph.D. in Biostatistics** – McGill University, Montréal, QC, Canada
Thesis Topic: Smooth modeling of covariate effects in bisulfite sequencing-derived measures of DNA methylation
Supervisors: [Celia M.T. Greenwood](#), Ph.D. and [Karim Oualkacha](#), Ph.D.
- 2014-2016 M.Sc. in Computational biology** – University of Manitoba, Winnipeg, MB, Canada
Thesis: Gene-pair based statistical methods for testing gene set enrichment in microarray gene expression studies.
Supervisor: [Pingzhao Hu](#), Ph.D.
- 2013-2014 M.Sc. in Statistics** – University of Windsor, Windsor, ON, Canada
Thesis: Confidence interval construction procedures for a difference between two dependent ICCs
Supervisor: [Sudhir Paul](#), Ph.D.
- 2009-2013 B.Sc. in Statistics** – Beijing Institute of Technology, Beijing, China
Project Topic: Hypothesis testings for the exponential distribution parameters
Project Advisor: Xiaoli Wang, Ph.D.

Honors, Awards and Fellowships

Awards – McGill University

- 2018-2021 [FRQS Doctoral award](#) (\$21,000/ year)
2018-2019 Graduate Excellence Award (\$12,638)
2017-2018 Faculty of Medicine Internal Studentship (\$12,000)
2016-2017 Graduate Excellence Award (\$27,748)

Awards – University of Manitoba

- 2015 CANSSI Student Research Scholarship(\$5000)
2014 Entrance Scholarship (\$4000)

Awards – University of Windsor

- 2013 Entrance Scholarship (\$5500)

Travel Awards

- 2018 Graduate Research Enhancement and Travel Awards, McGill University (\$415)
2015 Graduate Study Travel Award, University of Manitoba (\$750)
2015 CANSSI workshop “New Horizons in Copula Modeling” (\$1000)

Others

- 2015 BMG Graduate Student Presenter, 2016 Edge of Science & Medicine, University of Manitoba
2012 Honorable Mention, Undergraduate Mathematical Contest in Modeling, [COMAP](#), USA
2010 Silver Medalist, Beijing Undergraduate Mathematical Contest in Modeling, [CSIAM](#), China

Professional Experience

- Sep 2017 - Present** - Lady Davis Institute for Medical Research, Jewish General Hospital, Montréal, QC
Research Assistant
Supervisor: [Celia M.T. Greenwood](#), Ph.D.
- Mar 2018 - Dec 2019** - Jewish General Hospital, Montréal, QC
Statistics Consultant
Provide statistical support for research projects of the investigator [Marylise Boutros](#), M.D., FRCSC. Duties include conducting data analysis, interpreting results, writing reports, and preparing tables and figures for manuscript or presentations.
- Sep 2014 - Aug 2016** - Department of Statistics, University of Manitoba, Winnipeg, MB
Research Assistant
Supervisor: [Elif Acar](#), Ph.D.
- Nov 2014 - Aug 2016** - Data Science Platform of George & Fay Yee Center for Healthcare Innovation, Winnipeg, MB
Research Assistant / Bioinformatics Consultant
Supervisor: [Pingzhao Hu](#), Ph.D.

Teaching Experience

Course Instructor

- Jan 2020 - Department of Epidemiology, Biostatistics, and Occupational Health, McGill University
Apr 2020 *EPIB 521: Regression Analysis for Health Sciences*

Teaching Assistant

- Sep 2017 - Department of Epidemiology, Biostatistics, and Occupational Health, McGill University
Apr 2018 *EPIB 607: Inferential Statistics*
EPIB 621: Data Analysis in Health Sciences
- Sep 2013 - Department of Mathematics and Statistics, University of Windsor
Dec 2013 *62-130-01: Elements of Calculus*

Grader

- Sep 2013 - Department of Mathematics and Statistics, University of Windsor
Aug 2014 *62-216-01: Differential Equations; 62-139-01: Linear Algebra; 62-141-01: Integral Calculus; 65-205-01 Statistics for the Sciences*

Help Desk Advisor

- Jan 2014 - Department of Mathematics and Statistics, University of Windsor
Aug 2014 *Maths and Stats Learning Center*

Software

R packages

- **SOMNiBUS** (<https://github.com/kaiqiong/SOMNiBUS>), under review by R Bioconductor
A method for estimating smooth covariate effects and identifying differentially methylated regions, which copes with experimental errors and provides reliable inference.
- **sparseSOMNiBUS** (<https://github.com/kaiqiong/sparseSOMNiBUS>), coded with **Rcpp**
A sparse-smooth modeling method for identifying SNPs associated with methylation levels in a region, which copes with high-dimensional feature space and allows variable selection.

Shiny Application

- A web-based **Risk Calculator for Readmission for Dehydration following Creation of a Diverting Loop Ileostomy** (https://kaiqiong.shinyapps.io/dehydration_app/)

Publications

Preprint

1. **Zhao, K.**, Oualkacha, K., Lakhal-Chaieb, L., Labbe, A., Klein, K., Shao, X., Bernatsky, S., Hudson, M., Colmegna, I., Pastinen, T., Zhang, T., Daley, D. & Greenwood, C.M. Detecting differentially methylated regions in bisulfite sequencing data using quasi-binomial mixed models with smooth covariate effect estimates. *arXiv* (2021). <https://arxiv.org/abs/2101.07374>.

Peer-Reviewed Publications

2. **Zhao, K.**, Oualkacha, K., Lakhal-Chaieb, L., Labbe, A., Klein, K., Ciampi, A., Hudson, M., Colmegna, I., Pastinen, T., Zhang, T., Daley, D. & Greenwood, C.M. A novel statistical method for modeling covariate effects in bisulfite sequencing derived measures of DNA methylation. *Biometrics* (2020). PMID: 32438470.
3. Caillon, A., **Zhao, K.**, Klein, K., Greenwood, C.M., Lu, Z., Paradis, P. & Schiffrin, E. High systolic blood pressure at hospital admission is an important risk factor in models predicting outcome of COVID-19 patients. *American Journal of Hypertension* (2021). PMID: 33386395.
4. Caminsky, N., Hamad, D., He, H.B., **Zhao, K.**, Boutros, M., Feldman, L.S., Lee, L. & Fiore, J.F. Optimizing discharge decision-making in colorectal surgery: a prospective cohort study of discharge practices in a recently implemented enhanced recovery pathway. *Colorectal Dis* (2021). PMID: 33423346.
5. Manousaki, D., Forgetta, V., Keller-Baruch, J., **Zhao, K.**, Greenwood, C.M., Mooser, V., Bassett, J.D., Leslie, W.D. & Richards, J.B. A polygenic risk score as a risk factor for medication-associated fractures. *Journal of Bone and Mineral Research* (2020). PMID: 32511779.
6. Alqahtani, M., Garfinkle, R., **Zhao, K.**, Vasilevsky, C.A., Morin, N., Ghitulescu, G., Faria, J. & Boutros, M. Can we better predict readmission for dehydration following creation of a diverting loop ileostomy: development and validation of a prediction model and web-based risk calculator. *Surgical Endoscopy* (2020). PMID: 31451920.
7. Al-Masrouri, S., Garfinkle, R., Al-Rashid, F., **Zhao, K.**, Morin, N., Ghitulescu, G.A., Vasilevsky, C.A. & Boutros, M. Readmission for Treatment Failure After Nonoperative Management of Acute Diverticulitis: A Nationwide Readmissions Database Analysis. *Diseases of the Colon & Rectum* (2020). PMID: 31914114.
8. **Zhao, K.**, Jiang, L., Klein, K., Greenwood, C. M. & Oualkacha, K. CpG-set association assessment of lipid concentration changes and DNA methylation. *BMC proceedings* (2018). PMID: 30263044.
9. Jiang, L., **Zhao, K.**, Klein, K., Canty, A. J., Oualkacha, K. & Greenwood, C. M. Investigating potential causal relationships between SNPs, DNA methylation and HDL. *BMC proceedings* (2018). PMID: 30275877.
10. Lakhal-Chaieb, L., Greenwood, C. M., Ouhourane, M., **Zhao, K.**, Abdous, B. & Oualkacha, K. A smoothed EM-algorithm for DNA methylation profiles from sequencing-based methods in cell lines or for a single cell type. *Statistical applications in genetics and molecular biology* (2017). PMID: 29055941.
11. Ye, X., **Zhao, K.**, Wu, C., Hu, P. & Fu, H. Associations between genetic variants in immunoregulatory genes and risk of non-Hodgkin lymphoma in a Chinese population. *Oncotarget* (2017). PMID: 28060727.
12. Patton, M. J., McCorrister, S., Grant, C., Westmacott, G., Fariss, R., Hu, P., **Zhao, K.**, Blake, M., Whitmire, B., Yang, C., Caldwell, H.J. & McClarty, G. Chlamydial Protease-like Activity Factor and Type III Secreted Effectors Cooperate in the Inhibition of p65 Nuclear Translocation. *mBio* (2016). PMID: 27677792.

Manuscripts Under Review

13. McGuirk, S., Audet-Delage, Y., Annis, M., Xue, Y., Vernier, M., **Zhao, K.**, ..., St-Pierre, J. Resistance to different anthracycline chemotherapeutics elicits distinct and actionable primary metabolic dependencies in breast cancer. *eLife* (2020). Revision Submitted.

Manuscripts in Preparation

1. **Zhao, K.** et al. A novel sparse-smooth modeling method for identifying SNPs associated with methylation levels in a region. (2021+)
2. **Zhao, K.** et al. Statistical review of motif discovery methods for ChIP-Seq data. (2021+)

Talks and Seminars

Invited Talks

Apr 2021	Jewish General Hospital Epidemiology Seminar Series, Montréal, QC, Virtual
Dec 2020	Bioinformatics-Biostatistics Research Seminar Series, University of Manitoba, Winnipeg, MB, Virtual
Dec 2020	McGill Initiative in Computational Medicine Research Day, Montréal, QC, Virtual
Oct 2020	Statistics Seminar, Département de mathématiques, UQAM, Montréal, QC, Virtual
Feb 2019	Statistical Genetics Group Seminar, Jewish General Hospital, Montréal, QC
Feb 2015	Seminar, Department of Biochemistry and Medical Genetics, University of Manitoba, Winnipeg, MB

Contributed Talks

Sep 2020	(Bio)Statistics Research and Career Day, McGill University, Montréal, QC
Aug 2018	BIRS Workshop: New Statistical Methods for Family-Based Sequencing Studies, Banff, AB
June 2018	7th Annual Canadian Human and Statistical Genetics Meeting, Harrison Hot Spring, BC
June 2018	Statistical Society of Canada, Montréal, QC
June 2017	Statistical Society of Canada, Winnipeg, MB
June 2016	Canadian Society for Epidemiology and Biostatistics, Winnipeg, MB
Jan 2016	Edge of Science & Medicine, Faculty of Health Sciences, University of Manitoba, Winnipeg, MB
Jun 2015	Statistical Society of Canada Student Conference, Halifax, NS

Poster Presentations

Oct 2019	Annual International Genetic Epidemiology Society Meeting, Houston, Texas, USA
June 2019	8th Annual Canadian Human and Statistical Genetics Meeting, Montebello, QC
Sep 2018	(Bio)Statistics Research Day, Montréal, QC
Mar 2017	Genetic Analysis Workshop 20, San Diego, CA, USA
Apr 2016	5th Annual Canadian Human and Statistical Genetics Meeting, Halifax, NS
Oct 2015	11th Annual Canadian Chronic Lymphocytic Leukemia (CLL) Meeting, Winnipeg, MB
Sep 2015	Child Health Research Day, Winnipeg, MB

Journal Review

2020	Article co-reviewed for <i>Annals of Applied Statistics</i>
2020	Article co-reviewed for <i>Genetic Epidemiology</i>

Service and membership

Community Activities & Service

Sep 2017 -	<i>Student representative for the Biostatistics PhD Comprehensive Exam</i>
Aug 2018	Department of Epidemiology, Biostatistics and Occupational Health, McGill University

Memberships in Professional Organizations

2016-	Statistical Society of Canada
2019-2020	International Genetic Epidemiology Society