

Curriculum Vitae : Rahul Ghosal

DEPARTMENT

Department of Epidemiology and Biostatistics
Arnold School of Public Health
University of South Carolina

CONTACT INFORMATION

915 Greene Street, Discovery 448, Columbia, SC 29208
Mob: (919) 633-0818
Email: rghosal@mailbox.sc.edu
<https://sites.google.com/view/rahul-ghosal>

EDUCATION

- **Ph.D., Statistics, Department of Statistics, North Carolina State University, August 2016 - December 2019.**
Advisor: Dr. Arnab Maity
Thesis: Hypothesis Testing and Variable Selection in Functional Concurrent Regression Model.
- **Master of Statistics (M. Stat.), Indian Statistical Institute, Kolkata. July 2014 - May 2016.**
Specialization: Mathematics, Statistics and Probability
- **Bachelor of Statistics (B. Stat.), Indian Statistical Institute, Kolkata. July 2011 - May 2014.**

WORK EXPERIENCE

- **Assistant Professor**, Division of Biostatistics, Department of Epidemiology and Biostatistics, University of South Carolina, Aug 2022 - Current.
- **Postdoctoral Fellow**, Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, Jan 2020 - July 2022, Mentor: Dr. Vadim Zipunnikov.
- **Teaching Assistant**, Department of Statistics, N. C. State University, August 15, 2016 - December 2019.
- **Research Intern**, GE Global Research, May-July 2014.

RESEARCH INTERESTS

- Functional Data Analysis
- Distributional Data Analysis
- Variable Selection
- Nonparametric Inference
- Shape Restricted Regression
- Bayesian Inference
- Survival Analysis
- Wearable Data and Digital Health

PUBLICATIONS

Methods

1. Yue, Y., Self, S., Wu, Y., Zhang, J., and **Ghosal, R⁺**. (2026). [Variable Selection in Functional Linear Cox Model](#), *Biometrics*.
2. **Ghosal, R.**, Cho, E. and Matabuena, M. (2026). [Survival on image regression with application to partially functional distributional representation of physical activity](#), *Statistical Analysis and Data Mining*.

3. Matabuena, M., Vidal, J.C., **Ghosal, R.** and Onella, J.P. (2026) [Screening for diabetes melitus in the US population using neural network-based modeling and complex survey designs](#), *Statistical Methods in Medical Research*.
4. Onyame, V., Mclain, A.C., **Ghosal, R.**, Nolan, M. and Self, S. (2026) [A spatial scan statistic for group testing data](#), *Spatial and Spatio-temporal Epidemiology*.
5. **Ghosal, R.**, Ghosh, S., Schrack, J. A. and Zipunnikov, V. (2025). [Distributional outcome regression and its application to modelling continuously monitored heart rate and physical activity](#), *Journal of the American Statistical Association*.
6. **Ghosal, R.**, Matabuena, M. and Ghosh, S. (2025). [Functional Time Transformation Model with Applications to Digital Health](#), *Computational Statistics & Data Analysis*.
7. Matabuena, M., **Ghosal, R.**, ..., and Zippunikov, F., Onnela, J.P., and Gude, F. (2025). [Glucodensity functional profiles outperform traditional continuous glucose monitoring metrics](#), *Scientific Reports*.
8. Yi, J., Yin, J., **Ghosal, R.**, Fridriksson, J., Desai, R. and Wang, Y. (2026) [Uncovering Treatment Response Patterns with Topological Clustering of Brain Networks](#), *2025 IEEE International Conference on Big Data (BigData)*.
9. Dey, D., **Ghosal, R.***, Merikangas, K., and Zipunnikov, V. (2024). [Functional Principal Component Analysis for Continuous Non-Gaussian, Truncated, and Discrete Functional Data](#), *Statistics in Medicine*.
10. **Ghosal, R.** and Matabuena, M. (2024). [Multivariate Scalar on Multidimensional Distribution Regression](#), *Biometrical Journal*.
11. Cho, E., Saha, E., Matabuena, M., Wei, J. and **Ghosal, R.⁺** (2024). [Exploring the Association between Daily Distributional Patterns of Physical Activity and Cardiovascular Mortality Risk among Older Adults in NHANES 2003-2006](#), *Annals of Epidemiology*.
12. **Ghosal, R.** and Maity, A. (2023). [Variable Selection in Nonlinear Function-on-Scalar Regression](#), *Biometrics*.
13. **Ghosal, R.**, Matabuena, M. and Zhang, J. (2023). [Functional proportional hazards mixture cure model with applications in cancer mortality in NHANES and post ICU recovery](#), *Statistical Methods in Medical Research*.
14. **Ghosal, R.**, Ghosh, S., Urbanek, J., Schrack, J. A., and Zipunnikov, V. (2023). [Shape-Constrained Estimation in Functional Regression with Bernstein Polynomials](#), *Computational Statistics & Data Analysis*.
15. **Ghosal, R.** and Maity, A. (2023). [Variable Selection in Function-on-Scalar Single Index Model via the Alternating Direction Method of Multipliers](#), *TEST*.
16. Saha, E. and **Ghosal, R.*** (2023). [Gender Difference in the Effects of Chronic Diseases on Daily Physical Activity Patterns in Older Adults: Analysis of Objectively Measured Physical Activity in NHATS 2021](#), *Annals of Epidemiology*.
17. **Ghosal, R.**, Varma, V. R., Volfson, D., Urbanek, J., Hausdorff, J. M., Watts, A., and Zipunnikov, V. (2022). [Scalar on Time-by-Distribution Regression and its Application for Modelling Associations Between Daily-Living Physical Activity and Cognitive Functions in Alzheimers Disease](#), *Scientific Reports*.
18. **Ghosal, R.** and Ghosh, S. (2022). [Bayesian Inference for Generalized Linear Model with Linear Inequality Constraints](#), *Computational Statistics & Data Analysis*.
19. **Ghosal, R.** and Maity, A. (2022). [Variable Selection in Nonparametric Functional Concurrent Regression](#), *The Canadian Journal of Statistics*.
20. **Ghosal, R.** and Maity, A. (2022). [A Score-Based Test for Functional Linear Concurrent Regression](#), *Econometrics and Statistics*.
21. **Ghosal, R.** and Saha, E. (2021). [Impact of the COVID-19 Induced Lockdown Measures on \$PM_{2.5}\$ Concentration in the USA](#), *Atmospheric Environment*.

22. **Ghosal, R.**, Varma, V. R., Hillel, I., Volfson, D., Hausdorff, J. M., Watts, A., and Zipunnikov, V. (2021). [Distributional Data Analysis via Quantile Functions and its Application to Modelling Digital Biomarkers of Gait in Alzheimer’s Disease](#), *Biostatistics*.
23. **Ghosal, R.**, Maity, A., Clark, T., and Longo, S. (2020). [Variable Selection in Functional Linear Concurrent Regression](#), *J. R. Stat. Soc. C*.
24. Mirzaei, S., Sengupta, D., and **Ghosal, R.** (2020). [Estimating Menarcheal Age Distribution from Partially Recalled Data](#), *Biostatistics*.

Applications

1. Yang, C.H., Hakun, J.G., Cho, S.E., Lee, J., Prine, H., Coffman, D. and **Ghosal, R⁺**. (2026). [Not just how much, but how its done: movement activity bout distributions and everyday cognition in older adults with elevated dementia risk](#), *European Review of Aging and Physical Activity*.
2. **Ghosal, R.**, Weaver, R. G., Parker, H., Burkart, S., McAninch, J., Lane, A. D., ... and Armstrong, B. (2026). [Initial Validation of the PATCH: An Open-Source Device Designed to Measure Energy Expenditure among Children Aged 3-8 years](#), *Medicine & Science in Sports & Exercise*.
3. Ghosh, S., Cho, S.E., Yue, Y., Matabuena, M., Saha, E. and **Ghosal, R⁺**. (2026). [Daily Physical Activity Patterns Enhance Mortality Prediction in NHANES 2011-2014: A Comparative Study Across Classical, Machine Learning, and Deep Learning Models Using Accelerometer Data](#), *Journal for the Measurement of Physical Behaviour*.
4. Niyogi, P. G., Sanjayan, M., **Ghosal, R.**, Goldsmith, J., Fitzgerald, K. C., Mowry, E. M., and Zipunnikov, V. (2026). [Quantifying observable movement reserve in multiple sclerosis via upper diurnal activity quantiles](#), *Multiple sclerosis*.
5. **Ghosal, R.**, White, J., Finnegan, O., Nelakuditi, S., ... , and Weaver, R. G. (2025). [Leveraging Accelerometry and Heart rate Data from Consumer Wearables to Predict Physical Activity in Children: A Device Agnostic Approach](#), *Medicine & Science in Sports & Exercise*.
6. Hoppmann, A. L., Hurley, D.M, Cramer, S., Brown, M.J., **Ghosal, R.**, Alberg, A.J., and Bhatia, S. (2025). [Neighborhood Socioeconomic Status and Overall Survival among Children with Acute Lymphoblastic Leukemia](#), *Blood Advances*.
7. Owens, O., **Ghosal, R.**, ...; Bonilha, L., and Levkoff, S. (2025). [Home-Based Digital Technologies to Support Aging-in-Place for Rural African American People With Alzheimer Disease and Their Care Partners: Protocol for a Mixed Methods Feasibility Study](#), *JMIR Research Protocols*.
8. Finnegan, O. L., White, J., Armstrong, B., ..., **Ghosal, R.**, ... , and Weaver, R. G. (2025). [The Ability of Monitor-Independent Movement Summary Units, Euclidean Norm Minus One, and Mean Amplitude Deviation to Harmonize Accelerometry Data Across Research-Grade and Consumer Wearable Devices During Simulated Free-Living Physical Activity in Children](#), *Journal for the Measurement of Physical Behaviour*.
9. Weaver, R. G., Finnegan, O. L., White, J., ..., **Ghosal, R.**, ... , Armstrong, B. and Beets, M. (2025). [Free-Living Data Coverage of a Device Agnostic Approach With Three Common Consumer Wearables With Children](#), *Journal for the Measurement of Physical Behaviour*.
10. Weaver, R. G., White, J., Finnegan, O. L., Yang, H., ... , **Ghosal, R.**, ... , Armstrong, B., and Beets, M. (2025). [Predicting Sleep and Sleep Stage in Children Using Actigraphy and Heart rate via a Long Short-Term Memory Deep Learning Algorithm: A Performance Evaluation](#), *Journal of Sleep Research*.
11. Finnegan, O. L., Yang, H., Armstrong, B., Nelakuditi, S., ..., **Ghosal, R.**, ... , and Weaver, R. G. (2025). [Applying Behavioral Biometrics to Mobile Device Use Measurement in Children: Evaluating the Impact of Training Data Size, Proximity, and Type on Model Performance](#), *Journal of Technology in Behavioral Science*.

12. Li, K., **Ghosal, R.***, ... , and Wei, J. (2024). [The Associations of Sensory Impairment with 10-Year Risk of Dementia and Alzheimers Disease: The Health and Retirement Study, 2010-2020](#), *Journal of Geriatric Psychiatry and Neurology*.
13. Wei, J., Li, K., **Ghosal, R.**, Zhang, D., Merchant, A. T., and Crump, C. (2024). [Initiation of Hearing Aids Use and Incident Dementia Among Mid-to-late Life Adults: The Health and Retirement Study 2010-2018](#), *Journal of Geriatric Psychiatry and Neurology*.
14. Weaver, R. G., Chandrasekhar, M., Armstrong, B., ... , **Ghosal, R.**, ... , and Yang, H. (2024). [Jerks are Useful: Extracting Pulse Rate from Wrist-Placed Accelerometry Jerk During Sleep in Children](#), *Sleep*.
15. White, J., Finnegan, O., Tindall, N., ... , **Ghosal, R.**, ... , and Weaver, R. G. (2024). [Comparison of Raw Accelerometry Data from ActiGraph, Apple Watch, Garmin, and Fitbit Using a Mechanical Shaker Table](#), *Plos One*.
16. Cepni, A. B., Burkart, S., Zhu, X., White, J., Finnegan, O., Nelakuditi, S., ..., **Ghosal, R.**, ; and Weaver, R. G. (2024). [Evaluating the performance of open-source and proprietary processing of actigraphy sleep estimation in children with suspected sleep disorders: A comparison with polysomnography](#), *Sleep*.
17. Finnegan, O. L., Weaver, R. G., Yang, H., White, J. W., Nelakuditi, S., Zhong, Z., ..., **Ghosal, R.**, ...; and Armstrong, B. (2024). [Advancing Objective Mobile Device Use Measurement in Children Ages 6-11 Through Built-In Device Sensors: A Proof of Concept Study](#), *Human Behavior and Emerging Technologies*.
18. Weaver, R. G., White, J., Finnegan, O., Nelakuditi, S., ... , **Ghosal, R.**, ... , and Parker, H. (2023). [A Device-Agnostic Approach to Predict Children's Activity from Consumer Wearable Accelerometer Data: A Proof-of-Concept Study](#), *Medicine & Science in Sports & Exercise*.
19. Weaver, R. G., De Zambotti, M., White, J., Finnegan, O., Nelakuditi, S., ... , **Ghosal, R.**, ... , and Parker, H. (2023). [Evaluation of a Device-Agnostic Approach to Predict Sleep from Raw Accelerometry Data Collected by Apple Watch Series 7, Garmin Vivoactive 4, and ActiGraph GT9X Link in Children with Sleep Disruptions](#), *Sleep Health*.
20. Varma, V. R., **Ghosal, R.**, Hillel, I., Volfson, D., Weiss, J., Urbanek, J., Hausdorff, J. M., Zipunnikov, V., and Watts, A. (2021). [Continuous Gait Monitoring Discriminates Community-Dwelling Mild AD from Cognitively Normal Controls](#), *Alzheimer's & Dementia: Translational Research & Clinical Interventions*.

* Equal contribution. + Senior Author.

CURRENT RESEARCH

- **Ghosal, R.**, Matabuena, M., and Enakshi Saha (2026+). Variable Selection for Fixed and Random Effects in Multilevel Functional Mixed Effects Models.
- Yue, Y., Self, S., Wu, Y., Zhang, J., and **Ghosal, R.** (2026+). Variable Selection in Functional Linear Quantile Regression.
- Olejua, P., Saha, E., **Ghosal, R.**, Bai, R., and McLain, A. (2026+). Parameter Expanded Variational Bayes for Well-Calibrated High-Dimensional Linear Regression with Spike-and-Slab Priors.
- Matabuena, M., Louzao, C., **Ghosal, R.** and Gude, F. (2026+). Conformal Inference for Personalized Imputation: Applications in Predicting Diabetes Development with Continuous Glucose Monitoring and Distributional Representations.
- Matabuena, M., **Ghosal, R.**, Mozharovskiy, P., Padilla, O. and Onnela, J. (2026+). Conformal uncertainty quantification using kernel depth measures in separable Hilbert spaces.
- Matabuena, M., Vidal, J., **Ghosal, R.** and Onnela, J. (2026+). Deep Learning Framework with Uncertainty Quantification for Survey Data: Assessing and Predicting Diabetes Mellitus Risk in the American Population.
- Dey, D., **Ghosal, R.***, and Zipunnikov, V. (2026+). Multivariate Functional Principal Component Analysis for Mixed-type Functional Data.

* Equal contribution.

OTHER RESEARCH WORKS AND PROJECTS

- Ghosal, R., Bhattacharya, I. and Ghosh, S. (2019). [A Statistical Exploration of Duckworth-Lewis Method Using Bayesian Inference](#), *arxiv*.

FUNDING

- NIH R01, Using Open-Source Technology to Measure Energy Expenditure and Sleep Among Children 3 to 8 Years Old (2023-2028). Role: Co-I.
- NIH R03, Temporal Dynamics and Associations of Device-based Activity Distribution Metrics and Everyday Cognition in Older Adults (2024-2026). Role: Co-I.
- 2025 Research Fellowship in Aging (2026-2027), Office for the Study of Aging (OSA), University of South Carolina. Role: PI.
- 2026 Provost Research Award (2026-2028), University of South Carolina. Role: PI.
- ASPIRE, Office of Vice President for Research, University of South Carolina. Flexible Statistical Methods for Distributional Data and Survival Outcomes (2023-2024). Role: PI.
- USC School of Medicine, Emerging Physician Scientist Grant, Disparities in Survivorship Care among Childhood Cancer Survivors in South Carolina (2023-2024). Role: Co-I.
- Prisma Health, Hyundai Hope on Wheels, Social Determinants of Health and Adverse Outcomes in Childhood Cancer (2023-2024). Role: Co-I.

CONFERENCES/PRESENTATIONS

- “Hypothesis Testing in Functional Linear Concurrent Regression” at *International Indian Statistical Association Conference*, University of Florida, 2018. (Poster)
- “Variable selection in Functional Linear Concurrent Regression” at *Midwest ML Symposium (MMLS)*, Chicago, 2018. (Poster)
- “Variable selection in Functional Linear Concurrent Regression” at *2019 IMS/ASA Spring Research Conference*, Virginia Tech. (Poster)
- “Variable selection in Nonparametric Functional Concurrent Regression” at *Summer Research Conference, (SRCOS)*, University of Kentucky, 2019. (Poster)
- “Hypothesis Testing in Functional Linear Concurrent Regression” at *Joint Statistical Meetings*, Denver, 2019. (Paper)
- “A Score Based Test for Functional Linear Concurrent Regression” at *ENAR*, 2020. (Paper)
- “Distributional data analysis via quantile functions and its application to modelling digital biomarkers of gait in Alzheimer’s Disease” at *ENAR*, 2021. (Paper)
- “Distributional data analysis via quantile functions and its application to modelling digital biomarkers of gait in Alzheimer’s Disease” at *Georgetown University, Departmental Colloquium Series*, 2021. (Invited Talk)
- “Distributional data analysis via quantile functions and its application to modelling digital biomarkers of gait in Alzheimer’s Disease” at *ICAMPAM*, 2021. (Poster)
- “Enriching event data: A semi-supervised augmentation approach using location information” at *Pro Forum 2021*, 2021. (Presentation)
- “Distributional data analysis via quantile functions and its application to modelling digital biomarkers of gait in Alzheimer’s Disease” at *Joint Statistical Meetings*, 2021. (Paper)
- “Scalar on time-by-distribution regression and its application for modelling associations between daily-living physical activity and cognitive functions in Alzheimers Disease” at *ENAR*, 2022. (Paper, Session organizer)
- “Shape-Constrained Estimation in Functional Regression with Bernstein Polynomials” at *ENAR*, 2023. (Paper)

- “Distributional outcome regression and its application to modelling continuously monitored heart rate and physical activity” at *JSM*, 2023. (Paper, Session organizer)
- “Functional proportional hazard mixture cure model” at *ENAR*, 2024. (Paper)
- “Distributional outcome regression with quantile functions” at *Royal Statistical Society International Conference*, 2024. (Paper)
- “Functional time transformation model with applications to digital health” at *Emerging Statistical Methods for Digital Health Data Workshop, Banff International Research Station (BIRS)*, 2025 (Invited Paper)
- “Survival on Image Regression with Application to Partially Functional Distributional Representation of Physical Activity.” at *JSM*, 2025. (Invited Paper, Session organizer)
- “Distributional outcome regression via quantile functions” at *Virginia Commonwealth University, Biostatistics*, 2025. (Invited Seminar)
- “Functional time transformation model with applications to digital health” at *International Conference on Econometrics and Statistics (EcoSta)*, 2025. (Invited Paper)
- “Variable Selection for Fixed and Random Effects in Multilevel Functional Mixed Effects Models” at *ENAR*, 2026. (Paper)
- “Variable selection in functional linear Cox model” at *Biostatistics and Data Science Research Forum, S. Jude*, 2026. (Invited Seminar)

TEACHING EXPERIENCE

- ST 350, Economics and Business Statistics, *TA*, Fall 2016.
- ST 350, Economics and Business Statistics, *TA*, Spring 2017.
- ST 701, Statistical Theory I, *Lab Instructor and TA*, Fall 2017.
- ST 421, Introduction to Mathematical Statistics I, *TA*, Spring 2018.
- ST 590, Statistical Methods I, *TA*, Summer I 2018.
- ST 421, Introduction to Mathematical Statistics I, *TA*, Fall 2018.
- ST 421, Introduction to Mathematical Statistics I, *TA*, Spring 2019.
- ST 511-601, Statistical Methods For Researchers I, *TA*, Summer I 2019.
- ST 563, Introduction to Statistical Learning, *TA*, Summer II 2019.
- ST 516-001, Experimental Statistics For Engineers II, *TA*, Fall 2019.
- BIOS 700, Introduction to Biostatistics, *Instructor*, Spring 2023.
- BIOS 701, Concepts and Methods of Biostatistics, *Instructor*, Fall 2023, 2024, 2025.
- BIOS 811, Survival Analysis II, *Instructor*, Spring 2024, Spring 2026.
- BIOS 825, Multivariate Biostatistics, *Instructor*, Spring 2025.

ACADEMIC ACHIEVEMENTS AND HONORS

- Nominated member of Mu Sigma Rho, National Honor Society for Statistics.
- Nominated member of Delta Omega Honorary Society in Public Health.
- 2025 Research Fellowship in Aging, Office for the Study of Aging (OSA).
- ASPIRE, Office of Vice President for Research, University of South Carolina.
- Boyd Harshbarger Travel Award, SRCOS (2019).
- NSF Travel Award, IISA (2018) conference.

TECHNICAL AND COMMUNICATION SKILLS

- **Computer Language and applications:** R, MATLAB, Python, SQL.
- **Languages Known:** English, Bengali, Hindi.

POSITIONS OF RESPONSIBILITY

- Faculty Senator at the University of South Carolina.
- Associate Editor at Statistics and Computing.
- Served as a grant reviewer for the Swiss National Science Foundation (SNSF).
- Served as a referee for the following journals: JRSS-B (Journal of the Royal Statistical Society, Series B), Nature Communications, Annals of Statistics, Journal of Machine Learning Research, Journal of Computational and Graphical Statistics, Electronic Journal of Statistics, Statistics and Computing, Statistics in Medicine, Annals of Operations Research, Journal of Applied Statistics and Journal of Statistical Theory and Practice.
- Editorial board member at Scientific Reports.