

Curriculum Vitae: Olga A. Vsevolozhskaya

CONTACT INFORMATION

Assistant Professor
Department of Biostatistics
University of Kentucky
Email Address: vsevolozhskaya@uky.edu

EDUCATION

Michigan State University, East Lansing, MI

2015 NIDA T32 Postdoctoral Fellow, Department of Epidemiology

- Research mentors: [James C. Anthony](#) and [Qing Lu](#)

Montana State University, Bozeman, MT

2013 Ph.D., [Statistics](#)

- Dissertation Title: *Follow-Up Testing in Functional ANOVA*
- Adviser: [Mark C. Grennwood](#)
- Committee: [John Borkowski](#), [Jim Robinson-Cox](#), [Megan Higgs](#), [Scott Powell](#), [Prasanta Bandyopadhyay](#)

2009 M.S., [Statistics](#)

- Writing Project Topic: *Analysis of Localized Brain Activity*
- Adviser: [Mark C. Grennwood](#)
- Area of Study: Functional Data Analysis

Pittsburg State University, Pittsburg, KS

2006 M.S., [Mathematics](#)

- Writing Project Topic: *Credibility Theory: A Bayesian Approach*
- Adviser: [Ananda Jayawardhana](#)
- Area of Study: Bayesian Statistics

2005 B.S., [Mathematics](#)

- Statistics specialization

RESEARCH INTERESTS

My areas of statistical research include development of methods inspired by applications in various fields such as genetic association studies, pathway analysis, and drug abuse epidemiology. Statistical topics include empirical Bayes data analysis, functional data analysis, mixed-effects modeling, issues of replicability (selection of top results), and methods for combining summary statistics (P-values or Z-scores).

IN PEER REVIEWED JOURNAL ARTICLES

Senior-author and Co-First-author manuscripts indicated by underline

*Note: ** indicates PhD student, * indicates MS student*

- [1] Reynolds, L.J., Vsevolozhskaya, O.A., Rice, B.B., Chavan, N.R., Dugan, A.**, Maddox, H.F., Preston, J.D., DeHoff, L.B., Pearson, K.J. “Physical Activity during Pregnancy Alters Gene Expression in Neonatal Tissue.” *Physiology International*. Accepted.
- [2] Strickland J.C., Vsevolozhskaya, O.A., Stoops, W.W. (2020) E-Cigarette Demand: Impact of Commodity Definitions and Test-Retest Reliability. *Nicotine Tob Res*, ntaa139. doi:10.1093/ntr/ntaa139

- [3] **Vsevolozhskaya, O.A.**, Shi, M., Hu, F., Zaykin, D.V. (2020) [DOT: Gene-set analysis by combining decorrelated association statistics](#). *PLOS Computational Biology*, **16** (4), e1007819.
- [4] **Vsevolozhskaya, O.A.**, Zaykin, D.V. (2020) [Quantifying posterior effect size distribution of susceptibility loci by common summary statistics](#). *Genetic Epidemiology*, **44**, 339–351.
- [5] Benavides, R., **Vsevolozhskaya, O.A.**, Cattaneo, S., Zaykin, D.V., Brentone, A., Parisiena, M., Vermaa, V., Khourya, S., Gilronf, I., Diatchenko, L. (2020) [A functional polymorphism in the *ABCB1* transporter predicts pharmacologic response to combination of nortriptyline and morphine in neuropathic pain patients](#). *PAIN*, **161** (3), 619–629.
- [6] Kang, JH., Mosera, D.K., Biddle, M.J., Lennie, T.L., Smyth, S.S., **Vsevolozhskaya, O.A.** (2020) [Inflammatory properties of diet mediate the effect of depressive symptoms on cardiovascular disease risk in men and women: Results from the National Health and Nutrition Examination Survey \(2007-2014\)](#). *Nutrition Research*, **74**, 78–86.
- [7] Strickland, J.C., Spindle, T.R., **Vsevolozhskaya, O.A.**, Stoops W.W. (2020) [Considering the impact of vaping-associated pulmonary illness reports on e-cigarette harm perceptions and tobacco use patterns](#). *Drug and Alcohol Dependence*, **207**, 107797.
- [8] **Vsevolozhskaya, O.A.**, Hu, F., Zaykin, D.V. (2019) [Detecting weak signals by combining small P-values in genetic association studies](#). *Frontiers in genetics*, **10**, 1051.
- [9] ShROUT, T., Sexton, T.R., **Vsevolozhskaya, O.A.**, Guglin, M., Shafii, A., Smyth, S. (2019) [Early signatures of bleeding and mortality in patients on left ventricular assist device support: novel methods for personalized risk-stratification](#). *Biomarkers*, **24** (5), 448–456.
- [10] Trott, S., **Vsevolozhskaya, O.A.**, Pennypacker, K., Alhajeri, A., Fraser, J.F. (2019) [Immune System Activation in Perioperative Thrombectomy Patients: Preliminary Retrospective Study](#). *World Neurosurgery*, **128**, e966–e969.
- [11] McCann, M.R., Hatton, K.W., **Vsevolozhskaya, O.A.**, Fraser, J.F. (2019) [Earlier tracheostomy and percutaneous endoscopic gastrostomy in patients with hemorrhagic stroke: associated factors and effects on hospitalization](#). *Journal of Neurosurgery*, 1(aop), 1–7.
- [12] Gupta, V.A., Sousa, M., Kraitman, N., Annabathula, R., **Vsevolozhskaya, O.A.**, Leung, S.W., Sorrell, V.L. (2018) [Coronary artery calcification predicts cardiovascular complications after sepsis](#). *Journal of Critical Care*, **44**, 261–266.
- [13] Sexton, T.R., Zhang, G., Macaulay, T.E., Callahan, L.A., Charnigo, R., Vsevolozhskaya, O.A., Li, Z., Smyth, S. (2018) [Ticagrelor reduces thromboinflammatory markers in patients with pneumonia](#). *JACC: Basic to Translational Science*, **3** (4), 435–449.
- [14] Petriello, M.C., Hoffman, J.B., **Vsevolozhskaya, O.A.**, Morris, A.J., Bernard, H. (2018) [Dioxin-like PCB 126 increases intestinal inflammation and disrupts gut microbiota and metabolic homeostasis](#). *Environmental Pollution*, **242**, 1022–1032.

- [15] **Vsevolozhskaya, O.A.**, Ruiz, G., Zaykin, D.V. (2017) [Bayesian prediction intervals for assessing P-value variability in prospective replication studies](#). *Translational psychiatry*, **7** (12), 1271.
- [16] **Vsevolozhskaya, O.A.**, Kuo, CL., Ruiz, G., Diatchenko, L., Zaykin, D.V. (2017) [The more you test, the more you find: The smallest P-values become increasingly enriched with real findings as more tests are conducted](#). *Genetic Epidemiology*, **41** (8), 726–743.
- [17] Jadhav, S., **Vsevolozhskaya, O.A.**, Tong, X., Lu Q. (2016) [The impact of genetic structure on sequencing analysis](#). *BMC Proceedings*, **10** (7), 60.
- [18] **Vsevolozhskaya, O.A.**, Anthony, J.C. (2016) [Inter-relationships linking probability of becoming a case of nicotine dependence with frequency of tobacco cigarette smoking](#). *Nicotine & Tobacco Research*, DOI: 10.1093/ntr/ntw159
- [19] **Vsevolozhskaya, O.A.**, Anthony, J.C. (2016) [Estimated probability of becoming a case of drug dependence in relation to duration of drug-taking experience: a functional analysis approach](#). *International Journal of Methods in Psychiatric Research*, DOI: 10.1002/mpr.1513
- [20] **Vsevolozhskaya, O.A.**, Zaykin, D.V., Barondess, D.A., Tong, X., Jadhav, S., Lu, Q. (2016) [Uncovering local trends in genetic effects of multiple phenotypes via functional linear models](#). *Genetic Epidemiology*, **40** (3), 210–221.
- [21] **Vsevolozhskaya, O.A.**, Anthony, J.C. (2016) [Transitioning from first drug use to dependence onset: Illustration of a multiparametric approach for comparative epidemiology](#). *Neuropsychopharmacology*, **41** (3), 869–876. DOI:10.1038/npp.2015.213
- [22] Kuo CL., **Vsevolozhskaya, O.A.**, Zaykin D.V. (2015) [Assessing the probability that a finding is genuine for large-scale genetic association studies](#). *PLoS ONE*. DOI: 10.1371/journal.pone.012410
- [23] **Vsevolozhskaya, O.A.**, Greenwood, M.C., Powell, S., Zaykin, D.V. (2015) [Resampling-based multiple comparison procedure with application to point-wise testing with functional data](#). *Environmental and Ecological Statistics*. **22** (1), 45–59. DOI 10.1007/s10651-014-0282-7
- [24] **Vsevolozhskaya, O.A.**, Zaykin, D.V, Greenwood, M., Wei, C., Lu, Q. (2014) [Functional analysis of variance for association studies](#). *PLoS ONE*. DOI: 10.1371/journal.pone.0105074
- [25] Wei, C., Li, M., He, Z., **Vsevolozhskaya, O.A.**, Schaid, D.J., Lu, Q. (2014) [A weighted U-statistic for genetic association analyses of sequencing data](#). *Genetic Epidemiology*. DOI: 10.1002/gepi.21864
- [26] **Vsevolozhskaya, O.A.**, Anthony, J. (2014) [Confidence interval estimation in R-DAS](#). *Drug and Alcohol Dependence*. **143**, 95-104. DOI: 10.1016/j.drugalcdep.2014.07.017
- [27] **Vsevolozhskaya, O.A.**, Greenwood, M.C., Holodov, D.B. (2014) [Pairwise comparison of treatment levels in functional analysis of variance with application to erythrocyte hemolysis](#). *Annals of Applied Statistics*. **8** (2), 905–925.
- [28] **Vsevolozhskaya, O.A.**, Greenwood, M.C., Bellante, G.J., Powell, S.L., Lawrence, R.L., Repasky, K.S. (2013) [Combining functions and the closure principle for performing follow-up tests in functional analysis of variance](#). *Computational Statistics & Data Analysis*. **67**, 175–184.

UNDER REVIEW /
IN REVISION

- [1] **Vsevolozhskaya, O.A.**, Manz, K.C., Zephyr, P.M., Waters, T.M. “Measurement Matters: Changing Penalty Calculations under the Hospital Acquired Condition Reduction Program (HACRP) Cost Hospitals Millions.” *Health Affairs*
- [2] **Vsevolozhskaya, O.A.**, Herbst, A.C., Adams, A.A., Burns, C., Cantu, B., Barker, V.D., Zaykin, D.V. “Methods for combining multiple correlated biomarkers with application to the study of low-grade inflammation and muscle mass in senior horses.” *Scientific Reports*

CONFERENCE
PUBLICATIONS

- [1] Vsevolozhskaya, O.A. and Greenwood, M.C. “Follow-up testing in functional ANOVA.” *Proceedings of the 2011 Joint Statistical Meeting.*

CONFERENCE AND
SEMINAR
PRESENTATIONS

- Zaykin, D.V., Vsevolozhskaya., O.A. Flexible Approach for Gene-Level Genetic Analysis via Combinations of Summary Statistics. Contributed Talk.
Joint Statistical Meetings, 2019.
- Dugan, A.J.,** Fardo, D.V., Zaykin, D.V., Vsevolozhskaya., O.A. Statistical Inference for Gene-Level Analysis Based on Functional Linear Models. Contributed Talk.
Joint Statistical Meetings, 2019.
- Strickland, J., Vselvolozhskaya, O.A., Grigorian, A. Relevance of methamphetamine and injection drug use in an ongoing outbreak of Hepatitis A in Kentucky. **Late breaking research.**
The College on Problems of Drug Dependence, 2019.
- Vsevolozhskaya, O.A., Anthony, J.C., Zaykin. D.V. Bayesian prediction intervals for assessing P-value variability in prospective replication studies. Poster presentation.
WPA Section on Epidemiology and Public Health, 2018.
- Dugan, A.J.,** Fardo, D.V., Vsevolozhskaya., O.A. Testing for pleiotropy using functional linear regression: An application with neurodegeneration endophenotypes. Poster presentation.
American Society of Human Genetics Annual Meeting, 2018.
- Vsevolozhskaya, O.A. **Discussant of Invited Session** “Integrative Approaches for Analysis of Complex Phenotype and DNA Sequence Data.”
Joint Statistical Meetings, 2018.
- Vsevolozhskaya, O.A., Keren, I., Fardo, D., Zaykin, D.V. Cerebrospinal fluid biomarker signature in Alzheimer s disease genetic association landscape by functional linear models. **Invited Talk.**
Joint Statistical Meetings, 2017.
- Vsevolozhskaya, O.A. What Hill functions can teach us in analyses of complex survey sample data. **Workshop.**
The College on Problems of Drug Dependence, 2017.
- Vsevolozhskaya, O.A., Wagner, F., Anthony, J.C. Very rapid onset cannabis dependence risk in relation to co-occurring use of other psychoactive drugs. Poster presentation.
American College of Neuropsychopharmacology Annual Meeting, 2016.

- Vsevolozhskaya, O.A. Characterizing uncertainty in genetic association landscapes by functional Bayesian bands: Application to pleiotropic effects of CSF levels of Alzheimers disease proteins. **Invited Talk**.
University of Louisville, 2016.
- Vsevolozhskaya, O.A. The role of informative priors in zero-numerator problems with application to Hill functions. **Invited Talk**.
Michigan State University, 2016.
- Vsevolozhskaya, O.A., Keren, I., Fardo, D., Zaykin, D.V. Pleiotropic effects of CSF Levels of Alzheimers disease proteins. Poster presentation.
American Society of Human Genetics Annual Meeting, 2016.
- Vsevolozhskaya, O.A., Keren, I., Zaykin, D.V. Characterizing uncertainty in genetic association landscapes by functional Bayesian bands. Contributed Talk.
Joint Statistical Meetings, 2016.
- Vsevolozhskaya, O.A. Secondary Data Analysis of Health Data. **Workshop**.
University of Kentucky, 2016.
- Vsevolozhskaya, O.A., Wagner, F.A., Anthony, J.C. Dealing with zero-numerators in estimating drug-dependence chances: A Bayesian approach. Poster presentation.
The College on Problems of Drug Dependence, 2016.
- Vsevolozhskaya, O.A. Statistical interpretation including the APPROPRIATE statistical tests. **Invited talk**.
International Stroke Conference, 2016.
- Vsevolozhskaya, O.A., Anthony, J.C. Estimated probability of becoming alcohol dependent: Extending a multiparametric approach. Poster presentation.
American College of Neuropsychopharmacology Annual Meeting, 2015.
- Zaykin, D.V., Vsevolozhskaya, O.A. Functional linear models extensions uncover pleiotropic effects of chronic pain phenotypes. Poster presentation.
American Society of Human Genetics Annual Meeting, 2015.
- Zaykin, D.V., Vsevolozhskaya, O.A., Kuo, CL. Proportion of false discoveries within a subset of the smallest p-values in genetic association studies with large number of tests.
Joint Statistical Meetings, 2015.
- Vsevolozhskaya, O.A., Zaykin, D.V., Lu, Q. Function-on-scalar regression for next-generation sequencing studies. Contributed talk.
Joint Statistical Meetings, 2015.
- Lu, Q., Wei, C., Elston, R.C., Vsevolozhskaya, O.A. A non-parametric method finds genetic etiology of nicotine dependence differs in males and females. Poster presentation.
The College on Problems of Drug Dependence, 2015.
- Vsevolozhskaya, O.A., Anthony, J.C. Estimated probability of becoming a case of drug dependence in relation to duration of drug-taking experience: A functional approach. Poster presentation.
The College on Problems of Drug Dependence, 2015.

- Vsevolozhskaya, O.A., Zaykin, D.V., Lu, Q. Functional regression for genetic association studies. Poster presentation.
American Society of Human Genetics Annual Meeting, 2014.
- Zaykin, D.V., Vsevolozhskaya, O.A., Lu, Q. Estimating genetic distance-dependent effects of environmental exposures by functional models. Poster presentation.
American Society of Human Genetics Annual Meeting, 2014.
- Vsevolozhskaya, O.A., Zaykin, D.V., Lu, Q. Penalized functional regression for next-generation sequencing studies. Contributed talk.
Joint Statistical Meetings, 2014.
- Vsevolozhskaya, O.A., Anthony, J.C. From drug use to dependence: A multiparametric approach for comparative epidemiology. Poster presentation.
The College on Problems of Drug Dependence, 2014.
- Vsevolozhskaya, O.A., Anthony, J.C. From drug use to dependence: A multiparametric approach. Poster presentation.
Women in Statistics Conference, 2014.
- Vsevolozhskaya, O.A., Anthony, J.C. Confidence interval estimation in R-DAS: state-level estimates for extra-medical use of prescription pain relievers. Poster presentation.
The 13th annual MI Epidemiology Conference, 2014.
- Vsevolozhskaya, O.A., Zaykin, D.V., Greenwood, M., Lu, Q. Functional analysis of variance for association studies. Poster presentation.
Impact of Large-Scale Genomic Data on Statistical and Quantitative Genetics, 2013.
- Zaykin, D.V., Kuo, C., Vsevolozhskaya, O.A. The more you test, the more you find: Massive multiple testing does not promote spurious findings among top hits of association studies. Poster presentation.
American Society of Human Genetics Annual Meeting, 2013.
- Vsevolozhskaya, O.A., Lu, Q., Kuo, C., Zaykin, D.V. Use of P-values to evaluate the probability of a genuine finding in large-scale genetic association studies. Poster presentation.
American Society of Human Genetics Annual Meeting, 2013.
- Vsevolozhskaya, O.A., Greenwood, M.C., Wei, C., Lu, Q. Association studies for sequencing data with functional analysis of variance. Poster presentation.
Joint Statistical Meetings, 2013.
- Vsevolozhskaya, O.A., Greenwood, M.C. Resampling-based multiple comparison procedure with application to point-wise testing with functional data. Poster presentation.
SAMSI-SAVI Workshop on Environmental Statistics, 2013.
- Vsevolozhskaya, O.A., Greenwood, M.C., and Holodov, D. Methods for pairwise comparison of treatment levels in a functional data setting. Poster presentation.
Joint Statistical Meetings, 2012.

- Vsevolozhskaya, O.A., Greenwood, M.C., and Holodov, D. A proposed methodology for performing follow-up tests to compare pairs of treatment levels in functional linear models. Poster presentation.
Midwest Biopharmaceutical Statistical Workshop, 2012.
- Vsevolozhskaya, O.A. and Greenwood, M.C. Follow-up testing in functional ANOVA.
Fall Meeting of the Montana Chapter of the American Statistical Association, 2012.
- Vsevolozhskaya, O.A. and Greenwood, M.C. Follow-up testing in functional ANOVA. Poster presentation.
Joint Statistical Meetings, 2011.
Montana State University Welcome Dinner and Reception Presenters, 2011.

TEACHING
EXPERIENCE

University of Kentucky, Lexington, KY

Assistant Professor

July 2015 - present

Courses Created:

CPH 631: Design and Analysis of Health Surveys
Spring 2019, Spring 2017, Spring 2016

CPH 738: Special Topics in Biostatistics – Bayesian Stats and Hierarchical Models
Fall 2016/2017

CPH 738: Special Topics in Biostatistics – Methods for Observational Health Care Data Analysis
Fall 2018

Courses Taught:

CPH 682: Generalized Linear Models
Spring 2020

CPH 636: Data Mining in Public Health
Fall 2019

CPH 630: Biostatistics II
Spring 2019

CPH/STA 580: Biostatistics I
Spring/Fall 2017, Spring/Fall 2016

Montana State University, Bozeman, MT

Teaching Assistant

September 2007 to May 2013

Instructor for STAT 216: Introduction to Statistics
Fall 2007

Instructor for STAT 217: Intermediate Statistical Concepts
Spring, Fall, and Summer 2008, Spring, Fall, and Summer 2009, Spring, Fall, and Summer 2010, Spring and Summer 2011, Spring 2012

Instructor for STAT 332: Statistics for Scientists and Engineers
Fall 2011, Fall 2012

Instructor for M 221: Introduction to Linear Algebra
Summer 2012, Spring 2013

Pittsburg State University, Pittsburg, KS

Teaching Assistant

September 2005 to December 2006

Instructor for MATH 143: Elementary Statistics

MEMBERSHIP IN
PROFESSIONAL
SOCIETIES

- American Statistical Association, 2011-present
- American Society of Human Genetics, 2012-present
- College on Problems of Drug Dependence, 2013-present

SERVICES

- Reviewer for [PLOS ONE](#)
- Reviewer for [Statistics and Probability Letters](#)

AWARDS

University of Kentucky

- Teachers Who Made a Difference, 2019

The College on Problems of Drug Dependence

- NIDA Director Travel Award, 2015

Women in Statistics Conference

- Travel Award, 2014

SAMSI-SAVI Workshop on Environmental Statistics

- Travel Award, 2013

Montana State University

- Outstanding Graduate Teaching Assistant of College of Letters & Science Award, 2013
- Nominated for College of Letters & Science Outstanding Graduate Teaching Assistant Award, 2012
- Outstanding Graduate Student, Department of Mathematical Sciences, 2011-2012
- Outstanding Graduate Teaching Assistant, Department of Mathematical Sciences, 2010-2011
- College of Letters and Science Student Travel Grant, 2011

Midwest Biopharmaceutical Statistics Workshop

- Travel Award, 2012

Pittsburg State University

- Excellence in Research, 2007

TECHNICAL SKILLS

- **Programming:** , JAGS, Python, HTML, CSS, SAS[®].
- **Application:** L^AT_EX, B_IB_TE_X, Libre Office and other common packages from both Linux and Windows platforms.
- **Operating Systems:** Linux/Unix, MacOS, Microsoft Windows.