

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health
Department of Biostatistics

Sebastian K. Zoellner, associate professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health, and associate professor of psychiatry, with tenure, Department of Psychiatry, Medical School, is recommended for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health, and professor of psychiatry, with tenure, Department of Psychiatry, Medical School.

Academic Degrees:

Ph.D. (Biological Sciences)	2001	University of Munich, Leipzig, Germany
M.Sc. (Mathematics)	1997	University of Munich, Leipzig, Germany

Professional Record:

2011 - present	Associate Professor, Department of Biostatistics and Department of Psychiatry, University of Michigan
2005 - 2011	Assistant Professor, Department of Biostatistics and Department of Psychiatry, University of Michigan
2001- 2005	Post-Doctoral Fellow, Department of Human Genetics, University of Chicago
2001	Post-Doctoral Fellow, Max-Planck Institute for Evolutionary Anthropology

Summary of Evaluation:

Teaching: Professor Zoellner is an articulate and conscientious teacher who has received solid ratings and taught a varied set of courses. Since 2011, he has taught four different courses: BIOSTAT 449 (“Undergraduate Topics in Biostatistics,” now discontinued), BIOSTAT 665 (“Statistical Population Genetics”), BIOSTAT 666 (“Statistical Models and Numerical Methods in Human Genetics”), and BIOSTAT 501 (“Introduction to Biostatistics”). This is a diverse set of courses, ranging from large service courses (BIOSTAT 501 and BIOSTAT 449), to specialized courses (BIOSTAT 665 and BIOSTAT 666) that play to Professor Zoellner’s research strengths and that are key components of our statistical genomics training program. The specialized courses are especially popular. Even when the enrollment numbers are modest, the lectures often attract many post-doctoral fellows, advanced students and faculty.

Professor Zoellner has been very active in mentoring students. He has mentored 13 Ph.D. students (as dissertation chair or co-chair) and served on an additional 20 doctoral committees. This is exceptional and speaks to the fact that he is considered a generous and thoughtful mentor. He is a great resource for students and organizes a statistical genetics weekly seminar series attended by students from Biostatistics, Bioinformatics and Human Genetics. He also has numerous informal mentees in the Department of Psychiatry. Thus, his reach in mentoring activities has been in the multidisciplinary front, enriching student learning for students in every department.

Research: Professor Zoellner's main research interests are in the area of statistical and population genetics methodology and in the genetics of psychiatric disease. His work to date covers the following several broad areas: (1) using better models of genetic variation to map human disease genes; (2) characterizing copy number variation in the genome using new experimental methods and statistical techniques; (3) using genetic data to reconstruct human population history; (4) characterizing the rates and patterns of change in the genome, with a focus on the study of human mutation rates; (5) the design of new analytical methods that are specifically tailored to the analysis of rare genetic variation which could not be measured until recently; and (6) psychiatric genetics. Professor Zoellner is well known in each of these areas, where he has made substantive contributions and advances.

To date, Professor Zoellner has 55 publications (with 21 as the first or senior author) in peer-reviewed journals. His work has been influential and is highly cited (>10,000 citations in total and >17 papers have >100 citations each). Among his highly cited papers, twelve date from his time at Michigan. He has introduced several important concepts in human genetics, ranging from the idea of the "Winner's Curse" in genetic association studies, to the idea of using the burden of rare variation for genetic association mapping, to new methods to estimate genetic mutation rates from population genetic data, to a demonstration of "super-exponential" growth in recent human history (among others). Each of these papers has resulted in substantial follow-up work from his group and others.

Thus, from the methodological perspective Professor Zoellner has established lines of research that bring together ideas from theoretical population genetics with modern computational tools and data, and use the combination to understand the role of genes on complex disease. We fully expect he will continue to make innovative and important contributions to these areas.

Professor Zoellner has also been using genetics to improve our understanding of psychiatric disease. He is one of the leaders of the bipolar disorder sequencing consortium, which is currently undertaking sequence and analysis of >10,000 genomes of bipolar patients and controls. His major published contributions in the area to date include helping execute large genome-wide association studies for bipolar disorder, the systematic comparison of genome-wide association studies between different psychiatric diseases to demonstrate overlap in susceptibility genes, and a highly cited review summarizing current progress and pointing to the way ahead.

Professor Zoellner has been extremely successful in obtaining grants, which have enabled him to support his own salary as well as that of students. In addition to many collaborative projects, he has had three distinct projects funded through R01 grants where he is the principal investigator.

Recent and Significant Publications:

- Lin K, Zöllner S. (2015) Robust and powerful affected sibpair test for rare variant association. *Genet Epidemiol.* 39 (5), 325-333.
- Zawistowski M, Reppell M, Wegmann M, St. Jean PL, Ehm MG, Nelson MR, Novembre J, Zöllner S. (2014) Analysis of rare variant population structure in Europeans explains differential stratification of gene-based tests. *Eur. J. Hum. Genet.* 22 (9), 1137-1144.

- Reppell M, Boehnke M, Zöllner S. (2014) The impact of faster than exponential growth on genetic variation. *Genetics* 196(3):819-28.
- Zöllner S. (2012) Sampling strategies for rare variant tests in case-control studies. *Eur J Hum Genet.* 20(10):1085-91.
- Zawistowski M, Gopalakrishnan S, Ding J, Li Y, Grimm S, Zöllner S. (2010) Extending rare variant testing strategies: Analysis of non-coding sequence and imputed genotypes. *Am J Hum Genet* 87:604-61.

Service: Professor Zoellner has an excellent record of service to the department. Among numerous assignments, we especially note that he has served on faculty search committees (2010-2012), on the qualifying exam committee (2015-2016), and on the departmental admission committee (2007-2012, 2014-2015). Currently, he is serving (together with Dr. Tom Braun) as a graduate studies advisor for our entering cohort of master's students. This is a very substantial role, given we currently have our largest entering cohort ever, with >50 students.

Professor Zoellner has also been an important contributor to the profession. Most notable, together with John Novembre (University of Chicago) he started an Annual MidWest Population Genetics Meeting that provides an opportunity for 50-100 students and postdocs to present their work and interact over the course of several days. In addition, he is a regular grant reviewer for NIH and other organizations and also manuscript reviewer for several key journals in the field. Notably, he is currently an associate editor for the journal *Frontiers in Statistical Genetics and Methodology* and also serves on the University of Michigan's Data Science Initiative (MIDAS) Education Committee, where he is helping develop masters and certificate programs for students interested in the analysis of big data.

External Reviewers:

Reviewer A: "Professor Zollner's achievement, service, and productivity make him a deserving candidate. Of particular interest is Professor Zollner's work in studying rare genetic variation in humans, ranging from characterizing human patterns of rare variation in large scale studies to the development of novel methods for performing rare variation studies."

Reviewer B: "Dr. Zoellner is a brilliant biostatistician...who has already distinguished himself as a leading authority in mapping human heritable traits. He has reported new methods adopted by investigators worldwide. [He is] highly regarded for his scholarship but also his ability to communicate. His 2014 *Genetics* paper is a very clever and insightful study of the impact of population growth on patterns of genetic variation. I enthusiastically support his promotion."

Reviewer C: "He has established a strong, international reputation in the areas of theoretical population genetics and statistical genetics, where he publishes regularly in the top journals. [He has] made his strongest mark in the area of rare variant association tests. Sebastian was one of the first to model the explanation that the human population had been growing super-exponentially...this was a gem of a paper. He is by all accounts already recognized as a major player in the field and I am confident that his influence will continue to grow."

Reviewer D: “[His] research on population genetics of rare genetic variants...is an important and rapidly growing area of research. He is internationally recognized both as a scientist and as a leader in this area. His record also demonstrates a nice balance between work coming solely from his laboratory and active participation in collaborative efforts. [His] success in grantsmanship is exceptional.”

Reviewer E: “His recent publication record is excellent...papers on the genetics of psychiatric disorders have been particularly influential. His ongoing projects are diverse and promising. He has been very successful at obtaining NIH grant support. I am sure he would [be] promoted in my department. You are fortunate to have him on your faculty.”


Reviewer F: “Sebastian has made important contributions to statistical genetics and would be promoted to the rank of Professor at any reputable academic institution. I believe he must be an excellent teacher given the clarity of his presentations at scientific meetings. I support this promotion strongly and without reservations.”

Reviewer G: “He has clearly lived up to--even exceeded-- expectations for continued productivity. His work has concentrated in three main areas: copy number variant, linkage disequilibrium mapping, and next generation sequencing data analyses. These are *the* big three problems in genetic epidemiology today and he has made fundamental contributions to all three. I enthusiastically support Dr. Zoellner’s promotion without hesitation.”

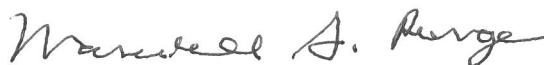
Reviewer H: “I believe that Dr. Zoellner is a leader in the field of human statistical genetics at both the national and international level. [He] has a very good record for obtaining grant funding including numerous NIH RO1 grants. He also has an impressive record of service both at the university and national level. I strongly support his promotion to full professor.”

Summary of Recommendation:

Based on Professor Zoellner’s research accomplishments, his teaching and mentoring activities, his reach across disciplines, external evaluations and his collaborative research contributions, we are pleased to recommend Sebastian K. Zoellner for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health, and professor of psychiatry, with tenure, Department of Psychiatry, Medical School.



Martin A. Philbert, Ph.D.
Dean, School of Public Health



Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School

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