Bryan E. Shepherd, Ph.D.
Supporting Statement

Dr. Shepherd is Professor with tenure and Vice Chair of Research in the Biostatistics Department at Vanderbilt University Medical Center. He has excelled as a faculty member at Vanderbilt since arriving in 2005 after obtaining his PhD in Biostatistics at the University of Washington. Dr. Shepherd is a well-rounded statistician and has done superb collaborative, methodological, teaching, and service/leadership work, some of which is highlighted below.

Collaborative Statistical Work
Dr. Shepherd has played a major role in the success of HIV/AIDS research at Vanderbilt, and he has developed an international reputation for his HIV/AIDS epidemiology research. Dr. Shepherd currently serves as the Director of the Biostatistics and Biomedical Informatics Core of the Tennessee Center for AIDS Research (CFAR); he was head statistician for the former Vanderbilt-Meharry CFAR from 2006-2013. He has also been the lead statistician for the Caribbean, Central and South America network for HIV Epidemiology (CCASAnet) and for the Vanderbilt Institute for Global Health since 2006. In these contexts Dr. Shepherd has collaborated on a wide variety of studies, resulting in approximately 150 peer-reviewed publications. This extensive collaborative research has required an understanding of many different statistical areas. For example, Dr. Shepherd led the development of the sampling design for a large survey in Mozambique, directed a genome wide association study of the pharmacogenetics of tenofovir-based antiretroviral therapy, has supervised analyses of numerous laboratory studies, and has served as the lead statistician for several clinical trials designed to improve care and reduce the spread of HIV in sub-Saharan Africa. Dr. Shepherd's collaborative studies with large, multinational HIV databases have been particularly noteworthy, and have led to many important advances in the understanding of HIV treatment. He has been a thought-leader, bringing modern, relevant statistical methods (e.g., natural splines, dynamic marginal structural models, and reproducible research techniques) to HIV/AIDS research with large observational databases. He has also taken the lead on many studies, serving as first or senior author on papers published in top HIV and epidemiology journals including *AIDS*, *Journal of Acquired Immune Deficiency Syndrome*, *Journal of the International AIDS Society, American Journal of Epidemiology,* and *Epidemiology*.

Statistical Methods Work
Dr. Shepherd has developed important methods in several statistical areas. These methods have been published in top statistical journals (e.g., *Journal of the American Statistical Association, The American Statistician, Canadian Journal of Statistics, Biometrika, Biometrics, Statistics in Medicine,* and *Journal of the Royal, Statistical Society Series B*), have led to external funding from the U.S. government, and have been internationally recognized.

Dr. Shepherd's earliest statistical research was in the area of causal inference, specifically sensitivity analyses within the principal stratification framework. He was co-investigator and principal investigator (PI) of the sub-contract for a National Institutes of Health (NIH) grant (R01) to investigate causal inference methods in partially randomized experiments motivated by HIV vaccine trials. He developed approaches to investigate the causal effect of interventions

among patient sub-groups selected after randomization (e.g., participants infected with HIV). More recently, his causal inference research has dealt with applications of dynamic marginal structural models to observational data, motivated by questions regarding optimal timing of antiretroviral therapy in persons living with HIV.

Dr. Shepherd's collaborative research with large HIV observational databases has also led to methods for improving estimation with messy data. Another area of methodological research has been studying approaches to incorporate information learned from data audits to improve estimation using data from the entire cohort, most of which has not been audited. These methods are related to methods for measurement error and missing data, but have required extensions because of the multidimensional and correlated nature of errors seen in practice. This work has been funded by the Patient Centered Outcomes Research Institute (PCORI) because of its relevance to studies using electronic health records data.

Finally, Dr. Shepherd has developed important methods for the analysis of ordinal data. He and his colleagues developed a new residual for ordinal outcomes, extended Spearman's rank correlation to account for covariates using semi-parametric transformation models, developed novel tests for association between ordered categorical variables while adjusting for covariates, and showed how continuous response variables could be analyzed using models typically reserved for the analysis of ordered categorical data. Dr. Shepherd has received an R01 from the NIH for this work, was named as the Shayle Searle Fellow in 2016 at Victoria University of Wellington for this research, and received the *Canadian Journal of Statistics Award* in 2016 for one of his papers in this area.

Teaching and Mentoring

Dr. Shepherd is an outstanding teacher and mentor. He has taught 'Introduction to Probability and Statistical Theory' to graduate students at Vanderbilt for the last 7 years, and he recently developed and began teaching a new course, 'Causal Inference.' Dr. Shepherd's teaching evaluations are essentially uniformly positive. Student comments from his most recent fall 2017 probability course included:

> "Professor Shepherd is exceptionally clear about concepts and he makes an effort to relate what we learn with applications."
> "The instructor's focus was enabling student success in grasping the material. The instructor was kind and responsive in answering questions and clarifying."
> "Bryan is extremely approachable and very good at conveying ideas and concepts."
> "The material was very difficult and I learned a lot, maybe the most I've learned in a single class ever."

Dr. Shepherd has served on 17 dissertation committees, currently acts as primary advisor for 3 students, and supervised Vanderbilt's first graduating PhD student from the Department of Biostatistics in 2016. Dr. Shepherd's efforts were recognized with him receiving the Outstanding Faculty Mentor Award for the Vanderbilt Department of Biostatistics in 2016. With his global health collaborations, he has also spent significant time mentoring early stage researchers in Africa and Latin America.

Leadership and Service

Dr. Shepherd has been an active member of the statistical community, both locally and externally. In addition to serving as Vice Chair of Research for the Department of Biostatistics, Dr. Shepherd has served on and led multiple committees within the department. He has played an important role in the development of the department (established in 2003), and particularly in the development of its graduate program (established in 2011). Dr. Shepherd has also been active in the local ASA chapter, serving as Chapter Representative for the Middle Tennessee Chapter from 2006-2008. His expertise has been called on outside of statistics; he served on the board of directors for the Nashville Health Management Foundation, a local non-profit HIV service organization from 2014-2016. Dr. Shepherd's service to the broader statistical community has also been substantial. He has served as a reviewer for numerous foundations including the Bill and Melinda Gates Foundation, the National Institutes of Health, the Wellcome Trust, and the Medical Research Council. He has served on several data and safety monitoring boards, chairing two of them. In addition, he has peer-reviewed over 75 articles for over 35 different journals. He currently serves as an associate editor for the *American Journal of Epidemiology*.