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**BIOGRAPHICAL SKETCH**

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NAME: Elliot M. Tucker-Drob

eRA COMMONS USER NAME: tuckerdrob

POSITION TITLE: Associate Professor, Department of Psychology

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**EDUCATION/TRAINING**

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INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
Cornell University, Ithaca, NY	AB	05/2004	Psychology
University of Virginia, Charlottesville, VA	MA	05/2007	Psychology
University of Virginia, Charlottesville, VA	PhD	05/2009	Psychology

**A. Personal Statement**

My research experience and expertise are in the areas of behavioral genetics, cognitive development, personality development, and longitudinal multivariate research methodology. My ongoing work seeks to clarify how social and economic contexts combine and interact with the neurobiological, genetic, and epigenetic mechanisms underlying heterogeneity in age-graded changes in cognitive abilities, academic and vocational skill, personality, behavior, and health across the life course. With Dr. Paige Harden, I founded and direct the Texas Twin Project, an ongoing population-based study of psychological development in child and adolescent twins that is funded by several grants from NICHD and NIAAA. Our studies involve (1) in-depth phenotyping of several consequential psychological outcomes, ranging from cognitive abilities, executive functioning, personality, and risk taking behavior, (2) detailed measurement of a range of neurobiological and neuroendocrine measures (including pubertal status, salivary DNA, salivary hormones (acute reactivity and diurnal variability), accumulated hormones in hair, and both functional and structural MRI hypothesized to index physiological processes mechanistically integral to psychological development and health, (3) extensive measurement of economic, social, and educational contexts from child- and parent-reports, US Census data linked to geocoded home addresses, and administrative data on classrooms and schools from the Texas Education Agency. This constellation of psychological, genetic, neuroendocrine, and sociocontextual measures uniquely positions us to study the complex system of influences on child and adolescent psychological development, educational attainment, risk taking behaviors, and health. Work stemming from the Texas Twin Project fits most closely within two of the PRC primary research areas: Population Health and Demography: Family Demography and Intergenerational Relationships.

The PRC has been crucial to my success as a scientist since my arrival at UT in 2009. I learned the basics of grant writing and wrote my first R21 proposal during the PRC grant writing Boot Camp during my first summer at UT. That proposal benefited enormously from the feedback that I received that summer, and was awarded after a single submission. I have been PI and Co-I of several other NIH grants since then, and each submission has benefited from the wisdom and feedback of my senior colleagues at the PRC. Now as PI of an NICHD-funded 5-year R01 project, I rely heavily on the expertise and support of the PRC Administrative Core to manage my award. The PRC Scientific & Technical Core provides the infrastructure that the Texas Twin Project has needs to securely and efficiently enter, store, and process the very large datasets that we have been collecting.

Harden, K. P., Tucker-Drob, E. M., & Tackett, J. L. (2013). The Texas Twin Project. *Twin Research and Human Genetics [Special Issue: Twin registers as a global resource for genetic research: An update]*, 16,385-390. PMC3587129

**B. Positions and Honors****Positions and Employment**

2005-2009 National Institute on Aging Predoctoral Trainee in *Quantitative Modeling in Aging Research*, University of Virginia (2005-2006, 2006-2007, 2008-2009)  
2006 Boston Geriatric Research Scholar – Harvard Medical School

- 2007 Visiting Research Fellow – Center for Lifespan Psychology, Max Planck Institute for Human Development, Berlin, Germany
- 2009-2015 Assistant Professor, Department of Psychology, University of Texas at Austin, Austin, TX
- 2009-Present Faculty Research Associate, Population Research Center, University of Texas at Austin, Austin, TX
- 2010-Present Founder and Director (with K. P Harden). The Texas Twin Project.
- 2015-2016 Visiting Scholar, Russell Sage Foundation, New York, NY
- 2015-Present Associate Professor with Tenure, Department of Psychology, The University of Texas at Austin, Austin, TX

### **Other Experiences and Professional Memberships**

- Since 2009 Journal Reviewer for: *Acta Psychologica*, *American Psychologist*, *Behavior Genetics*, *Crime and Delinquency*, *Developmental Psychology*, *Developmental Science*, *European Journal of Psychological Assessment*, *Intelligence*, *Journal of Experimental Psychology: General*, *Journal of Gerontology: Psychological Sciences*, *Journal of Geriatric Psychiatry and Neurology*, *Journal of Health and Social Behavior*, *Journal of Individual Differences*, *Journal of Personality and Social Psychology*, *Journal of Research in Personality*, *PLoS ONE*, *Psychological Science*, *Psychology and Aging*, *Social Psychological and Personality Science*
- Since 2009 Ad Hoc Grant Reviewer for National Science Foundation, Swiss National Science Foundation, Medical Research Council, United Kingdom
- 2014 Panelist, NIH Special Emphasis Panels ZRG1 PSE-H 50 and ZDK1 GRB-J (J1)
- 2015 Panelist, NIH Behavior Genetics and Epidemiology Study Section (BGES)
- Present Editorial Board Member: *Developmental Psychology* (Associate Editor), *Psychology and Aging* (Consulting Editor), *Intelligence*

### **Honors**

- 2006 Recipient, John B. Carroll Award for Research Methodology, International Society for Intelligence Research
- 2008 Recipient, Maury Pathfinder Award for Best Master's Thesis, University of Virginia
- 2008 Recipient, Retirement Research Foundation Award for Outstanding Graduate Research, American Psychological Association
- 2009 Science, Editor's Choice (January 28, 2011; DOI:10.1126/science.331.6016.378-a)
- 2015 Fuller and Scott Award for Outstanding Scientific Accomplishments, Behavior Genetics Association
- 2016 Fulker Award for best paper published in *Behavior Genetics* in 2015

## **C. Contributions to Science**

### **1. Modeling Genetic Influences on Personality and Cognitive Development across Time**

Childhood and adolescence are times of change. Over the course of childhood, learning experiences accrue, genetic variation becomes expressed and amplified, and cognitive functions become highly canalized. In adolescence, surges in adrenal and gonadal hormones at puberty cause dramatic physiological changes, including a second period of plasticity in the brain, and the rapid escalation of appetitive behavioral tendencies toward risk and reward. These developmental processes have the potential to have lasting reorganizational effects on psychological and neural structure and function with direct implications for life course patterns of physical and psychiatric health. They also have the potential to result in “snares,” such as teenage pregnancy, school dropout, criminal conviction, substance use initiation, and accidents (e.g. poisoning and car accidents) – that entrench individuals in lifelong patterns of poor health and wellbeing. One major goal of my research program is to elucidate these patterns of individual differences in age-related changes in psychological and behavioral development. A particular emphasis of my work has been on understanding how early genetic and environmental influences on personality and cognitive ability persist forward in time, and how novel genetic and environmental influences emerge over the course of development, to have lasting effects on health and wellbeing over the life course.

Briley, D. A., & Tucker-Drob, E. M. (2014). Genetic and environmental continuity in personality development: A meta-analysis. *Psychological Bulletin*, *140*, 1303-1331. PMC4152379

Tucker-Drob, E. M., & Briley, D. A. (2014). Continuity of genetic and environmental influences on cognition across the life span: A meta-analysis of longitudinal twin and adoption studies. *Psychological Bulletin*, *140*, 949-979. PMC4069230

- Briley, D. A., & Tucker-Drob, E. M. (2013). Explaining the increasing heritability of cognition over development: A meta-analysis of longitudinal twin and adoption studies. *Psychological Science, 24*, 1704-1713. PMC3954471
- Tucker-Drob, E. M., Briley, D. A., & Harden, K. P. (2013). Genetic and environmental influences on cognition across development and context. *Current Directions in Psychological Science, 22*, 349-355. PMC4006996

## **2. Longitudinal Investigations of Hypothesized Correlates and Consequences of Psychological Development**

In addition to highly important basic descriptive information about patterns of age-graded changes in cognition and personality, is an understanding of associations between such changes and both hypothesized upstream risk and protective factors and hypothesized downstream social, psychological, and physiological consequences. My research in this area has emphasized the importance of longitudinal data for answering these questions. More conventional cross-sectional approaches are only capable of understanding how total variation in a phenotype relates to a correlate at a given point in time, and are therefore unable to faithfully untangle the temporal ordering of dynamic processes, or distinguish correlates of change during a specific developmental period from pre-existing covariance relations that persist forward in time. Longitudinal approaches allow for direct assessment of change over time, and are therefore more robust to such confounds. I have applied sophisticated longitudinal models (e.g., growth curve models, dual change score models, and cross-lagged models) to test an array of hypotheses regarding the prospective correlates and consequences of behavioral development at multiple periods of the life course. For example, I have examined longitudinal coupling between sensation seeking and delinquency, parental cognitive stimulation and reading development, white matter integrity and intelligence, and neurocognitive abilities and everyday functions.

- Harden, K. P., Quinn, P. D., & Tucker-Drob, E. M. (2012). Genetically influenced changes in sensation seeking drive the rise of delinquent behavior in adolescence. *Developmental Science, 15*, 150-163. PMC3261521
- Tucker-Drob, E. M., & Harden, K. P. (2012). Early childhood cognitive development and parental cognitive stimulation: Evidence for reciprocal gene-environment transactions. *Developmental Science, 15*, 250-259. PMC3296290
- Ritchie, S. J., Bastin, M., Tucker-Drob, E. M., Maniega, S. M., Engelhardt, L. E., Cox, S., Royle, N. A., Gow, A. J., Corley, J., Pattie, A., Taylor, A., Hernandez, M. V., Starr, J. M., Wardlaw, J. M., & Deary, I. J. (2015). Coupled changes in brain white matter microstructure and fluid intelligence in later life. *Journal of Neuroscience, 35*, 8672-8682. PMC4452562
- Tucker-Drob, E. M. (2011). Neurocognitive functions and everyday functions change together in old age. *Neuropsychology, 25*, 368-377. PMC3086995

## **3. Multivariate Models of Longitudinal Changes across Related Phenotypes**

One overarching goal of my research is to use multivariate longitudinal methods to advance understanding of how developmental changes in conceptually-related phenotypes are associated with one another. For instance, are aging-related declines in episodic memory accompanied by declines in processing speed and spatial ability? Addressing this question is fundamental to understanding whether empirical investigations of developmental changes should be carried out across general dimensions, or individually for specific dimensions. Such work also speaks directly to *common cause* hypotheses that a low dimensional vector of variation undergirds variation in changes across a broad assortment of phenotypes. For instance I have documented very consistent evidence for moderate-to-strong codependences between longitudinal changes in difference cognitive functions in both childhood and adulthood. In related work, I have found that a common dimension of longitudinal change substantially mediates genetic influences on changes in individual cognitive abilities in late life.

- Ritchie, S. J., Tucker-Drob, E. M., & Deary, I. J. (2014). A strong link between speed of visual discrimination and cognitive ageing. *Current Biology, 24*, R681-R683. PMC4123160
- Rhemtulla, M., & Tucker-Drob, E. M. (2011). Correlated longitudinal changes across linguistic, achievement, and psychomotor domains in early childhood: Evidence for a global dimension of development. *Developmental Science, 14*, 1245-1254.

Tucker-Drob, E. M., Reynolds, C., Finkel, D., & Pedersen, N. L. (2014). Shared and unique genetic and environmental influences on aging-related changes in multiple cognitive abilities. *Developmental Psychology*, 152-166. PMC4135450

Tucker-Drob, E. M. (2011). Global and domain-specific changes in cognition throughout adulthood. *Developmental Psychology*, 47, 331-343.

#### **4. Gene x Environment Interactions in Cognitive and Behavioral Development**

One major emphasis of my work in behavioral genetics has been on empirically delineating patterns of gene-by-environment interaction on cognitive abilities, academic achievement, and behavioral problems. I have been specifically interested in identifying the directions and shapes of such of gene-by-environment interactions, and mapping these findings onto clear theoretical models. I am also very interested in probing the robustness of these findings via close replication and meta-analysis.

Briley, D. A., Bates, T. C., Harden, K. P., & Tucker-Drob, E. M. (2015). Nonparametric estimates of gene x environment interaction using local structural equation modeling. *Behavior Genetics* 45, 581-596.

Tucker-Drob, E. M., & Bates, T. C. (2016). Large cross-national differences in gene x socioeconomic status interaction on intelligence. *Psychological Science*, 27, 138-149. PMC4749462.

Tucker-Drob, E. M. (2012). Preschools reduce early academic achievement gaps: A longitudinal twin approach. *Psychological Science*, 23, 310-319. PMC3543777

Tucker-Drob, E. M., & Harden, K. P. (2013). Gene-by-preschool interaction on the development of early externalizing problems. *Journal of Child Psychology and Psychiatry*, 54, 77-85. PMC3492524

#### **5. Integrating Cognitive, Developmental, and Psychometric Models of Cognitive Abilities**

My work has always been very interested in how both elementary cognitive processes and executive control processes combine with one another to give rise to forms of complex reasoning and decision making that are tapped by psychometric tests of fluid intelligence. Much of my work on these topics has sought to understand the implications of changes in both elementary and executive control process over childhood and adulthood for higher order reasoning and decision making.

Engelhardt, L. E., Mann, F. D., Briley, D. A., Church, J. A., Harden, K. P., & Tucker-Drob, E. M. (2016). Strong genetic overlap between executive functions and intelligence. *Journal of Experimental Psychology: General* 145, 1141-1159. PMC5001920

Engelhardt, L., Briley, D. A., Mann, F. D., Harden, K. P., & Tucker-Drob, E. M. (2015). Genes unite executive functions in childhood. *Psychological Science*, 26, 1151-1163. PMC4530525.

Tucker-Drob, E. M. (2009). Differentiation of cognitive abilities across the life span. *Developmental Psychology*, 45, 1097-1118. PMC2855504

Salthouse, T. A., Pink, J. E., & Tucker-Drob, E. M. (2008). Contextual analysis of fluid intelligence. *Intelligence*, 36, 464-486. PMC2615402

#### **Links to my publications can be found at**

<https://www.ncbi.nlm.nih.gov/sites/myncbi/elliott.tucker-drob.1/bibliography/51160396/public/?sort=date&direction=descending>

#### **D. Research Support**

##### **Ongoing Research Support**

R01HD083613 (E.M. Tucker-Drob, PI)

01/01/16-12/31/20

National Institute of Child Health and Human Development

*Cortisol, Socioeconomic Status, and Genetic Influences on Cognitive Development*

We are currently collecting behavioral genetic, molecular genetic, educational, endocrine, and demographic data from gradeschool participants in the Texas Twin Project to (1) examine the genetic etiology of hypothalamic-pituitary-adrenal (HPA) axis function, as indexed by multiple measures of cortisol output in saliva and hair; (2) test the genetic and environmental mechanisms by which cortisol output is associated with child cognitive ability; and (3) test whether cortisol, along with genetic polymorphisms in the glucocorticoid pathway, interact with latent genetic influences on cognition.

Role: Principal Investigator

Responsibilities: As PI for this project I oversee the team in all aspects of protocol design, data collection, data analysis, and research dissemination.

R21HD081437 (E. M. Tucker-Drob and J. A. Church-Lang, PI's) 04/01/15-03/31/17  
National Institute of Child Health and Human Development  
*Chronic Stress and Executive Function in Children: A Neuroimaging Study of Twins*  
Using a sample of elementary school twins from the Texas Twin Project, this project examines the relation between multiple markers of chronic socioecological stress and both resting-state and event-related brain activity underlying executive functioning (EF). We are testing the extent to which within-twin-pair-differences in stress response are related to within-twin-pair-differences in EF-related brain activity using fMRI.  
Role: Principal Investigator  
Responsibilities: As PI for this Multiple PI project, I oversee the team in all aspects of behavioral and neuroendocrine protocol design, data collection, data analysis, and research dissemination. Dr. Church-Lang oversees the MRI component of the project.

R01DC013274 (J.R. Booth, PI) 09/1/14-08/31/19  
National Institute on Deafness and Other Communication Disorders  
*Interactive-Specialization of Language Impairment*  
This longitudinal functional neuroimaging study will test the hypothesis that children with language impairments lack specialization in temporo-parietal cortex and have altered interactions between temporo-parietal and frontal brain regions.  
Role: Co-Investigator  
Responsibilities: My responsibilities for this project pertain to design, implementation, and interpretation of advanced multivariate models to the neuroimaging and behavioral data, and to research dissemination.

### **Completed Research Support**

R21AA023322 (K. P. Harden, PI) 09/5/14-06/30/16  
National Institute on Alcohol Abuse and Alcoholism  
*Testing Gene-Testosterone Interplay in Adolescent Alcohol Use*  
This project collected data on salivary and hair testosterone, decision making, personality, alcohol use, illicit drug use, and delinquency from a diverse sample of high school twins from the **Texas Twin Project**. We tested the extent to which testosterone mediates genetic influences on alcohol use and other risk-taking behaviors that escalate over the course of adolescence.  
Role: Co-Investigator  
Responsibilities: As co-director of the Texas Twin Project I worked with Dr. Harden to oversee the team in all aspects of protocol design, data collection, data analysis, and research dissemination.

R21AA020588 (K. P. Harden, PI) 05/04/12-4/30/15  
National Institute on Alcohol Abuse and Alcoholism  
*Genetic Influences on Adolescent Decision-Making and Alcohol Use*  
This project has collected data from a diverse sample of high school twins from the **Texas Twin Project**. We investigated the extent to which impulse control and reward sensitivity mediate genetic influence on alcohol use and other risk-taking behaviors.  
Role: Co-Investigator  
Responsibilities: As co-director of the Texas Twin Project I worked with Dr. Harden to oversee the team in all aspects of protocol design, data collection, data analysis, and research dissemination.

R21HD069772 (E.M. Tucker-Drob, PI) 07/1/11-06/30/14  
National Institute of Child Health and Human Development  
*Gene-Environment Interplay in Early Cognitive Development*  
This research tested psychosocial mechanisms by which genes combine and interact with socioeconomic status, parent behaviors, and child behaviors to affect children's early cognitive development.  
Role: Principal Investigator  
Responsibilities: As PI of this project, I oversaw the team in all aspects of data analysis and research dissemination for this data analysis project.