

BIOGRAPHICAL SKETCH
DO NOT EXCEED FIVE PAGES.

NAME: Sloan, Richard

eRA COMMONS USER NAME (credential, e.g., agency login): SLOANR

POSITION TITLE: Nathaniel Wharton Professor of Behavioral Medicine in Psychiatry

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Union College, Schenectady, NY	B.S.	1970	Biology
New School for Social Research	M.A.	1974	Psychology
New School for Social Research	Ph.D.	1978	Psychology

A. Personal Statement

For the first 10 years of my academic career, I taught psychology to undergraduate students in the SUNY system. During the 1984-85 academic year, I came to Columbia University on sabbatical to work on my first NIH project, the Cardiac Arrhythmia Pilot Study, and having tired of teaching, I resolved to retrain and pursue a career in biomedical research. To that end, I was awarded a T32 post-doctoral fellowship in Developmental Psychobiology and studied cardiovascular psychophysiology. Since that time, I have accumulated 25 years of experience in laboratory and ambulatory studies of autonomic nervous system (ANS) regulation of the heart and vasculature as a potential mechanism linking psychological and psychosocial factors to medical disease. Our research protocols have been implemented not only at Columbia University but also in NIH-funded multi-center studies including CARDIA, MIDUS, and MESA. This research has been the basis of continuous funding from the NIH since 1990, beginning with an NRSA, two K awards, and a series of R01s and R21s as PI and a series of R01s and P01s on which I served as co-I or core director. These funded projects include observational studies of the relationship between psychosocial factors and the ANS as a function of aging as well as trials of interventions that test the impact of physical exercise and hostility reduction on cardiovascular ANS regulation. These studies of exercise have led to productive and ongoing collaborations testing the effect of aerobic training and dietary interventions on the autonomic regulation of inflammatory markers and on cognitive function and brain structure.

- McIntyre KM, Mogle JA, Scodes JM, Pavlicova M, Shapiro PA, Gorenstein EE, Tager FA, Monk CE, Almeida DM, Sloan RP. Anger reduction treatment reduces negative affect reactivity to daily stressors. *Journal of Consulting and Clinical Psychology*, 2018;87(2):141-150.
- Sloan RP, Shapiro PA, McKinley PS, Bartels M, Shimbo D, Lauriola V, Karmally W, Pavlicova M, Choi CJ, Choo T-H, Scodes JM, Flood P, Tracey KJ. Aerobic Exercise Training and Inducible Inflammation: Results of a Randomized Controlled Trial in Healthy, Young Adults. *Journal of the American Heart Association*, epub doi:10.1161/JAHA.118.010201.
- Brickman AM, Khan UA, Provenzano FA, Yeung L-K, Suzuki W, Schroeter H, Wall M, Sloan RP, Small SA. Enhancing dentate gyrus function with dietary flavanols improves cognition in older adults. *Nature Neuroscience*, 2014;17(12):1798-1803. NIHMSID 695554
- Cooper TM, McKinley PS, Seeman TE, Choo T, Lee S, Sloan RP. Heart Rate Variability Predicts Levels of Inflammatory Markers: Evidence for the Vagal Anti-Inflammatory Pathway. *Brain Behavior and Immunity*, 2015;49:94-100. PMID:25541185

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

2010 Doctor of Humane Letters, CUNY Graduate Center, The City University of New York

2008	Stephen M. Kellen Distinguished Visitor, American Academy in Berlin
2008-	Nathaniel Wharton Professor of Behavioral Medicine (in Psychiatry), College of Physicians and Surgeons, Columbia University Medical Center
2003	Academic Residency, Bellagio Scholars Center, Rockefeller Foundation
2001-	Professor of Behavioral Medicine (in Psychiatry), College of Physicians and Surgeons, Columbia University
1999-	Chief, Division of Behavioral Medicine, New York State Psychiatric Institute
1991-	Associate Professor of Clinical Psychology (in Psychiatry), College of Physicians and Surgeons, Columbia University
1988-1997	Associate Director, Biological Studies Unit, New York State Psychiatric Institute, New York, NY
1988-1991	Post-Doctoral Research Fellow, Department of Psychiatry, Columbia University
1986-1988	Assistant Professor of Clinical Psychology (in Psychiatry), Columbia University
1984-1988	Visiting Assistant Professor of Psychology and Education, Department of Social, Organizational, and Counseling Psychology, Teachers College, Columbia University
	Associate, The Center for Health Promotion, Teachers College, Columbia University
1984-1986	Visiting Assistant Professor of Clinical Psychology (in Psychiatry), Columbia University
1984-1987	Associate Professor, Department of Psychology, SUNY, New Paltz, NY
1977-1984	Assistant Professor, Department of Psychology, SUNY, New Paltz, NY

C. Contribution to Science

1. During my post-doctoral retraining, I focused on the problem of role of the autonomic nervous system (ANS) in the cardiac response to psychological stress. Using first the quasi-experimental model of cardiac transplantation and then analysis of heart rate variability (HRV), we demonstrated that cardiac autonomic innervation and not circulating neurohormones were responsible for psychological stress-induced increases in heart rate. These studies were funded by NIH K awards and R01s.

- a) Sloan RP, Shapiro PA, Gorman JM. Psychophysiological reactivity in cardiac transplant recipients. *Psychophysiology*. 1990;27:187-194.
- b) Shapiro PA, Sloan RP, Horn EM, Myers MM, Gorman JM. Differential effects of psychological stress on innervated and denervated SA node activity after cardiac transplantation. *Psychosomatic Medicine*. 1990;52:222-223.
- c) Sloan RP, Shapiro PA, Bagiella E, Myers MM, Bigger JT, Steinman RC, Gorman JM. Brief interval HPV by different methods of analysis correlates highly with 24-hour analyses in normals. *Biological Psychology*. 1994;38:133-142.
- d) Sloan RP, Shapiro PA, Bagiella E, Bigger JT, Lo ES, Gorman JM. Relationship between circulating catecholamines and low frequency heart period variability as indices of cardiac sympathetic activity during mental stress. *Psychosomatic Medicine*. 1996;58:25-31.

2. The mechanisms by which behavioral and psychosocial risk factors for heart disease operate have been under investigation for decades, with varying degrees of success. Over the course of a decade, we examined whether dysregulated autonomic control of the heart was among the pathophysiologic mechanisms responsible for the elevated risk of heart disease conveyed by high levels of hostility. Specifically, we hypothesized that high levels of hostility were associated with low levels of HRV and a series of papers provided support for this hypothesis. We next conducted a randomized controlled trial to test whether reduction of hostility led to enhanced cardiac autonomic control. Results of this trial demonstrated that while the CBT-based intervention reduced hostility, there was no corresponding improvement in HRV.

- a) Sloan RP, Shapiro PA, Bigger JT, Bagiella E, Steinman RC, Gorman JM. Cardiac autonomic control and hostility in healthy subjects. *American Journal of Cardiology*. 1994;74:298-300.
- b) Pine DS, Wasserman GA, Miller L, Coplan JD, Bagiella E, Kovelenuk P, Myers MM, Sloan RP. Heart period variability and psychopathology in urban boys at risk for delinquency. *Psychophysiology*. 1998;35:521-529.
- c) Sloan RP, Bagiella E, Shapiro PA, Kuhl JP, Chernikhova D, Berg J, Myers MM. Hostility, gender, and cardiac autonomic control. *Psychosomatic Medicine*. 2001;63:434-440.

- d) Sloan RP, Shapiro PA, Gorenstein EE, Tager FA, Monk EC, McKinley PS, Bagiella E, Chen I, Steinman R, Myers MM, and Bigger JT. Cardiac Autonomic Control And Treatment of Hostility: A Randomized Controlled Trial, *Psychosomatic Medicine*. 2010;72:1-8. PMC3647338

3. Another behavioral factor known to influence the risk of heart disease is exercise and one of its cardioprotective mechanisms is thought to be enhanced cardiac autonomic regulation. Because CHD is inflammatory in nature, exercise may reduce the risk of heart disease through its effect on the cholinergic anti-inflammatory reflex identified by Kevin Tracey. We have sought to test this hypothesis but careful reading of the exercise – ANS literature reveals conflicting findings. Therefore, we conducted an RCT with a sample of adequate size and representativeness that confirmed that aerobic but not strength training increased HRV. In analyses of data from CARDIA and MIDUS, we further demonstrated inverse relationships between HRV and a series of inflammatory markers. However, in a recently completed trial, aerobic exercise training failed to attenuate either circulating or stimulated inflammatory markers.

- a) Sloan RP, Shapiro PA, McKinley PS, Bartels M, Shimbo D, Lauriola V, Karmally W, Pavlicova M, Choi CJ, Choo T-H, Scodes JM, Flood P, Tracey KJ. Aerobic Exercise Training and Inducible Inflammation: Results of a Randomized Controlled Trial in Healthy, Young Adults. *Journal of the American Heart Association*, epub doi:10.1161/JAHA.118.010201.
- b) Sloan RP, McCreath H, Tracey KJ, Sidney S, Liu K, Seeman T. RR Interval Variability is Inversely Related to Inflammatory Markers: The CARDIA Study. *Mol Medicine*. 2007;13:178-184.
- c) Sloan RP, Shapiro PA, DeMeersman RE, Bagiella E, Brondolo E, McKinley PS, Slavov I, Fang Y, and Myers MM. The Impact of Aerobic Training on Cardiac Autonomic Regulation: Does Gender Play a Role? *American Journal of Public Health*. 2009;99:921-928. PMC2667843
- d) Cooper TM, McKinley PS, Seeman TE, Choo T, Lee S, Sloan RP. Heart Rate Variability Predicts Levels of Inflammatory Markers: Evidence for the Vagal Anti-Inflammatory Pathway. *Brain Behavior and Immunity*, 2015;49:94-100. PMID:25541185

4. Exercise promotes cardioprotection but also appears to enhance cognitive function. Collaborating with neuroscience colleagues, we have conducted several trials of exercise training alone and in combination with a dietary flavanol to determine effects on cognition and brain structure in older and younger healthy participants and in patients with schizophrenia.

- a) Stern Y, MacKay-Brandt A, Lee S, McKinley P, McIntyre K, Razlighi Q, Agarunov E, Bartels M and Sloan RP. Effect of aerobic exercise on cognition in younger adults: A randomized clinical trial. *Neurology*. 2019;92:e905-e916.
- b) Pereira AC, Huddleston D, Brickman AM, Hen R, Sosunov AA, McKhann GM, Sloan RP, Gage FH, Brown TR, Small SA. An *in vivo* correlate of dentate gyrus neurogenesis observed in exercising mice and humans. *Proc Natl Acad Sci*. 2007;104:5638-5643.
- c) Brickman AM, Khan UA, Provenzano FA, Yeung L-K, Suzuki W, Schroeter H, Wall M, Sloan RP, Small SA. Enhancing dentate gyrus function with dietary flavanols improves cognition in older adults. *Nature Neuroscience*, 2014;17(12):1798-1803. NIHMSID 695554
- d) Kimhy D, Vakhrusheva J, Bartels MN, Armstrong HF, Ballon JS, Khan S, Chang RW, Hansen MC, Ayanruoh L, Lister A, Castren E, Smith EE, Sloan RP: The Impact of Aerobic Exercise on Brain- Kimhy D, Vakhrusheva J, Bartels MN, Armstrong HF, Ballon JS, Khan S, Chang RW, Hansen MC, Ayanruoh L, Smith EE, Sloan RP: Aerobic Fitness and Body Mass Index in Individuals with Schizophrenia: Implications for Neurocognitive and Daily Functioning. *Psychiatry Research*, 2014;220(3):784-791. PMC4258141

Complete List of Published Work in MyBibliography:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/richard.sloan.1/bibliography/40447853/public/?sort=date&direction=ascending>

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R01AG058417

Sloan

09/01/18 - 05/31/23

NIH/NIA

Dietary Modulation of Neuroinflammation in Age-Related Memory Disorders

To test the effect of cocoa flavanol consumption on cognitive function and brain morphology.

Role: PI

R01HL141811 Chang 08/01/18-06/30/23
NIH/NHLBI

Testing a Rapid Outpatient Management Strategy on PTSD, Cardiovascular and Rehospitalization Risk in TIA and Minor Stroke Survivors evaluated in the Emergency Department

The aim of this study is to test the effect of emergency department discharge to rapid outpatient neurology clinic on TIA/stroke-induced PTSD, cardiovascular disease outcomes and 30-day rehospitalization in a sample of TIA and minor stroke patients seen in the emergency department. We will also test autonomic mediators of any group difference in PTSD symptoms.

Role: Co-Investigator

R01HL139614-01A1 Sumner 07/01/18-6/30/23
NIH/NHLBI

Identifying Early Intervention Targets for Reducing Cardiovascular Risk in Posttraumatic Stress

This study will test whether endothelial dysfunction could be the early subclinical mechanism by which posttraumatic stress disorder (PTSD) increases cardiovascular disease (CVD) risk, and whether posttraumatic fear—a key component of PTSD—or another PTSD dimension could be the target to offset that risk. The results of this study may help trauma-exposed individuals who are at risk of having CVD events.

Role: Co-Investigator

R01HL141494-01 Shechter 04/01/18-03/31/23
NIH/NHLBI

Poor Sleep, Sedentary Behavior, and Secondary Cardiovascular Risk in Stroke and TIA Patients

The goal of this ancillary R01 is to evaluate sleep and sedentary behavior after stroke or transient ischemic attack (TIA) as potential therapeutic targets to reduce risk of secondary cardiovascular disease (CVD).

Role: Co-Investigator

2P01AG003949 Lipton 09/01/17 - 08/31/21
NIH/NIA (Einstein)

Einstein Aging Study

To identify risk factors and protective factors that influence both normative cognitive aging and the earliest onset of Alzheimer's Disease.

Role: Subcontract PI

1U19AG051426-01A1 Ryff 07/25/16 - 05/31/21
NIH/NIA (WISC)

Integrative Pathways to Health & Illness

The overall objective of MIDUS is to study health, broadly defined, as an integrated biopsychosocial process that unfolds across the decades of adult life.

Role: Subcontract PI

R01MH110623 Kimhy 04/01/17 - 03/31/21
NIH/NIMH (Mount Sinai)

Improving Cognition via Exercise in Schizophrenia

Individuals with schizophrenia (SZ) display substantial cognitive deficits across multiple domains that are major determinants of poor functioning and disability, representing a serious public health concern and an important target for interventions. Exercise may be a novel treatment for these deficits in people with SZ.

Role: Co-Investigator

P50 AG008702 Small 06/01/15 - 05/31/20
NIH/NIA

Alzheimer's Disease Research Center

This project supports a wide spectrum of research on Alzheimer's disease.

Role: Co-Investigator

R33 ES024734-01 NIH/NIEHS <i>Potential inhaled dose of particulates, biking and cardiovascular indicators</i> This grant seeks to improve our toolkit for measuring human exposure to air pollution by combining data from instruments that measure air pollution concentrations every minute with estimates of how much air a given person drew into their lungs. Role: Co-Investigator	Chillrud and Jack	03/01/17 - 02/28/20
DoD Department of Defense <i>Pre-motor Brain and Behavioral signs of Parkinson's Disease in an environmentally at-risk birth cohort</i> This study addresses several important questions about the causes and progression of Parkinson's disease (PD) over the life course, including the role of toxic exposures that may contribute to the risk of disease. Role: Co-Investigator	Rauh	01/01/19-12/31/20
R01ES030039 NIH/NIEHS <i>Brain and Behavioral Indicators of Risk for Parkinsonism among Adolescents with Early Pesticide Exposure</i> This study has the potential to contribute to our understanding of the etiologic role of pesticides, and through this work, shift the research paradigm for PD, from a strictly degenerative model to one that incorporates a neurodevelopmental perspective, potentially identifying intervention targets. Role: Co-Investigator	Rauh	01/15/19-12/31/22
<u>Selected Completed Research Support</u>		
5 R01 HL128310-02 NIH/NHLBI <i>Test of a new theory to explain excess risk in cardiac PTSD</i> The goal of the proposed research is to identify targets for new interventions to reduce the doubled cardiac event recurrence and mortality risk faced by the 1 in 8 survivors of non-ST elevation myocardial infarction and unstable angina who develop PTSD secondary to their life-threatening cardiac event. Role: Co-Investigator	Edmonson	07/15/15 - 03/31/19
5 R01AG035015-05 NIH/NIA <i>Exercise, Age-Related Memory Decline, and Hippocampal Function</i> The goal of this proposal is to conduct a randomized controlled trial of the effects of aerobic training on cognitive decline and to investigate the role of the hippocampus in mediating this effect. Role: PI	Small/Sloan	09/15/10-05/31/17
5 R01 AG033546-05 NIH/NIA <i>Exercise, Aging, and Cognition: Effect and Mechanisms</i> The goal of the proposed study is to extend the investigation of the beneficial effects of aerobic exercise to younger individuals, aged 25-40 and 50-65. Role: PI	Stern/Sloan	09/15/10-05/31/17
1 R21 AG044260-02 <i>Psychosocial Factors & Aging Effects: Resting & Reflexive Cardiovascular Control</i> The goal of this proposal is to conduct what we believe to be the first community study ever to examine beat-to-beat BPV, assessing relationships between resting and reactive BPV and psychosocial and biomarker data collected across the age spectrum in MIDUS and prospectively, testing whether greater BPV is associated with increased mortality. Role: PI	Sloan	4/15/13 – 3/31/16 (NCE)