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## I. EDUCATION

**2005 ScD Environmental Health**, Harvard School of Public Health, Boston, MA

**2000 MSc Occupational Hygiene**, University of British Columbia, Vancouver, BC

**1997 BSc Microbiology and Immunology**, University of British Columbia, Vancouver, BC

## II. PROFESSIONAL EXPERIENCE

**2014-present Associate Professor**, Department of Environmental Health, Rollins School of Public Health, Emory University, Atlanta, GA

**2009-2014 Assistant Professor**, Department of Environmental Health, Rollins School of Public Health, Emory University, Atlanta, GA

**2005-2009 Assistant Research Professor**, Department of Environmental and Occupational Health, Rollins School of Public Health, Emory University, Atlanta, GA

**2000-2004 Doctoral Researcher**, Department of Environmental Health, Harvard School of Public Health, Boston, MA

**1999-2000 Air Quality Scientist**, School of Occupational and Environmental Hygiene, University of British Columbia, Vancouver, BC

## III. PROFESSIONAL ACTIVITIES

**2017-Present** Associate Editor, *Journal of Exposure Science and Environmental Epidemiology*

**2016-Present** Editorial board member, *Epidemiology*

**2016** Expert reviewer of the U.S. Environmental Protection Agency's Integrated Science Assessment for Particulate Matter draft, June 9, 2016

**2015-Present** Member, Mothers & Others for Clean Air (a program of the American Lung Association of the Southeast) Partnership Council

**2013** Expert reviewer of the U.S. Environmental Protection Agency's Integrated Science Assessment for Nitrogen Oxides preliminary draft, workshop June 11 2013, Durham, NC

**2011-2013** Member, Health Effects Institute Review Panel on Ultrafine Particles. "*Understanding the Health Effects of Ambient Ultrafine Particles. HEI Perspectives 3*. Health Effects Institute, Boston, MA, January 2013" available at: <http://pubs.healtheffects.org/types.php?type=5>

**2011-2012** Member, National Research Council's ad hoc Committee on Urban Meteorology: Scoping the Problem, Defining the Needs. Final report: "National Research Council. *Urban Meteorology: Forecasting, Monitoring, and Meeting Users' Needs*. Washington,

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DC: The National Academies Press, 2012" available at:  
[http://www.nap.edu/catalog.php?record\\_id=13328](http://www.nap.edu/catalog.php?record_id=13328)

- 2009-2012** Member, Program Committee for the American Thoracic Society's Assembly on Environmental and Occupational Health
- 2008** Expert reviewer of the U.S. Environmental Protection Agency's Integrated Science Assessment for Particulate Matter draft, workshop June 16-17 2008, Durham, NC
- 2009-Present** Ad hoc grant reviewer for: Health Effects Institute, National Institutes of Health, Environmental Protection Agency, Environment and Health Fund (Israel), Health Research Board (Ireland)
- 2000-Present** Ad hoc journal reviewer for: *American Journal of Respiratory and Critical Care Medicine*, *American Journal of Epidemiology*, *Environmental Health*, *Environmental Health Perspectives*, *Environmental Research*, *Environmental Science & Technology*, *Epidemiology*, *Journal of the Air and Waste Management Association*, *Journal of Exposure Science and Environmental Epidemiology*, *Science of the Total Environment*

#### **IV. RESEARCH GRANTS AND CONTRACTS**

##### **Current Research Support**

**HERCULES Pilot (Sarnat S., PI) 06/01/2017-03/31/2018**

National Institutes of Health via HERCULES P30 ES019776

Title: *Traffic-Related Air Pollution and Health in the CHDWB Cohort (TRAPHIC Study)*

Goal: To characterize data from the Emory Georgia Tech Center for Health Discovery and Well Being to inform development of an epidemiologic framework for assessing air pollution health effects in this cohort

**R01ES027892 (Chang, PI) 05/01/2017-03/31/2022**

National Institutes of Health

Title: *Data Integration Methods for Environmental Exposures with Applications to Air Pollution and Asthma Morbidity*

Goal: The proposed project will develop and apply novel statistical data integration methods for national air pollution exposure assessment

**EPA-G2014-STAR-A1 (Koutrakis, PI; Sarnat J., PI of subcontract) 11/01/2014-10/31/2017**

U.S. Environmental Protection Agency

Title: *Assessing the Potential Impact of Global Warming on Indoor Air Quality and Human Health in Two US Cities: Boston, MA and Atlanta, GA*

Goal: To measure the association between climate and indoor and outdoor sources of particle pollution  
Role: Co-PI

**10002467 (Sarnat S., PI) 09/01/2014-12/31/2017**

Electric Power Research Institute

Title: *A Multi-City Examination of Pollutant Components and Acute Morbidity*

Goal: A multi-city examination of the relations between speciated pollutant components and acute cardiorespiratory morbidity

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### **Completed Research Support (past 3 years)**

**RD-83479901 (Tolbert and Russell, Center Co-Directors)**

**01/01/2011-12/31/2016**

U.S. Environmental Protection Agency

Center Title: *The Emory/Georgia Tech Collaborative: Multi-Scale Assessment of Health Effects of Air Pollution Mixtures Using Novel Measurements and Models*

Center Goal: To establish a multi-disciplinary center, the Southeastern Center for Air Pollution and Epidemiology (SCAPE), devoted to understanding health effects of urban air mixtures

Role: Project 4 PI

**1R21ES022795-01A1 (Chang, PI)**

**12/10/2013-11/30/2016**

National Institutes of Health

Title: *Statistical Methods for Exposure Uncertainty in Air Pollution and Health Studies*

Goal: To develop and apply novel statistical approaches for improving exposure assessment and quantifying the impacts of exposure uncertainties in air pollution and health studies

Role: Co-I

**4912-RFA11-1/12-6 (Russell, PI; Tolbert, PI of subcontract)**

**01/01/2013-10/31/2016**

Health Effects Institute

Title: *Impacts of Emissions Changes on Air Quality and Acute Health Effects in the Southeast, 1993-2012*

Goal: To develop and apply methods to quantify how emission programs and meteorological variations impact air quality and health

Role: Co-I

**(Sarnat J., PI)**

**03/01/2014-08/31/2016**

Health Effects Institute

Title: *Developing Multipollutant Indicators of Traffic Pollution: The DRIVE Study*

Goal: To characterize a traffic pollution hotspot adjacent to residential areas on a college campus, with a focus on assessing the emission-to-exposure pathway for multipollutant indicators of primary traffic emissions

Role: Co-I

**1R21ES023763-01 (Sarnat S., PI)**

**07/18/2013-06/30/2016**

National Institutes of Health

Title: *Climate change and heat-related morbidity among vulnerable populations in Atlanta*

Goal: To conduct a detailed assessment of heat-related morbidity and climate change health impacts for Atlanta, Georgia

**EP-P34975/C15892 and EP-P45572/C19698 (Sarnat S., PI)**

**03/01/2010-12/31/2015**

Electric Power Research Institute

Title: *The Dallas Air Pollution Epidemiology Study*

Goal: To assess the relationship of ambient air pollution with multiple health outcomes using data on emergency department visits

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## V. BIBLIOGRAPHY

\*Student author (Master's or PhD) at the time work was completed; #Served as students' thesis/dissertation chair or committee member

### Peer-Reviewed Journal Articles

1. Grundstein AJ, Shepherd M, Miller P, **Sarnat SE**. The Role of mesoscale-convective processes in explaining the epidemic thunderstorm asthma in Melbourne Australia, 21 November 2016. *Journal of Applied Meteorology and Climatology*, accepted.
2. Friberg MD\*, Kahn RA, Holmes HA, Chang HH, **Sarnat SE**, Tolbert PE, Russell AG, Mulholland JA. Daily ambient air pollution metrics for five cities: evaluation of data-fusion-based estimates and uncertainties. *Atmospheric Environment*, accepted.
3. Hulland E\*, Chowdhury R\*\*#, **Sarnat S**, Chang H, Steenland K. Socioeconomic status and non-fatal adult injuries in selected Atlanta hospitals. *Prehospital and Disaster Medicine*, in press.
4. Chen T\*\*#, **Sarnat SE**, Grundstein AJ, Winkvist A, Chang HH. Time-series analysis of heat waves and emergency department visits in Atlanta, 1993 to 2012. *Environmental Health Perspectives*, 125(5):057009 (<https://doi.org/10.1289/EHP44M>), 2017.
5. O'Lenick CR\*\*#, Chang HH, Kramer MR, Winkvist A, Mulholland JA, Friberg MD\*, **Sarnat SE**. Ozone and childhood respiratory disease in three US cities: evaluation of effect measure modification by neighborhood socioeconomic status using a Bayesian hierarchical approach. *Environmental Health*, 16:36, 2017.
6. O'Lenick CR\*\*#, Winkvist A, Chang HH, Kramer MR, Mulholland JA, Grundstein A, **Sarnat SE**. Evaluation of individual and area-level factors as modifiers of the association between warm-season temperature and pediatric asthma morbidity in Atlanta, GA. *Environmental Research*, 156:132-144, 2017.
7. Ye D\*\*#, Klein M, Chang HH, Sarnat JA, Mulholland JA, Edgerton ES, Winkvist A, Tolbert PE, **Sarnat SE**. Estimating acute cardiorespiratory effects of ambient volatile organic compounds. *Epidemiology*, 28:197-206, 2017.
8. O'Lenick CR\*\*#, Winkvist A, Mulholland JA, Friberg MD\*, Chang HH, Kramer MR, Darrow LA, **Sarnat SE**. Assessment of neighbourhood-level socioeconomic status as a modifier of air pollution-asthma associations among children in Atlanta. *Journal of Epidemiology and Community Health*, 71:129-136, 2017.
9. Krall JR, Mulholland JA, Russell AG, Balachandran S, Winkvist A, Tolbert PE, Waller LA, **Sarnat SE**. Associations between source-specific fine particulate matter and emergency department visits for respiratory disease in four U.S. cities. *Environmental Health Perspectives*, 125:97-103, 2017.
10. Heidari L\*\*#, Winkvist A, Klein M, O'Lenick CR\*\*#, Grundstein A, **Sarnat SE**. Susceptibility to heat-related fluid and electrolyte imbalance emergency department visits in Atlanta, Georgia, USA. *International Journal of Environmental Research and Public Health – Special Issue on Climate Change and Human Health*, 13:982, 2016.
11. **Sarnat SE**, Chang HH, Weber RJ. Invited editorial – Ambient PM<sub>2.5</sub> and health: does PM<sub>2.5</sub> oxidative potential play a role? *American Journal of Respiratory and Critical Care Medicine*, 194(5):530-531, 2016.
12. Pearce JL, Waller LA, **Sarnat SE**, Chang HH, Klein M, Mulholland JA, Tolbert PE. Characterizing the spatial distribution of multiple pollutants and populations at risk in Atlanta, Georgia. *Spatial and Spatio-Temporal Epidemiology*, 18:13-23, 2016.
13. Levy K, Klein M, **Sarnat SE**, Panwhar S, Huttinger A, Tolbert P, Moe C. Refined assessment of associations between drinking water residence time and emergency department visits for gastrointestinal illness in metro Atlanta, Georgia. *Journal of Water and Health*, 14:672-681, 2016.
14. Winkvist A, Grundstein A, Chang HH, Hess J, **Sarnat SE**. Warm-season temperatures and emergency department visits in Atlanta, Georgia. *Environmental Research*, 147:314-323, 2016.

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15. Friberg MD\*, Zhai X, Holmes HA, Chang HH, Strickland MJ, **Sarnat SE**, Tolbert PE, Russell AG, Mulholland JA. Method for fusing observational data and chemical transport model simulations to estimate spatiotemporally-resolved ambient air pollution. *Environmental Science & Technology*, 50:3695-3705, 2016.
  16. Alhanti BA\*\*#, Chang HH, Winquist A, Mulholland JA, Darrow L, **Sarnat SE**. Ambient air pollution and emergency department visits for asthma: a multi-city assessment of effect modification by age. *Journal of Exposure Science and Environmental Epidemiology*, 26:180-188, 2016.
  17. Fang T\*, Verma V, Bates JT\*, Abrams J\*\*#, Klein M, Strickland MJ, **Sarnat SE**, Chang HH, Mulholland JA, Tolbert PE, Russell AG, Weber RJ. Oxidative potential of ambient water-soluble PM<sub>2.5</sub> in the southeastern United States: contrasts in sources and health associations between ascorbic acid (AA) and dithiothreitol (DTT) assays. *Atmospheric Chemistry and Physics*, 16:3865-3879, 2016.
  18. Krall JR, Chang HH, **Sarnat SE**, Peng RD, Waller LA. Current methods and challenges for epidemiologic studies of the associations between chemical constituents of particulate matter and health. *Current Environmental Health Reports*, 2:388-398, 2015.
  19. Bates JT\*, Weber RJ, Abrams J\*\*#, Verma V, Fang T\*, Klein M, Strickland MJ, **Sarnat SE**, Chang HH, Mulholland JA, Tolbert PE, Russell AG. Reactive oxygen species generation linked to sources of atmospheric particulate matter and cardiorespiratory effects. *Environmental Science & Technology*, 49(22):13605-12, 2015.
  20. Gass K\*\*#, Klein M, **Sarnat SE**, Winquist A, Darrow LA, Flanders WD, Chang HH, Mulholland JA, Tolbert PE, Strickland MJ. Associations between ambient air pollutant mixtures and pediatric asthma emergency department visits in three cities: a classification and regression tree approach. *Environmental Health*, 14:58, 2015.
  21. Pearce JL, Waller LA, Mulholland JA, **Sarnat SE**, Strickland MJ, Chang HH, Tolbert PE. Exploring associations between multipollutant day types and asthma morbidity: epidemiologic applications of self-organizing map ambient air quality classifications. *Environmental Health*, 14:55, 2015.
  22. **Sarnat SE**, Winquist A, Schauer JJ, Turner J, Sarnat JA. Fine particulate matter components and emergency department visits for cardiovascular and respiratory diseases in St. Louis, Missouri-Illinois, metropolitan area. *Environmental Health Perspectives*, 123:437-444, 2015.
  23. Chowdhury R\*\*#, Mukhopadhyay A, McClellan W, **Sarnat S**, Darrow L, Steenland K. Survival patterns in a cohort of lead exposed workers with end stage renal disease from the Adult Blood Lead Epidemiology & Surveillance program. *American Journal of the Medical Sciences*, 349:222-227, 2015.
  24. Winquist A, Schauer JJ, Turner J, Klein M, **Sarnat SE**. Impact of ambient fine particulate matter carbon measurement methods on observed associations with acute cardiorespiratory morbidity. *Journal of Exposure Science and Environmental Epidemiology*, 25:215-221, 2015.
  25. Russell A, Holmes H, Friberg M\*, Ivey C, Hu Y, Balachandran S, Mulholland J, Tolbert P, Sarnat J, **Sarnat S**, Strickland M, Chang H, Liu Y. Use of Air Quality Modeling Results in Health Effects Research, in *Air Pollution Modeling and Its Application XXIII* (D. Steyn and R. Mathur eds.), p 1-5, Springer International DOI 10.1007/978-3-319-04379-1\_1, 2014.
  26. Winquist A, Kirrane E, Klein M, Strickland M, Darrow L, **Sarnat SE**, Gass K\*\*#, Mulholland J, Russell A, Tolbert P. Joint effects of combinations of ambient air pollutants on pediatric emergency department visits in Atlanta, 1998-2004. *Epidemiology*, 25:666-673, 2014.
  27. Chowdhury R\*\*#, Darrow L, McClellan W, **Sarnat S**, Steenland K. Incident ESRD among participants in a lead surveillance program. *American Journal of Kidney Disease*, 64:25-31, 2014.
  28. Pearce JL, Waller LA, Chang HH, Klein M, Mulholland JA, Sarnat JA, **Sarnat SE**, Strickland MJ, Tolbert PE. Using self-organizing maps to develop ambient air quality classifications: a time series example. *Environmental Health*, 13:56, 2014.

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29. Sarnat JA, Golan R, Greenwald R, Raysoni AU, Kewada P, Winqvist A, **Sarnat SE**, Flanders WD, Mirabelli MC, Zora JE, Bergin MH, Yip F. Exposure to traffic pollution, acute inflammation and autonomic response in a panel of car commuters. *Environmental Research*, 133:66-76, 2014.
  30. Chowdhury R<sup>\*\*</sup>, **Sarnat SE**, Darrow L, McClellan W, Steenland K. Mortality among participants in a lead surveillance program. *Environmental Research* 132:100-104, 2014.
  31. Chang HH, Hao H<sup>\*</sup>, **Sarnat SE**. A statistical modeling framework for projecting future ambient ozone and its health impact due to climate change. *Atmospheric Environment* 89:290-297, 2014.
  32. Luttmann-Gibson H, **Sarnat SE**, Suh HH, Coull BA, Schwartz J, Zanobetti A, Gold DR. Short-term effects of air pollution on oxygen saturation in a cohort of senior adults in Steubenville, Ohio. *Journal of Occupational and Environmental Medicine* 56:149-154, 2014.
  33. Raysoni AU, Stock TH, Sarnat JA, Sosa TM, **Sarnat SE**, Holguin F, Greenwald R, Johnson B, Li WW. Characterization of traffic-related air pollutant metrics at four schools in El Paso, Texas, USA: Implications for exposure assessment and siting schools in urban areas. *Atmospheric Environment* 80:140-151, 2013.
  34. Baxter LK, Dionisio KL, Burke J, **Sarnat SE**, Sarnat JA, Hodas N, Rich DQ, Turpin BJ, Jones RR, Mannshardt E, Kumar N, Beevers SD, Özkaynak H. Exposure prediction approaches used in air pollution epidemiology studies: Key findings and future recommendations. *Journal of Exposure Science and Environmental Epidemiology* 23:654-659, 2013.
  35. Sarnat JA, **Sarnat SE**, Flanders WD, Chang HH, Mulholland J, Baxter L, Isakov V, Özkaynak H. Spatiotemporally-resolved air exchange rate as a modifier of acute air pollution-related morbidity in Atlanta. *Journal of Exposure Science and Environmental Epidemiology* 23:606-615, 2013.
  36. **Sarnat SE**, Sarnat JA, Mulholland J, Isakov V, Özkaynak H, Chang HH, Klein M, Tolbert PE. Application of alternative spatiotemporal metrics of ambient air pollution exposure in a time-series epidemiological study in Atlanta. *Journal of Exposure Science and Environmental Epidemiology* 23:593-605, 2013.
  37. Dionisio KL, Isakov V, Baxter LK, Sarnat JA, **Sarnat SE**, Burke J, Rosenbaum A, Graham SE, Cook R, Mulholland J, Özkaynak H. Development and evaluation of alternative approaches for exposure assessment of multiple air pollutants in Atlanta, Georgia. *Journal of Exposure Science and Environmental Epidemiology* 23:581-592, 2013.
  38. Greenwald R, **Sarnat SE**, Raysoni AU, Li WW, Stock TH, Johnson BA, Olvera H, Holguin F, Sarnat JA. Associations between source-indicative pollution metrics and increases in pulmonary inflammation and reduced lung function in a panel of asthmatic children. *Air Quality, Atmosphere and Health* 6:487-499, 2013.
  39. Maier ML<sup>\*</sup>, Balachandran S<sup>\*</sup>, **Sarnat SE**, Turner JR, Mulholland JA, Russell AG. Application of an ensemble-trained source apportionment approach at a site impacted by multiple point sources. *Environmental Science & Technology* 47:3743-3751, 2013.
  40. Zora JE<sup>\*\*</sup>, **Sarnat SE**, Raysoni AU, Johnson BA, Li WW, Greenwald R, Holguin F, Stock TH, Sarnat JA. Associations between urban air pollution and pediatric asthma control in El Paso, Texas. *Science of the Total Environment* 448:56-65, 2013.
  41. Winqvist A, Klein M, Tolbert P, Flanders WD, Hess J, **Sarnat SE**. Comparison of emergency department and hospital admissions data for air pollution time-series studies. *Environmental Health*, 11:70, 2012.
  42. Winqvist A, Klein M, Tolbert P, **Sarnat SE**. Power estimation using simulations in air pollution time-series studies. *Environmental Health* 11:68, 2012.
  43. Darrow LA, Hess J, Rogers CA, Tolbert PE, Klein M, **Sarnat SE**. Ambient pollen concentrations and emergency department visits for asthma and wheeze. *Journal of Allergy and Clinical Immunology* 130:630-638, 2012.



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44. Brown MS<sup>\*#</sup>, **Sarnat SE**, DeMuth KA, Brown LAS, Whitlock DR, Brown SW, Tolbert PE, Fitzpatrick AM. Residential proximity to a major roadway is associated with features of asthma control in children. *PLoS ONE* 7(5):e37044, 2012.
  45. Solomon PA, Costantini M, Grahame TJ, Gerlofs-Nijland ME, Cassee FR, Russell AG, Brook JR, Hopke PK, Hidy G, Phalen RF, Saldiva P, **Sarnat SE**, Balmes JR, Tager IB, Özkaynak H, Vedal S, Wierman SSG, Costa DL. Air pollution and health: bridging the gap from sources to health outcomes: conference summary. *Air Quality, Atmosphere and Health* 5:9-62, 2012.
  46. **Sarnat SE**, Raysoni AU<sup>\*</sup>, Li WW, Holguin F, Johnson B, Flores-Luevano S, Garcia JH, Sarnat JA. Air pollution and acute respiratory response in a panel of asthmatic children along the US-Mexico Border. *Environmental Health Perspectives* 120:437-444, 2012.
  47. Flanders WD, Klein M, Darrow LA, Strickland MJ, **Sarnat SE**, Sarnat JA, Waller LA, Winquist A, Tolbert PE. A method to detect residual confounding in spatial and other observational studies. *Epidemiology* 22:823-826, 2011.
  48. Raysoni AU<sup>\*</sup>, Sarnat JA, **Sarnat SE**, Garcia JH, Holguin F, Flores-Luevano S, Li WW. Binational school-based monitoring of traffic-related air pollutants in El Paso, Texas (USA) and Ciudad Juárez, Chihuahua (México). *Environmental Pollution* 159:2476-2486, 2011.
  49. Flanders WD, Tolbert PE, Darrow L, Strickland M, **Sarnat S**, Sarnat J, Waller L, Winquist A, Klein M. A method for detection of residual confounding in time-series and other observational studies. *Epidemiology* 22:59-67, 2011.
  50. Darrow L, Klein M, Sarnat JA, Mulholland JA, Strickland MJ, **Sarnat SE**, Russell AG, Tolbert PE. The use of alternative pollutant metrics in time-series studies of ambient air pollution and respiratory emergency department visits. *Journal of Exposure Science and Environmental Epidemiology* 21:10-19, 2011.
  51. Luttmann-Gibson H, Suh HH, Coull BA, Dockery DW, **Sarnat SE**, Schwartz J, Stone PH, Gold DR. Systemic inflammation, heart rate variability and air pollution in a cohort of senior adults. *Occupational and Environmental Medicine* 67:625-630, 2010.
  52. Strickland MJ, Darrow LA, Klein M, Flanders WD, Sarnat JA, Waller LA, **Sarnat SE**, Mulholland JA, Tolbert PE. Short-term associations between ambient air pollutants and pediatric asthma emergency department visits. *American Journal of Respiratory & Critical Care Medicine* 182:307-316, 2010.
  53. **Sarnat SE**, Klein M, Sarnat JA, Mulholland J, Russell AG, Flanders WD, Waller LA, Tolbert PE. An examination of exposure measurement error from air pollutant spatial variability in time-series studies. *Journal of Exposure Science and Environmental Epidemiology* 20:135-146, 2010.
  54. Sarnat JA, Brown KW, Bartell SM, **Sarnat SE**, Wheeler AJ, Suh HH, Koutrakis P. The relationship between averaged sulfate exposures and concentrations: results from exposure assessment panel studies in four U.S. cities. *Environmental Science & Technology* 43:5028-5034, 2009.
  55. Grundstein A, **Sarnat SE**. Meteorological hypotheses of thunderstorm asthma. *Geography Compass* 3:45-63, 2009.
  56. Grundstein A, **Sarnat SE**, Klein M, Shepherd M, Naeher L, Mote T, Tolbert P. Thunderstorm-associated asthma in Atlanta, Georgia. *Thorax* 63:659-660, 2008.
  57. Sarnat JA, Marmur A, Klein M, Kim E, Russell AG, **Sarnat SE**, Mulholland JA, Hopke PK, Tolbert PE. Fine particle sources and cardiorespiratory morbidity: an application of chemical mass balance and factor analytical source apportionment methods. *Environmental Health Perspectives* 116:459-466, 2008.
  58. Tolbert PE, Klein M, Peel JL, **Sarnat SE**, Sarnat JA. Multipollutant modeling issues in a study of ambient air quality and emergency department visits in Atlanta. *Journal of Exposure Science and Environmental Epidemiology* 17:S29-S35, 2007.

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59. **Sarnat SE**, Suh HH, Coull BA, Schwartz J, Stone PH, Gold DR. Ambient particulate air pollution and cardiac arrhythmia in a panel of older adults in Steubenville, Ohio. *Occupational and Environmental Medicine* 63:700-706, 2006.
  60. Luttmann-Gibson H, Suh HH, Coull BA, Dockery DW, **Sarnat SE**, Schwartz J, Stone PH, Gold DR. Short-term effects of air pollution on heart rate variability in senior adults in Steubenville, Ohio. *Journal of Occupational and Environmental Medicine* 48:780-788, 2006.
  61. **Sarnat SE**, Coull BA, Schwartz J, Gold DR, Suh HH. Factors affecting the association between ambient concentrations and personal exposures to particles and gases. *Environmental Health Perspectives* 114:649-654, 2006.
  62. **Sarnat SE**, Ruiz P, Coull BA, Koutrakis P, Suh HH. The influences of ambient particle composition and size on particle infiltration in Los Angeles, CA residences. *Journal of the Air and Waste Management Association* 56:186-196, 2006.
  63. **Ebelt ST**, Wilson WE, Brauer M. Exposure to ambient and nonambient components of particulate matter: a comparison of health effects. *Epidemiology* 16:396-405, 2005.
  64. Adamkiewicz G, **Ebelt ST**, Syring M, Slater J, Speizer F, Schwartz J, Suh HH, Gold DR. Association between air pollution exposure and exhaled nitric oxide in an elderly panel. *Thorax* 59:204-209, 2004.
  65. Brauer M, **Ebelt ST**, Fisher TV, Brumm J, Petkau AJ, Vedal S. Exposure of chronic obstructive pulmonary disease patients to particles: respiratory and cardiovascular health effects. *Journal of Exposure Analysis and Environmental Epidemiology* 11:490-500, 2001.
  66. **Ebelt ST**, Brauer M, Cyrys J, Tuch T, Kreyling WG, Wichmann HE, Heinrich J. Air quality in post-unification Erfurt, East Germany: associating changes in pollutant concentrations with changes in emissions. *Environmental Health Perspectives* 109:325-333, 2001.
  67. **Ebelt ST**, Petkau AJ, Vedal S, Fisher TV, Brauer M. Exposure of chronic obstructive pulmonary disease patients to particulate matter: relationships between personal and ambient air concentrations. *Journal of the Air and Waste Management Association* 50:1081-1094, 2000.