Raffaele Vardavas, PhD

Senior-Level Mathematician — RAND Corporation (2008-2025)
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Security Clearance: Secret — Languages: English and Italian

SUMMARY

Mathematical modeling • Computational social science • Infectious disease dynamics • Policy simulation

Mathematical and computational modeler with extensive experience developing simulation-based analyses of complex social and behavioral systems. My work integrates mathematical modeling, agent-based and microsimulation methods, and longitudinal data to study contagion processes, health behaviors, and policy interventions. I have led or co-led major federally funded research efforts, published widely in peer-reviewed journals and RAND reports, and contributed to high-visibility decision-support tools for public agencies.

EDUCATION

Imperial College, *London, UK*

Ph.D. in Physics — *March 2002*

M.Sci. in Physics (First Class Honours) — *June 1998*

ACADEMIC AND RESEARCH APPOINTMENTS

RAND Corporation — *Santa Monica, CA*

Senior-Level Mathematician — *2020 - 2025*

- Developed coupled behavioral-epidemiological simulation models for COVID-19 and seasonal influenza transmission dynamics
- Co-designed and managed COVID-Paths and Flu-Paths longitudinal surveys (American Life Panel, n∼2,000, 8 years) to capture behavioral dynamics for parameterizing simulation models
- Applied Decision Under Deep Uncertainty (DUDM) methods to evaluate policy scenarios and generate evidence-based policy recommendations
- Created interactive decision support tools for policymakers to compare intervention strategies
- Conducted cost-benefit analysis of military screening policies for visual dysfunction using simulation modeling
- Applied deep generative models to create synthetic health data and simulate socio-centric and ego-centric networks

Full-Level Mathematician *2013 - 2020*

- Developed evolutionary game-theoretic model of firm lobbying behavior and climate change policy
- Forecasted disease burden for chronic conditions and alcohol and drug use using microsimulation models
- Modeled income tax evasion dynamics in the US using agent-based simulation approaches
- Simulated alternative policy interventions to curb US healthcare spending

Associate-Level Mathematician *2008 - 2013*

- Co-developed the COMPARE microsimulation model evaluating US healthcare system reforms
- Constructed disease transmission models for smallpox, HIV, and other viral STIs
- Forecasted healthcare workforce needs for Singapore Ministry of Health

UCLA, Disease Modeling Group (BioMath) *Los Angeles, CA*

Postdoctoral Researcher *2004 - 2008*

- Developed simulation models of influenza and HIV transmission dynamics using deterministic and stochastic methods

UCLA, Department of Applied Mathematics *Los Angeles, CA*

Postdoctoral Researcher *2002 - 2004*

- Developed simulation models of atomic diffusion, nucleation, and aggregation kinetics on strained surfaces using kinetic Monte Carlo and level-set methods

RESEARCH FUNDING

Modeling the Coupled Dynamics of COVID-19 Transmission and Protective Behaviors

National Institute of Allergy and Infectious Diseases, R01AI160240 *2021 - 2026*

Role: Principal Investigator (PI) with Dr. Andy Parker

Amount awarded: $2,758,368

Modeling the Coupled Dynamics of Influenza Transmission and Vaccination Behavior

National Institute of Allergy and Infectious Diseases, R01AI118705-01A1 *2016 - 2022*

Role: Principal Investigator (PI) with Dr. Andy Parker

Amount awarded: $2,200,000

RAND Alcohol Policy Platform

National Institute on Alcohol Abuse and Alcoholism, 1R01AA022132-01A1 *2014 - 2021*

Role: co-PI with Dr. Rosalie Pacula

Amount awarded: $2,679,116

Agent-Based Model of the Role of Perceptions in Income Tax Evasion

National Science Foundation, 1519116 *2015 - 2017*

Role: Principal Investigator

Amount awarded: $605,844

A Focus Group and a Survey Study on the Adoption of Nanovaccines for Seasonal Influenza Vaccination

Nanovaccine Consortium *2015 - 2016*

Role: Principal Investigator

Amount awarded: $40,000

Health Outcomes, Risk Perceptions and Preventive Behavior on Social Networks

National Institutes of Health, R21 5R21CA157571-02 *2011 - 2013*

Role: PI with Dr. S. Nowak (co-PI)

Amount awarded: $415,295

Control and Prevention of Infectious Diseases

National Academies Keck Futures Initiatives *2006*

Role: co-PI with Dr. S. Blower and Dr. R. Breban

Amount awarded: $75,000

Total: 7 federal research grants as PI/co-PI totaling $8,773,623 (2006–2026)

DISTINCTIONS AND AWARDS

RAND Silver Medal Award *RAND Corporation, 2021*

Mission & Impact for developing RAND's COVID-19 State Policy Tool to help local policymakers evaluate pandemic response interventions. The tool became RAND's most popular research of 2020. Awarded alongside Lawrence Baker, Pedro Nascimento de Lima, Alyson Youngblood, and Heather McCracken.

Imperial College Physics Department – Tessella Prize *Imperial College London, 1998*

Awarded for the best MSci final-year physics research project, recognizing outstanding work on simulating the kinetic dynamics of gases.

RESEARCH

Peer-Reviewed Journal Articles

[1] Konstantinos Mitsopoulos, Lawrence Baker, Christian Lebiere, Peter Pirolli, Mark Orr, and **Vardavas, Raffaele**. "Cognitively-plausible reinforcement learning in epidemiological agent-based simulations." In: *Frontiers in Epidemiology* 5 (July 2025).

[2] Adrienne M. Propp, **Vardavas, Raffaele**, Carter C. Price, and Kandice A. Kapinos. "The Longitudinal Health, Income, and Employment Model (LHIEM): A Discrete-Time Microsimulation Model for Policy Analysis." In: *Journal of Artificial Societies and Social Simulation* 28.2 (Mar. 2025).

[3] Pedro Nascimento de Lima, Spencer Karr, Jude Z. Lim, **Vardavas, Raffaele**, David Roberts, Abigail Kessler, Jalal Awan, Laura J. Faherty, and Henry H. Willis. "The value of environmental surveillance for pandemic response." In: *PLOS ONE* (2024).

[4] Matthew M Walsh, Andrew M Parker, **Vardavas, Raffaele**, Sarah A Nowak, David P Kennedy, and Courtney A Gidengil. "Using a computational cognitive model to simulate the effects of personal and social network experiences on seasonal influenza vaccination decisions." In: *Frontiers in epidemiology* 4 (2024), p. 1467301.

[5] Luke J. Matthews, Megan S. Schuler, **Vardavas, Raffaele**, Joshua Breslau, and Ioana Popescu. "Evaluation via simulation of statistical corrections for network nonindependence." In: *Health Services and Outcomes Research Methodology* (2023), pp. 1–16.

[6] Sarah A. Nowak, Pedro Nascimento de Lima, and **Vardavas, Raffaele**. "Optimal non-pharmaceutical pandemic response strategies depend critically on time horizons and costs." In: *Scientific Reports* 13.1 (2023), p. 2416.

[7] Sarah A Nowak, Andrew M Parker, Courtney A Gidengil, Andrea S Richardson, Matthew M Walsh, David P Kennedy, and **Vardavas, Raffaele**. "Reciprocal relationships among influenza experiences, perceptions, and behavior: Results from a national, longitudinal survey of United States adults." In: *Social Science & Medicine* 296 (2022), p. 114693.

[8] Andrew M Parker, Samer Atshan, Matthew M Walsh, Courtney A Gidengil, and **Vardavas, Raffaele**. "Association of COVID-19 vaccination with influenza vaccine history and changes in influenza vaccination." In: *JAMA Network Open* 5.11 (2022), e2241888–e2241888.

[9] Jamal Rahmani, Alberto Montesanto, Edward Giovannucci, Hamid Zand, Meisam Barati, John J Kopchick, Mario G Mirisola, Vincenzo Lagani, Hiba Bawadi, **Vardavas, Raffaele**, et al. "Association between IGF-1 levels ranges and all-cause mortality: A meta-analysis." In: *Aging Cell* 21.2 (2022), e13540.

[10] Gavin S. Hartnett, Edward Parker, Timothy R. Gulden, **Vardavas, Raffaele**, and David Kravitz. "Modelling the impact of social distancing and targeted vaccination on the spread of COVID-19 through a real city-scale contact network." In: *Journal of Complex Networks* 9.6 (2021), cnab042.

[11] Pedro Nascimento de Lima, Robert Lempert, **Vardavas, Raffaele**, Lawrence Baker, Jeanne Ringel, Carolyn M. Rutter, Jonathan Ozik, and Nicholson Collier. "Reopening California: Seeking robust, non-dominated COVID-19 exit strategies." In: *PLoS ONE* 16.10 (2021), e0259166.

[12] **Vardavas, Raffaele**, Pedro Nascimento de Lima, and Lawrence Baker. "Could periodic nonpharmaceutical intervention strategies produce better COVID-19 health and economic outcomes?" In: *Journal on Policy and Complex Systems* 7.1 (2021).

[13] **Vardavas, Raffaele**, Pedro Nascimento de Lima, Paul K. Davis, Andrew M. Parker, and Lawrence Baker. "Modeling Infectious Behaviors: The Need to Account for Behavioral Adaptation in COVID-19 Models." In: *Journal on Policy and Complex Systems* 7.1 (2021), pp. 21–32.

[14] Wändi Bruine de Bruin, Mirta Galesic, Andrew M Parker, and **Vardavas, Raffaele**. "The role of social circle perceptions in "false consensus" about population statistics: Evidence from a national flu survey." In: *Medical Decision Making* 40.2 (2020), pp. 235–241.

[15] Matthew M Walsh, Andrew M Parker, **Vardavas, Raffaele**, Sarah A Nowak, David P Kennedy, and Courtney A Gidengil. "The stability of influenza vaccination behavior over time: a longitudinal analysis of individuals across 8 years." In: *Annals of Behavioral Medicine* 54.10 (2020), pp. 783–793.

[16] Wändi Bruine de Bruin, Andrew M Parker, Mirta Galesic, and Raffaele Vardavas. "Reports of social circles' and own vaccination behavior: A national longitudinal survey." In: *Health Psychology* 38.11 (2019), p. 975.

[17] Michael Johansson, Karyn M. Apfeldorf, Scott Dobson, ..., and **Vardavas, Raffaele**. "An open challenge to advance probabilistic forecasting for dengue epidemics." In: *Proceedings of the National Academy of Sciences* 116.48 (2019), pp. 24268–24274.

[18] Emmanuel Drabo, Joel W. Hay, **Vardavas, Raffaele**, Zachary Wagner, and Neeraj Sood. "A cost-effectiveness analysis of preexposure prophylaxis for the prevention of HIV among Los Angeles county men who have sex with men." In: *Clinical Infectious Diseases* 63.11 (2016), pp. 1495–1504.

[19] Emmanuel F. Drabo, Joel W. Hay, **Vardavas, Raffaele**, Zachary Wagner, and Neeraj Sood. "Rolling Out Oral Pre-Exposure Prophylaxis (Prep) Is a Cost-Effective HIV Prevention Strategy Among the Los Angeles County (LAC) Men Who Have Sex With Men (MSM)." In: *Value in Health* 18.3 (2015), A237.

[20] Risa M Hoffman, Amber Jaycocks, **Vardavas, Raffaele**, Glenn Wagner, Jordan E Lake, Deborah Mindry, Judith S Currier, and Raphael J Landovitz. "Benefits of PrEP as an adjunctive method of HIV prevention during attempted conception between HIV-uninfected women and HIV-infected male partners." In: *The Journal of infectious diseases* 212.10 (2015), pp. 1534–1543.

[21] Steven C Isley, Robert J Lempert, Steven W Popper, and **Vardavas, Raffaele**. "The effect of near-term policy choices on long-term greenhouse gas transformation pathways." In: *Global Environmental Change* 34 (2015), pp. 147–158.

[22] Amado Cordova, **Vardavas, Raffaele**, James Broyles, Christine Eibner, and Federico Girosi. "Modeling Employer Self-Insurance Decisions After the Affordable Care Act." In: *Health Services Research* 48.2 Pt 2 (2013), pp. 850–65.

[23] Andrew M. Parker, **Vardavas, Raffaele**, Christopher S. Marcum, and Courtney A. Gidengil. "Conscious consideration of herd immunity in influenza vaccination decisions." In: *American Journal of Preventive Medicine* 45.1 (2013), pp. 118–21.

[24] Neeraj Sood, Zachary Wagner, Amber Jaycocks, Emmanuel Drabo, and **Vardavas, Raffaele**. "Test-and-Treat in Los Angeles: A Mathematical Model of the Effects of Test-and-Treat for the Population of Men Who Have Sex With Men in Los Angeles County." In: *Clinical Infectious Diseases* 56.12 (2013), pp. 1789–96.

[25] Christine Eibner, Carter Price, **Vardavas, Raffaele**, Amado Cordova, and Federico Girosi. "Small firms' actions in two areas, and exchange premium and enrollment impact." In: *Health Affairs* 31.2 (2012), pp. 324–331.

[26] **Vardavas, Raffaele**, Romulus Breban, and Sally Blower. "A universal long-term flu vaccine may not prevent severe epidemics." In: *BMC Research Notes* 3 (2010), p. 92.

[27] Sally Blower and **Vardavas, Raffaele**. "Treatment equity & the HIV epidemic in Africa." In: *Nuntium* 34 (2008).

[28] Romulus Breban, Virginie Supervie, Justin T. Okano, **Vardavas, Raffaele**, and Sally Blower. "Is there any evidence that syphilis epidemics cycle?" In: *The Lancet Infectious Diseases* 8.9 (2008), pp. 577–581.

[29] Kevin A. Fenton, Romulus Breban, **Vardavas, Raffaele**, Justin T. Okano, Tara Martin, Sevgi Aral, and Sally Blower. "Infectious syphilis in high-income settings in the 21st century." In: *The Lancet Infectious Diseases* 8.4 (2008), pp. 244–253.

[30] Romulus Breban, **Vardavas, Raffaele**, and Sally Blower. "Mean-field analysis of an inductive reasoning game: Application to influenza vaccination." In: *Physical Review E* 76.3 (2007), p. 031127.

[31] Romulus Breban, **Vardavas, Raffaele**, and Sally Blower. "Theory versus data: How to calculate R_0?" In: *PLoS ONE* 2.3 (2007), e282.

[32] **Vardavas, Raffaele** and Sally Blower. "The emergence of HIV transmitted resistance in Botswana: When will the WHO detection threshold be exceeded?" In: *PLoS ONE* 2.1 (2007), e152.

[33] **Vardavas, Raffaele**, Romulus Breban, and Sally Blower. "Can influenza epidemics be prevented by voluntary vaccination?" In: *PLoS Computational Biology* 3.5 (2007), e85.

[34] X. Niu, **Vardavas, R.**, R. E. Caflisch, and C. Ratsch. "Level set simulation of directed self-assembly during epitaxial growth." In: *Physical Review B* 74.19 (2006), p. 193403.

[35] Romulus Breban, **Vardavas, Raffaele**, and Sally Blower. "Linking population-level models with growing networks: A class of epidemic models." In: *Physical Review E* 72.4 (2005), p. 046110.

[36] C. Ratsch, Y. Landa, and **Vardavas, R.** "The asymptotic scaling limit of point island models for epitaxial growth." In: *Surface Science* 578.1-3 (2005), pp. 196–202.

[37] Paola Fabrizio, Luisa Battistella, **Vardavas, Raffaello**, Cristina Gattazzo, Lee-Loung Liou, Alberto Diaspro, Janis W. Dossen, Edith Butler Gralla, and Valter D. Longo. "Superoxide is a mediator of an altruistic aging program in saccharomyces cerevisiae." In: *Journal of Cell Biology* 166.7 (2004), pp. 1055–1067.

[38] **Vardavas, R.**, C. Ratsch, and R. E. Caflisch. "Submonolayer growth in the presence of defect sites." In: *Surface Science* 569.1-3 (2004), pp. 185–192.

[39] Chiara Baggio, **Vardavas, Raffaele**, and Dimitri D. Vvedensky. "Fokker-Planck equation for lattice deposition models." In: *Physical Review E* 64.4 (2001), p. 045103.

RAND Reports (peer-reviewed research reports)

[1] Mahshid Abir, Raffaele Vardavas, Zohan H. Tariq, Emily Hoch, Emily Lawson, and Sydney Cortner. *Impact of Climate Change on Health and Drug Demand*. Research Report RRA3425-1. RAND Corporation, 2024.

[2] Pedro Nascimento de Lima, Spencer Karr, Jude Z. Lim, **Vardavas, Raffaele**, David Roberts, Abigail Kessler, Jalal Awan, Laura J. Faherty, and Henry H. Willis. *The Value of Environmental Surveillance for Pandemic Response*. Tech. rep. WRA3263-1. RAND Corporation, 2024.

[3] **Vardavas, Raffaele**, Philip Armour, Sai Prathyush Katragadda, Tiffany Pujol-Mitchell, Pedro Nascimento de Lima, Bijan Fateh, Hector Hernandez, Susan Yi, Janice Rojas Aguilera, and Caolionn Gadwah-Meaden. *Cost-Benefit Analysis of Comprehensive Military Eye Examination Policies*. Tech. rep. RRA2188-1. RAND Corporation, 2024.

[4] **Vardavas, Raffaele**, Pedro Nascimento de Lima, Lawrence Baker, Caitlin Crowley, Katherine G. Carman, and Mahshid Abir. *Modeling the Disruptive Impact of the COVID-19 Pandemic on Nurses' Supply and Wages*. Tech. rep. WRA1444-1. RAND Corporation, 2024.

[5] Megan Andrew, Brian Briscombe, **Vardavas, Raffaele**, Nazia Wolters, Nabeel Qureshi, Wilson Nham, and Mahshid Abir. *Identifying Strategies for Strengthening the Health Care Workforce in the Commonwealth of Virginia*. Tech. rep. RRA2903-1. RAND Corporation, 2023.

[6] Megan Andrew, Brian Briscombe, **Vardavas, Raffaele**, Nazia Wolters, Nabeel Qureshi, Wilson Nham, and Mahshid Abir. *Recommendations for Strengthening the Health Care Workforce in the Commonwealth of Virginia*. Tech. rep. RBA2903-1. RAND Corporation, 2023.

[7] Federico Girosi, Sai Prathyush Katragadda, Joshua Steier, and **Vardavas, Raffaele**. *Using Artificial Intelligence to Generate Synthetic Health Data*. Tech. rep. WRA2892-1. RAND Corporation, 2023.

[8] Pedro Nascimento de Lima, Abby Stevens, **Vardavas, Raffaele**, Jonathan Ozik, and Robert J. Lempert. *Co-Designing Capabilities for a Robust Pandemic Response: Stakeholder Engagement for Visioning, Backcasting, and Evaluating New Decision-Support Capabilities*. Tech. rep. WRA3085-1. RAND Corporation, 2023.

[9] Preethi Rao, Federico Girosi, **Vardavas, Raffaele**, Lawrence Baker, and Christine Eibner. *Increasing Subsidies and Expanding Health Insurance Options in Connecticut*. Tech. rep. RRA1276-2. RAND Corporation, 2022.

[10] Preethi Rao, Federico Girosi, **Vardavas, Raffaele**, Lawrence Baker, and Christine Eibner. *Increasing Subsidies and Expanding Health Insurance Options in Connecticut: Findings Without the Build Back Better Act*. Tech. rep. RBA1276-1. RAND Corporation, 2022.

[11] Christine Eibner, Jodi L. Liu, Carter C. Price, Nabeel Qureshi, and **Vardavas, Raffaele**. *Temporary Safety-Net Policies and Pandemic-Related Insurance Loss in New York State*. Tech. rep. RRA804-1. RAND Corporation, 2021.

[12] Timothy R. Gulden, Gavin S. Hartnett, **Vardavas, Raffaele**, and David Kravitz. *Protecting the Most Vulnerable by Vaccinating the Most Active*. Tech. rep. PEA1068-1. RAND Corporation, 2021.

[13] Gavin S. Hartnett, Edward Parker, Timothy R. Gulden, **Vardavas, Raffaele**, and David Kravitz. *Modeling the Impact of Social Distancing and Targeted Vaccination on the Spread of COVID-19 Through a Real City-Scale Contact Network*. Tech. rep. WRA1068-1. RAND Corporation, 2021.

[14] Kandice A. Kapinos, Carter C. Price, Drew M. Anderson, Adrienne M. Propp, **Vardavas, Raffaele**, and Christopher M. Whaley. *10Plan, How Would It Affect Health Care Spending by Consumers and the Federal Government*. Tech. rep. RB10127. RAND Corporation, 2021.

[15] Kandice A. Kapinos, Carter C. Price, Drew M. Anderson, Adrienne M. Propp, **Vardavas, Raffaele**, and Christopher M. Whaley. *Analysis of the 10Plan: A Self-Pay System Designed to Minimize the Burden of Health Care Costs*. Tech. rep. RR4270. RAND Corporation, 2021.

[16] Pedro Nascimento de Lima, **Vardavas, Raffaele**, Lawrence Baker, Jeanne S. Ringel, Robert J. Lempert, Carolyn M. Rutter, and Jonathan Ozik. *Reopening Under Uncertainty: Stress-Testing California's COVID-19 Exit Strategy*. Tech. rep. PEA1080-1. RAND Corporation, 2021.

[17] **Vardavas, Raffaele**, Pedro Nascimento de Lima, and Lawrence Baker. *Modeling COVID-19 Nonpharmaceutical Interventions: Exploring periodic NPI Strategies*. Tech. rep. WRA1080-1. RAND Corporation, 2021.

[18] Gavin S. Hartnett, **Vardavas, Raffaele**, Lawrence Baker, Michael Chaykowsky, C. Ben Gibson, Federico Girosi, David P. Kennedy, and Osonde A. Osoba. *Deep Generative Modeling in Network Science with Applications to Public Policy Research*. Tech. rep. WRA843-1. RAND Corporation, 2020.

[19] Adam C. Resnick, Anthony DeCicco, Vikram Kilambi, Keenan D. Yoho, **Vardavas, Raffaele**, and Aaron C. Davenport. *Logistics Analysis of Puerto Rico: Will the Seaborne Supply Chain of Puerto Rico Support Hurricane Recovery Projects?* Tech. rep. RR3040. RAND Corporation, 2020.

[20] **Vardavas, Raffaele**, Aaron Strong, Jennifer Bouey, Jonathan W. Welburn, Pedro Nascimento de Lima, Lawrence Baker, Keren Zhu, Michelle Priest, Lynn Hu, and Jeanne S. Ringel. *The Health and Economic Impacts of Non-pharmaceutical Interventions to Address COVID-19: A Decision Support Tool for State and Local Policymakers*. Tech. rep. TLA173-1. RAND Corporation, 2020.

[21] Gursel Aliyev, Andrew M. Parker, **Vardavas, Raffaele**, Sebastian Linnemayr, and Kim Bloomquist. *Taxpayers' Misperceptions and Two Novel Behavioral Interventions to Counter Tax Evasion*. Tech. rep. RGSD-435. RAND Corporation, 2019.

[22] Christine Eibner, **Vardavas, Raffaele**, Sarah Nowak, Jodi L. Liu, and Preethi Rao. *Medicare for 50-to-64-Year-Olds: Assessing the Effects of Allowing Older Adults to Buy Into the Medicare Program*. Tech. rep. RR4246. RAND Corporation, 2019.

[23] **Vardavas, Raffaele**, Pavan Katkar, Andrew M. Parker, Gursel Aliyev, Marlon Graf, and Krishna B. Kumar. *RAND's Interdisciplinary Behavioral and Social Science Agent-Based Model of Income Tax Evasion: Technical Report*. Tech. rep. WR1322. RAND Corporation, 2019.

[24] Patrick H. Mills, Sarah Nowak, Peter Buryk, John G. Drew, Christopher Guo, and **Vardavas, Raffaele**. *Increasing Cost-Effective Readiness for the U.S. Air Force by Reducing Supply Chain Variance: Technical Analysis of Flying Hour Program Variance*. Tech. rep. RR2118. RAND Corporation, 2018.

[25] Joie D. Acosta, Amariah Becker, Jennifer L. Cerully, Michael P. Fisher, Laurie T. Martin, **Vardavas, Raffaele**, Mary Ellen Slaughter, and Terry L. Schell. *Assessing the Department of Defense's Approach to Reducing Mental Health Stigma*. Tech. rep. RB9881. RAND Corporation, 2016.

[26] David Manheim, Margaret Chamberlin, Osonde A. Osoba, **Vardavas, Raffaele**, and Melinda Moore. *Improving Decision Support for Infectious Disease Prevention and Control: Aligning Models and Other Tools with Policymakers' Needs*. Tech. rep. RR1576. RAND Corporation, 2016.

[27] Patrick H. Mills, Sarah Nowak, Peter Buryk, John G. Drew, Christopher Guo, and **Vardavas, Raffaele**. *Increasing Cost-Effective Readiness for the U.S. Air Force by Reducing Supply Chain Variance: Technical Analysis of Flying Hour Program Variance*. Tech. rep. PR1488. RAND Corporation, 2016.

[28] Rosalie Liccardo Pacula, Sarah Beth Hunter, Allison J. Ober, Karen Chan Osilla, **Vardavas, Raffaele**, Janice C. Blanchard, David de Vries, Emmanuel Drabo, Kristin Leuschner, Warren Stewart, Jennifer Walters, Mary Ellen

Slaughter, and Terry L. Schell. *Preventing, Identifying, and Treating Prescription Drug Misuse Among Active-Duty Service Members*. Tech. rep. PR1830. RAND Corporation, 2015.

[29] Jirka Taylor, Marco Hafner, Erez Yerushalmi, Richard Smith, Jacopo Bellasio, **Vardavas, Raffaele**, Teresa Bienkowska-Gibbs, and Jennifer Rubin. *Estimating the Economic Costs of Antimicrobial Resistance: Model and Results*. Tech. rep. RR911. RAND Corporation, 2014.

[30] Amariah Becker, Jennifer L. Cerully, Michael P. Fisher, Laurie T. Martin, **Vardavas, Raffaele**, and Mary Ellen Slaughter. *Mental Health Stigma in the Military*. Tech. rep. RR426. RAND Corporation, 2013.

[31] Steven C. Isley, Robert J. Lempert, Steven W. Popper, and **Vardavas, Raffaele**. *An Evolutionary Model of Industry Transformation and the Political Sustainability of Emission Control Policies*. Tech. rep. TR1308. RAND Corporation, 2013.

[32] Christine Eibner, Federico Girosi, Amalia R. Miller, Amado Cordova, Elizabeth A. McGlynn, Nicholas M. Pace, Carter C. Price, **Vardavas, Raffaele**, and Carole R. Gresenz. *Employer Self-Insurance Decisions and the Implications of the Patient Protection and Affordable Care Act as Modified by the Health Care and Education Reconciliation Act of 2010 (ACA)*. Tech. rep. TR971. RAND Corporation, 2011.

[33] John Bertko, Melinda Beeuwkes Buntin, Amado Cordova, Christine Eibner, Federico Girosi, Carole R. Gresenz, Emmett B. Keeler, Jeanne S. Ringel, Jeffery Sullivan, and **Vardavas, Raffaele**. *Overview of the COMPARE Microsimulation Model*. Tech. rep. WR650. RAND Corporation, 2009.

Book Chapters

[1] Angela O'Mahony, Paul K. Davis, Scott Appling, Matthew E. Brashears, Erica Briscoe, Kathleen M. Carley, Joshua M. Epstein, Luke Joseph Matthews, Theodore P. Pavlic, William Rand, Scott Neal Reilly, William B. Rouse, Samarth Swarup, Andreas Tolk, **Vardavas, Raffaele**, and Levent Yilmaz. "Social-Behavioral Modeling for Complex Systems." In: *Handbook of Systems Engineering*. John Wiley & Sons, 2019.

[2] **Vardavas, R.** and C. S. Marcum. "Modeling influenza vaccination behaviour via inductive reasoning games." In: *Modeling the Interplay between Human Behavior and the Spread of Infectious Diseases*. Ed. by Piero Manfredi and Alberto d'Onofrio. Springer, 2013.

[3] D. D. Vvedensky, C. Baggio, A. Chua, C. Haselwandter, and **Vardavas, R.** "Stochastic differential equations for driven lattice systems." In: *Recent Advances in Scientific Computing and Partial Differential Equations*. Vol. 330. Contemporary Mathematics Series. American Mathematical Society, 2003.

Letters and Comments

[1] Neeraj Sood, Zachary Wagner, Amber Jaycocks, Emmanuel Drabo, and **Vardavas, Raffaele**. "Reply to Gonzalez-Serna et al." In: *Clinical Infectious Diseases* (May 2013).

[2] Romulus Breban, **Vardavas, Raffaele**, and Sally Blower. "Reply to "comment on 'linking population-level models with growing networks: A class of epidemic models' "." In: *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)* 74.1 (2006), p. 018102.

[3] D. D. Vvedensky, C. Ratsch, F. Gibou, and **Vardavas, R.** "Singularities and spatial fluctuations in submonolayer epitaxy." In: *Physical Review Letters* 90.18 (May 2003), p. 189601.

Ph.D. Thesis

Fluctuations and scaling in 1D irreversible film growth models,

Imperial College of Science, Technology and Medicine, London, Spring 2002;

Ph.D. Advisor: Prof. Dimitri Vvedensky.

TEACHING EXPERIENCE

Full Course Instructor (with Dr. P. Davis), *Modeling Complex Systems for Policy*, RAND Corporation, 2020, 2021, 2022, 2023, 2024, 2025

Tutorial Classes, *Evolutionary Complex Socio-economic Systems*, RAND Corporation, 2013

Teaching Assistant, *Mathematical Finance*, University of California, Los Angeles, 2003

Teaching Assistant, *Statistical Mechanics*, Imperial College, London, 2000

MENTORING

Dissertation Advisory Committee (RAND Ph.D. Students)

- **Pedro Nascimento de Lima** (2022)

  Robust Decision Making in Health Policy. Applications to COVID-19 and Colorectal Cancer

  RAND/RGSDA2531-1

- **Jesse Lastunen** (2020)

  Technological Change and the Skill Premium: 21st Century Evidence

  RAND/RGSDA1167-1

- **Gursel Aliyev** (2019)

  Taxpayers' misperceptions and two novel behavioral interventions to counter tax evasion

  RAND/RGSD-435

- **Gulrez Azhar** (2019)

  Indian summer: three essays on heatwave vulnerability, estimation and adaption

  RAND/RGSD-431

- **Myong-Hyun Go** (2010)

  Structures and Dynamics of Social Networks: Selection, Influence, and Self-Organization

  RAND/RGSD263

Dissertation Advisory Committee (Non-RAND Ph.D. Students)

- **Amandine Pepiot** (2024)

  Eliminating HIV with voluntary testing? A game theoretic perspective

  Sorbonne Université - École Doctorale Pierre Louis de Santé Publique, Paris, France

- **Sofia Jijón Alban** (2021)

  Prevention of infectious diseases in the context of effective treatment: a game-theoretic approach

  Sorbonne Université - École Doctorale Pierre Louis de Santé Publique, Paris, France

Advisor to RAND Summer Associates

- **Dr. Chamsi Hssaine**, Summer 2018

  Doctoral student in Operations Research at Cornell University - now Assistant Professor of Data Sciences and Operations at University of Southern California, Marshall School of Business

- **Dr. Xindi (Cindy) Hu**, Summer 2016

  Doctoral student in Environmental Health at Harvard T.H. Chan School of Public Health - now Tenure-track Assistant Professor at The George Washington University

- **Dr. Elizabeth Bodine-Baron** (CalTech), Summer 2011

  Doctoral student in Engineering at CalTech - now senior-level RAND researcher

RAND Project Sponsor and Advisor to UCLA IPAM RIPS Program Participants

- Mentored two research teams of four competitively selected undergraduate mathematics students each as part of the Research in Industrial Projects for Students (RIPS) program hosted by the Institute for Pure and Applied Mathematics (IPAM) at UCLA.

- **2025 UCLA IPAM RIPS Program**: Explored use of large language models (LLMs) trained on longitudinal survey data to simulate behavioral personas and assess responses to counterfactual scenarios.
- **2024 UCLA IPAM RIPS Program**: Focused on generating large-scale, realistic social networks by integrating ego-centric survey data from the American Life Panel with external socio-centric network data.

SELECTED CONFERENCE PRESENTATIONS

- Translational Global Infectious Diseases Research Center (TGIR), University of Vermont (November 2024): "Adapting to Changing Epidemiology: Behavioral Feedback in Flu and COVID-19 Transmission Models" (invited)
- Virtual ISPOR Europe (November-December 2021): "Mathematical Models of Disease Transmission and Model Parameter Uncertainties" (invited)
- MIDAS Webinar (November 2021): "Towards Modeling Infectious Behaviors" (invited)
- INFORMS Annual Meeting, Anaheim, CA (October 2021): "The use of Periodic Nonpharmaceutical Interventions Strategies to Mitigate COVID-19 Health and Economic Outcomes" (invited)
- Santa Fe Institute, Santa Fe, NM (April 2018): "Perceptions of Income Tax Evasion and Tax Moral: A survey to inform an agent-based model" (invited)
- INFORMS Annual Meeting, Houston, TX (October 2017): "Perceptions of Income Tax Evasion and Tax Moral: A survey to inform an agent-based model" (contributed)
- European Conference on Mathematical and Theoretical Biology, Krakow, Poland (June/July 2011): "Modeling Adaptive Behavior in Influenza Vaccination Decisions" (invited)
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT (May 2009): "Modeling Control Measures of Smallpox Attack Outbreaks" (contributed)
- SIAM/SMB Conference on Life Sciences, Raleigh, NC (July/August 2006): "Controlling Influenza Epidemics via Public Health Vaccination Incentives" (invited)

Total: 20+ conference presentations

PROFESSIONAL SERVICE

Review Panels and Technical Working Groups

- Technical Working Group on Integrated Epidemiological-Economic Modelling to Inform COVID-19 Control Policies, WHO/OECD/World Bank *October 2021 - March 2022*
- Emergency Awards: Rapid Investigation of SARS-CoV-2 and COVID-19 (R21/R01), NIH/NIAID *September 2-3, 2020*
- Centers of Excellence for Influenza Research and Response (CEIRR), NIH/NIAID *July 14-15, 2020*

Editorial Service

- **Topic Editor**, *Frontiers in Public Health* *2024–present*

  Research Topic: "Modelling the Impact of Human Behavior on Infectious Disease Epidemiology." Leading editorial team for cross-disciplinary research collection spanning behavioral modeling, vaccination decisions, and disease control policy.

- **Peer Reviewer** for journals including: Chaos, Solitons & Fractals; Frontiers in Public Health; Frontiers in Applied Mathematics and Statistics; BMC Infectious Diseases; and others.

ADVISORY ROLES

- **Advisory Board Member**, Create Cures Foundation *2016–present*

  Los Angeles, USA

  Supporting research for inexpensive therapies for serious diseases and prevention strategies.

- **Board of Directors**, L-Nutra *2009–2015*

  Los Angeles, USA

  USC spin-off developing medical food for protection against age-related diseases.

- **Co-founder**, Quantnotes.com *2001–2009*

  London, UK

  Educational website on mathematical finance (∼10,000 weekly sessions during operational period).

TECHNICAL SKILLS

Programming (Expert)	R, C/C++
Programming (Proficient)	Python, NetLogo
Programming (Basic)	Java, Matlab, FORTRAN
Modeling Approaches	Agent-Based Modeling, Microsimulation, Stochastic Simulations, Deterministic Models, Network Analysis (socio-centric and ego-centric), Game Theory (evolutionary and classical), Deep Generative Models, Robust Decision Making, Behavioral-Epidemiological Coupling
Research Methods	Survey Design, Longitudinal Data Collection, Mixed-Methods Research, Decision Under Deep Uncertainty (DUDM)
Other Software	Mathematica (expert), Tableau, LaTeX, MS Office