

**Social Relationships, Networks, and Health**  
**Sociol 797NH (Spring 2017 / Th, 10a-12:30p)**

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This course is designed to provide an overview of what we have learned from relational studies of human health; how relational studies of health-related topics are conducted; and the strengths and limits of various approaches. Much of what you will encounter in this course will be some form of social network analysis, though familiarity with network methods is not assumed nor required as a prerequisite. Typically, the material will engage sociology, population health and medicine, and will be a combination of exposure to key texts; learning about methodological approaches and recent advances that have shaped studies of health and relationships; and importantly, examining the frontiers and opportunities for the field to expand. While the vast majority of the assigned readings will directly involve analysis of a health-related topic, on several occasions the focus of a given study will be an important related concept that will illuminate aspects of the week's theme or the future of this research area (examples will include fundamental social processes such as social status dynamics, or social exclusion).

The format of the course is discussion-based; I will spend time each week giving key background and context to how the work articulates with the development of the field, and each week one (or two) of you will lead a discussion introducing the material (no more than 15 minutes), and we'll spend the remainder of the time engaging with the questions raised by the discussants. This discussion will touch on conceptual/methodological contributions of the studies, how they articulate with prior approaches, and any challenging questions they raise.

Your goals in this course to take the skills you learn during the term to develop either a research paper, or an NSF or NIH-style funding proposal that you will present to the class. Either final product will be evaluated by me, but part of your course grade will come from thoughtful peer reviews of your classmates' presentations to help them advance their thinking should they decide to develop it further into a publication, thesis, or dissertation. Starting in Week 2, if you have not signed up as one of the week's two discussants, you will be required to write and submit a 1-page memo (single-spaced, 12pt font) on an aspect(s) of the reading(s) that you found interesting (or provocative, or problematic) to Moodle by Wednesday @ 12n. The list of weekly *supplemental* readings) is intended to provide extra detail for those that wish it; these are not required.

Grading: 35% class participation and engagement (including serving as discussant and reflection papers); 15% short research proposal; 40% final project (research paper or NSF/NIH proposal); 10% peer reviews of the final project.

While not required, if you have not had formal exposure to social network methods, you may wish to familiarize yourself with key concepts in one of the following texts:

- Book: Scott, John P. 2000. *Social network analysis: a Handbook*. Sage Publications Ltd.
- Book: Valente, Thomas W. 2010. *Social Networks & Health*. Oxford University Press.
- Book: Borgatti, Stephen P., Martin G. Everett, and Jeffrey C. Johnson. 2013. *Analyzing social networks*. SAGE Publications Limited.
- Article: O'Malley, A. James, and Peter V. Marsden. "The analysis of social networks." *Health Services and Outcomes Research Methodology* 8.4 (2008): 222-269.

## **Week 1: Overview: relational approaches to studying health (January 26)**

This week we will discuss major theories that motivate the study of social relationships and health from the literatures on medical sociology and social epidemiology.

- Smith, Kirsten P., and Nicholas A. Christakis. 2008. "Social Networks and Health." *Annual Review of Sociology*. Vol. 34:405-29
- Umberson, Debra, Robert Crosnoe, Corinne Reczek. 2010. "Social Relationships and Health Behavior Across the Life Course" *Annual Review of Sociology*, v.36:136-157.
- Berkman LF, Krishna A. Social network epidemiology. In: Berkman LF, Kawachi I, Glymour M, eds. *Social Epidemiology* 2014:234-289.
- Antonucci TC, Ajrouch KJ, Birditt KS. The Convoy Model: Explaining Social Relations From a Multidisciplinary Perspective. *Gerontologist*. 2014;54(1):82-92.
- Thoits PA. Mechanisms linking social ties and support to physical and mental health. *Journal of Health & Social Behavior* 2011;52(2):145-61.

## **Week 2: Overview of key data sources that make use of network and health data (Feb. 2)**

This week we will begin to become familiar with some of the canonical social science and epidemiological datasets that have benefited scientific knowledge from bringing together network and health data. The required readings are exemplar studies, while the "also recommended" reading gives additional detail about the study design should you wish to become more familiar with it. Taken together, this comparative overview should orient you to possible data sources you may wish to explore for thesis projects or department comprehensive exams.

- National Longitudinal Study of Adolescent to Adult Health (Add Health): Bearman, Peter S., James Moody, and Katherine Stovel. "Chains of affection: The structure of adolescent romantic and sexual networks1." *American journal of sociology* 110.1 (2004): 44-91.
- Framingham Heart Study (FHS): Christakis Nicholas A., and James H. Fowler. 2007. "The Spread of Obesity in a Large Social Network over 32 Years." *New England Journal of Medicine*. Vol. 357(4): 370-379.
- National Social Life, Health, and Aging Project (NSHAP): Cornwell, Benjamin, Edward O. Laumann, and L. Philip Schumm. "The social connectedness of older adults: A national profile." *American sociological review* 73.2 (2008): 185-203.
- Yang, Y.C., Boen, C., Gerken, K., Li, T., Schorpp, K. and Harris, K.M., 2016. Social relationships and physiological determinants of longevity across the human life span. *Proceedings of the National Academy of Sciences*, 113(3), pp.578-583.

### *Also recommended:*

- Harris, Kathleen Mullan. "The add health study: design and accomplishments." *Chapel Hill: Carolina Population Center, University of North Carolina at Chapel Hill* (2013). (Add Health)
- Reither, Eric N., Robert M. Hauser, and Karen C. Swallen. "Predicting adult health and mortality from adolescent facial characteristics in yearbook photographs." *Demography* 46.1 (2009): 27-41. (Wisconsin Longitudinal Study)
- Paik, Anthony, and Kenneth Sanchagrin. "Social Isolation in America: An Artifact." *American Sociological Review* (2013). 78(3): 339-360. (General Social Survey)

### **Week 3: Special methodological challenges in network analysis (Feb. 9)**

- Edwards, Gemma. "Mixed-method approaches to social network analysis." (2010). ESRC National Centre for Research Methods Review paper.
- Heath, Sue, Alison Fuller, and Brenda Johnston. "Chasing shadows: defining network boundaries in qualitative social network analysis." *Qualitative Research* 9.5 (2009): 645-661.
- Cohen-Cole, Ethan, Jason Fletcher. 2008. "Is Obesity Contagious? Social Networks vs. Environmental Factors in the Obesity Epidemic." *Journal of Health Economics*. V. 27.
- Shalizi, Cosma Rohilla, and Andrew C. Thomas. 2011. "Homophily and Contagion Are Generically Confounded in Observational Social Network Studies." *Soc. Methods & Research* 43:1
- Christakis, N.A., & Fowler, J.H. (2013). Social contagion theory: examining dynamic social networks and human behavior. *Statistics & Medicine*, 32, 556-577.
- Also recommended:*
- O'Malley, A. James, and Jukka-Pekka Onnela. "Topics in social network analysis and network science." *arXiv preprint arXiv:1404.0067* (2014).
- O'Malley, A. James. "The analysis of social network data: an exciting frontier for statisticians." *Statistics in medicine* 32.4 (2013): 539-555.

### **Week 4: Probabilistic approaches to examining relationships and health (Feb. 16)**

- Snijders, Tom AB, Gerhard G Van de Bunt and Christian EG Steglich. 2010. "Introduction to Stochastic Actor-Based Models for Network Dynamics." *Social Networks* 32(1):44-60.
- Simpkins SD, Schaefer DR, Price CD, Vest AE. Adolescent friendships, BMI, and physical activity: Untangling selection and influence through longitudinal social network analysis. *Journal of Research on Adolescence*. 2013;23(3):537-549.
- de la Haye, K., Robins, G., Mohr, P. and Wilson, C., 2013. Adolescents' intake of junk food: processes and mechanisms driving consumption similarities among friends. *Journal of Research on adolescence*, 23(3), pp.524-536.
- adams, J, Schaefer, David R., 2016. How Initial Prevalence Moderates Network-based Smoking Change Estimating Contextual Effects with Stochastic Actor-based Models. *Journal of Health and Social Behavior*, 57(1): 22-38.
- Also recommended:*
- Faust, K. and J. Skvoretz. 2002. "Comparing Networks across Space and Time, Size and Species." *Sociological Methodology* 2002, Vol 32 32:267-99.
- Lewis, K., M. Gonzalez and J. Kaufman. 2012. "Social Selection and Peer Influence in an Online Social Network." *PNAS* 109(1):68-72.

### **Week 5: How networks shape the provision and experience of health care and propensity for epidemic infectiousness (Feb. 23)**

- Coleman, James, Elihu Katz and Herbert Menzel. 1957. "The Diffusion of an Innovation Among Physicians." *Sociometry*. Vol. 20: 253-270.
- Barnett, Michael L., Bruce E. Landon, A. James O'Malley, Nancy L. Keating, and Nicholas A. Christakis. "Mapping physician networks with self-reported and administrative data." *Health services research* 46, no. 5 (2011): 1592-1609.
- Gage, Elizabeth A. 2013 "Social networks of experientially similar others: Formation, activation, and consequences of network ties on the health care experience." *Soc Sci & Med* 95: 43-51.
- Moody, James, and Richard A. Benton. "Interdependent effects of cohesion and concurrency for epidemic potential." *Annals of epidemiology* 26, no. 4 (2016): 241-248.

adams, jimi, James Moody, and Martina Morris. "Sex, drugs, and race: how behaviors differentially contribute to the sexually transmitted infection risk network structure." *American journal of public health* 103.2 (2013): 322-329.

*Also recommended:*

Van den Bulte, Christopher, and Gary L. Lilien. 2001. "Medical innovation revisited: Social contagion versus marketing effort." *American Journal of Sociology*, 106, 1409-1435.

Christakis, Nicholas A., and James H. Fowler. "Social network sensors for early detection of contagious outbreaks." *PloS one* 5.9 (2010): e12948.

### **Week 6: Missing data in networks. (March 2)**

While strategies to estimate causal effects in the presence of missing data have been refined for traditional sample survey data, approaches to missing network data are comparatively underdeveloped. Completeness is especially important for SNA because of the often-clustered nature of relationships. If one is missing data from a key individual who has ties to others, information is then missing on both that person's attributes and ties.

Kossinets, Gueorgi. 2006. "Effects of Missing Data in Social Networks." *Social Networks*. Vol. 28(3): 247-68.

Wang, Dan J., Xiaolin Shi, Daniel A. McFarland, and Jure Leskovec. "Measurement error in network data: A re-classification." *Social Networks* 34, no. 4 (2012): 396-409.

Smith, Jeffrey A., and James Moody. "Structural effects of network sampling coverage I: Nodes missing at random." *Social Networks* 35, no. 4 (2013): 652-668.

Wang, Cheng, Carter T. Butts, John R. Hipp, Rupa Jose, and Cynthia M. Lakon. "Multiple imputation for missing edge data: A predictive evaluation method with application to Add Health." *Social Networks* 45 (2016): 89-98.

Smith, Jeffrey A., James Moody, and Jonathan H. Morgan. "Network sampling coverage II: The effect of non-random missing data on network measurement." *Social Networks* 48 (2017): 78-99.

*Also recommended:*

Handcock, Mark S., and Krista J. Gile. "Modeling social networks from sampled data." *The Annals of Applied Statistics* 4, no. 1 (2010): 5

Clauset, Aaron, Christopher Moore and Mark EJ Newman. 2008. "Hierarchical Structure and the Prediction of Missing Links in Networks." *Nature* 453(7191):98-101.

Crawford, Forrest W, Jiacheng Wu and Robert Heimer. 2015. "Hidden Population Size Estimation from Respondent-Driven Sampling: A Network Approach." *arXiv preprint arXiv:1504.08349*.

Lü, Linyuan and Tao Zhou. 2011. "Link Prediction in Complex Networks: A Survey." *Physica A: Statistical Mechanics and its Applications* 390(6):1150-70.

Robins, Garry, Philippa Pattison and Jodie Woolcock. 2004. "Missing Data in Networks: Exponential Random Graph ( $P^*$ ) Models for Networks with Non-Respondents." *Social Networks* 26(3):257-83.

\*\*\* Due March 3: short research proposal (3 single-spaced pages, max). This deadline is so that I can give you feedback before spring break \*\*\*

## **Week 7: Network health interventions & experimental paradigms (March 9)**

Valente TW. Network interventions. *Science*. 2012;337(6090):49-53.

Centola, Damon. 2011. An experimental study of homophily in the adoption of health behavior. *Science* 334(6060):1269-1272.

Latkin, C., Donnell, D., Liu, T.Y., Davey - Rothwell, M., Celentano, D. and Metzger, D., 2013. The dynamic relationship between social norms and behaviors: the results of an HIV prevention network intervention for injection drug users. *Addiction*, 108(5), pp.934-943.

Brashears, M. E. and E. Quintane. 2015. "The Microstructures of Network Recall: How Social Networks Are Encoded and Represented in Human Memory." *Social Networks* 41:113-26.

Zerubavel, N., P. S. Bearman, J. Weber and K. N. Ochsner. 2015. "Neural Mechanisms Tracking Popularity in Real-World Social Networks." *Proc Natl Acad Sci* 112(49):15072-7.

### *Also recommended:*

Latkin CA, Knowlton AR. Social Network Assessments and Interventions for Health Behavior Change: A Critical Review. *Behav Med*. 2015;41(3):90-7.

Staples, Patrick C., Elizabeth L. Ogburn, and Jukka-Pekka Onnela. "Incorporating Contact Network Structure in Cluster Randomized Trials." *Scientific reports* 5 (2015).

Rudolph, A.E., Crawford, N.D., Latkin, C. and Lewis, C.F., 2016. Multiplex Relationships and HIV: Implications for Network - Based Interventions. *AIDS and behavior*, pp.1-9.

Nishi, A., Shirado, H., Rand, D.G. and Christakis, N.A., 2015. Inequality and visibility of wealth in experimental social networks. *Nature*, 526(7573), pp.426-429.

\*\*\*\*\* No class Week 8 : March 16 – Spring Break \*\*\*\*\*

## **Week 9: Research ethics in relational data (March 23)**

Kadushin, Charles. 2005. "Who benefits from network analysis: ethics of social network research." *Social Networks* 27: 139-153.

Klovdahl, Alden S. 2005. "Social network research and human subjects protection: Towards more effective infectious disease control." *Social Networks* 27:119-137.

Rolls, David A., Peng Wang, Rebecca Jenkinson, Phillipa E. Pattison, Garry L. Robins, Rachel Sacks-Davis, Galina Daraganova, Margaret Hellard, and Emma McBryde. "Modelling a disease-relevant contact network of people who inject drugs." *Social Networks* 35, no. 4 (2013): 699-710.

Metcalf, Jacob, Emily F. Keller, and danah boyd. 2016. "Perspectives on Big Data, Ethics, and Society." *Council for Big Data, Ethics, and Society*.

*Also recommended:* \*to be announced\* (likely one or more Human Subjects Applications)

## **Week 10: Friend & family network influences on health across the life course (March 30)**

- Meadows, Sarah O., Sara S. McLanahan, and Jeanne Brooks-Gunn. "Stability and change in family structure and maternal health trajectories." *American sociological review* 73.2 (2008): 314-334.
- Cornelius, Talea, Alethea Desrosiers, and Trace Kershaw. "Spread of health behaviors in young couples: How relationship power shapes relational influence." *Social Science & Medicine* 165 (2016): 46-55.
- Pachucki, Mark A., Paul F. Jacques, and Nicholas A. Christakis. "Social network concordance in food choice among spouses, friends, and siblings." *American Journal of Public Health* 101.11 (2011): 2170-2177.
- Schaefer, David R., Olga Kornienko, and Andrew M. Fox. "Misery does not love company: Network selection mechanisms and depression homophily." *American Sociological Review* 76.5 (2011): 764-785.
- Wrzus, C., M. Hanel, J. Wagner and F. J. Neyer. 2013. "Social Network Changes and Life Events across the Life Span: A Meta-Analysis." *Psychological Bulletin* 139(1):53-80.

### *Also recommended:*

- Abrutyn, Seth, and Anna S. Mueller. "Are suicidal behaviors contagious in adolescence? Using longitudinal data to examine suicide suggestion." *American Sociological Review* 79.2 (2014): 211-227.

## **Week 11: New technologies to monitor health behaviors and social networks (April 6)**

In the last decade we have entered an era of computational social science, where massive streams of real-time data on human behavior are increasingly amenable to analysis to improve our understanding of how social processes contribute to health from birth until our twilight years. Yet given the ubiquity of portable devices and advances in Bluetooth and radio-frequency-identification (RFID) technologies, conducting this type of research is becoming more feasible and widespread. Reliance upon social network data to construct relational datasets that reflect who people actually interact with has great potential to clarify how socialization processes unfold and moreover, how social processes interact with biological processes of human development. (Pachucki, 2016, [NIH OBSSR Blog, https://obsr.od.nih.gov/the-importance-of-social-relationships-over-the-life-course/](https://obsr.od.nih.gov/the-importance-of-social-relationships-over-the-life-course/)).

- Cattuto C, Van den Broeck W, Barrat A, Colizza V, Pinton JF, Vespignani A. Dynamics of person-to-person interactions from distributed RFID sensor networks. *PLoS One* 2010;5(7):e11596.
- Salathe M, Kazandjieva M, Lee JW, Levis P, Feldman MW, Jones JH. "A high-resolution human contact network for infectious disease transmission." *Proceedings of the National Academy of Sciences*. Vol. 107(51):22020-5.
- Eagle N, Pentland AS, Lazer D. Inferring friendship network structure by using mobile phone data. *Proceedings of the National Academy of Sciences*. Vol. 106(36):15274-8.
- Pachucki, Mark C., Emily J. Ozer, Alain Barrat, and Ciro Cattuto. "Mental health and social networks in early adolescence: A dynamic study of objectively-measured social interaction behaviors." *Social science & medicine* 125 (2015): 40-50.
- Barnett, I., Khanna, T., & Onnela, J. P. (2016). Social and Spatial Clustering of People at Humanity's Largest Gathering. *PloS one*, 11(6), e0156794.

## **Week 12: Perspectives on social isolation & integration in health and well-being (April 13)**

Kreager, Derek A., Hanneke Palmen, Anja JE Dirkzwager, and Paul Nieuwbeerta. "Doing your own time: Peer integration, aggression and mental health in Dutch male detainment facilities." *Social Science & Medicine* 151 (2016): 92-99.

Holt-Lunstad, Julianne, Timothy B. Smith, and J. Bradley Layton. "Social relationships and mortality risk: a meta-analytic review." *PLoS Med* 7.7 (2010): e1000316.

Holt-Lunstad, Julianne, et al. "Loneliness and social isolation as risk factors for mortality a meta-analytic review." *Perspectives on Psychological Science* 10.2 (2015): 227-237.

Pantell M, Rehkopf D, Jutte D, Syme SL, Balmes J, Adler N. Social isolation: a predictor of mortality comparable to traditional clinical risk factors. *Am J Public Health*. 2013;103(11):2056-62.

Cornwell B, Laumann EO. The health benefits of network growth: new evidence from a national survey of older adults. *Soc Sci Med*. 2015;125:94-106.

*Also recommended:*

Abbott KM, Sefcik JS, Van Haitsma K. Measuring social integration among residents in a dementia special care unit versus traditional nursing home: A pilot study. *Dementia*. 2015.

Abbott, Katherine M., and Mark C. Pachucki. "Associations between social network characteristics, cognitive function, and quality of life among residents in a dementia special care unit: A pilot study." *Dementia*. 2016.

English T, Carstensen LL. Selective narrowing of social networks across adulthood is associated with improved emotional experience in daily life. *Int J Behav Dev*. 2014;38(2):195-202.

Waite L, Das A. Families, Social Life, and Well-Being at Older Ages. *Demography*. 2010;47:S87-S109.

## **Week 13: Social relationships, health, and genetics (April 20)**

Perry, Brea L. "Gendering Genetics: Biological Contingencies in the Protective Effects of Social Integration for Men and Women." *American Journal of Sociology* 121, no. 6 (2016): 1655-1696.

Christakis, Nicholas A., and James H. Fowler. "Friendship and natural selection." *Proceedings of the National Academy of Sciences* 111, no. Supplement 3 (2014): 10796-10801.

Raghavan, Sridharan, Mark C. Pachucki, Yuchiao Chang, Bianca Porneala, Caroline S. Fox, Josée Dupuis, and James B. Meigs. "Incident Type 2 Diabetes Risk is Influenced by Obesity and Diabetes in Social Contacts: a Social Network Analysis." *Journal of general internal medicine* (2016): 1-7.

Cole, Steven W. "Social regulation of human gene expression: mechanisms and implications for public health." *American journal of public health* 103, no. S1 (2013): S84-S92.

*Also recommended:*

Freese, J. 2008. "Genetics and the Social Science Explanation of Individual Outcomes." *American Journal of Sociology* 114 Suppl:S1-35.

Freese, J. and S. Shostak. 2009. "Genetics and Social Inquiry." *Annual Review of Sociology* 35:107-28.

Robinson, Matthew R., et al. "Genetic evidence of assortative mating in humans." *Nature Human Behaviour* (2017): 0016.

## **Week 14: Final project presentations and group feedback (April 27)**

In this class session, your goal is to publicly summarize (in 5-10 minutes) your final project, lessons learned, and next steps. This will serve as a workshop of sorts, and allow you to integrate feedback from your peers in time for the final paper submission.

*\*\*\*\*\* Final papers due May 5 \*\*\*\*\**

*\*\*\*\*\* Your feedback to (no more than 2) peers due to them (and to me) by May 10 \*\*\*\*\**