

KATE A. DUCHOWNY

University of California, San Francisco (UCSF)
Department of Epidemiology & Biostatistics
550 16th Street, 2nd Floor
San Francisco, CA 94158
kate.duchowny@ucsf.edu

PROFESSIONAL POSITIONS

Postdoctoral Scholar | Department of Epidemiology & Biostatistics
University of California, San Francisco (UCSF) Present

K99/R00 Postdoctoral Scholar | National Institutes on Aging Present
Research: Social epidemiology; life course perspectives; neighborhoods; disability; muscle health; mitochondrial function

EDUCATION & TRAINING

University of California, San Francisco 2018-2020
T32 Postdoctoral Scholar, Department of Epidemiology & Biostatistics
Mentors: Drs. Maria Glymour & Peggy Cawthon

University of Michigan School of Public Health 2013-2018
PhD, Epidemiologic Science
Dissertation: “Muscle Weakness in Older Adults: Examining the Measurement, Health Outcomes and Life Course Determinants”
Committee Chair: Dr. Philippa Clarke

University of Miami Miller School of Medicine 2009-2010
MPH, Public Health
Capstone Advisor: Dr. Lisa Metsch

University of Miami College of Arts and Sciences 2004-2008
BA, Major: Psychology | Minor: Political Science & English

RESEARCH SUPPORT

Current

K99AG066846-01A1 Duchowny (PI) 1/2021- 12/2026

National Institute on Aging: K99/R00 Pathway to Independence Award

Examining the Role of the Neighborhood Environment on Muscle Function in Older Adults: This study seeks to identify which features of the neighborhood environment are related to muscle function, physical activity and mitochondrial health in order to understand what social and biologic risk factors matter most for muscle function among older adults.

R01AG069147-02 Duchowny (Co-I) 1/2021- 9/2026

NIH/National Institute on Aging

Access and use of long-term services and supports for older adults living alone with Alzheimer's disease and related dementias from four racial/ethnic groups: The proposed research will elucidate key barriers and facilitators to accessing and using long-term services and supports (LTSS) for older adults with ADRD, especially those who live alone and racial/ethnic minorities

Completed

T32AG049663 Glymour (PI) 9/2018- 9/2020

NIH/National Institute on Aging

Translational Epidemiology- Training for Research on Aging and Chronic Disease

The goal of this training program is train PhD students and postdoctoral researchers to conduct research on prevention and treatment of chronic diseases in older adults.

Role: Postdoctoral Trainee

P30AG012846 Duchowny (Co-I) 7/2016- 6/2017

NIH/National Institute on Aging

Internal Pilot grant investigating the long-term health consequences associated with muscle weakness in the Health and Retirement Study.

T32AG027708 Mendes de Leon (PI) 5/2015- 4/2017

NIH/National Institute on Aging

Interdisciplinary Research Training on Health and Aging

The goal of this training program is to provide training in the social and behavioral determinants and adverse health outcomes in older age.

Role: Predoctoral Trainee

Predocotoral Fellowship Award Duchowny (PI) 6/2017-9/2018

University of Michigan Rackham Graduate School

Muscle Weakness in Older Americans: Measurement, Health Outcomes & Determinants: Doctoral research on the health consequences of muscle weakness on older adults.

PUBLICATIONS

1. Yang, Y., Swinnerton, K., Glymour, M.M., Portacolone, E., Torres, J.*, **Duchowny, K.A.***, “Unmet Needs Among Older Adults Living Alone with Cognitive Impairment”. Accepted for publication, *Journal of Alzheimer’s & Dementia*.
2. Chen, Y.H., Riley, A.R., **Duchowny, K.A.**, Aschmann, H.E., Chen,R., Kiang, M.V., Mooney, A, Stokes, A.C., Glymour, M.M., Bibbins-Domingo, K. (2022) “COVID-19 mortality and excess mortality among working-age Californians, by occupational sector: an analysis of mortality surveillance data”. *Accepted for publication, Lancet Public Health*.
3. **Duchowny, K.A.***, Ackley, S.F.*, Zimmerman, S.C., Brenowitz, W., Caunca, M.R., Glymour, M.M. (2022). “The Association Between Handgrip Strength and Dementia Risk: Evidence from the UK Biobank”. *JAMA Network Open, In Press*.

4. Wallace, J., Lollo, A., **Duchowny, K.A.**, Lavalley, M., Ndumele, C. (2022). “Inequities in Healthcare Access and Utilization in the US: Evidence from White and Black Medicaid Enrollees in 3 States”. *JAMA Health Forum, In Press*.
5. Matthay, E.C., **Duchowny, K.A.**, Riley, A.R., Thomas, M., Chen, Y.H., Bibbins-Domingo, K., Glymour, M.M. (2022) “Occupation and educational attainment characteristics associated with COVID-19 Mortality by race and ethnicity in California”. *JAMA Network Open, In Press*
6. Zanker, J., Blackwell, T., Patel, S., **Duchowny, K.A.**, Brennan-Olsen, S., Cummings, S.R., Evans, W.J., Orwoll, E.S., Scott, D., Vogrin, S., Duque, G., Cawthon, P.M. (2022) “Factor analysis to determine relative contributions of strength, physical performance, body composition and muscle mass to disability and mobility disability outcomes in older men”. *Experimental Gerontology, In Press*
7. Thomas, M.D., Matthay, E.C., **Duchowny, K.A.**, Riley, A.R., Chen, Y-H, Glymour, M.M, Bibbins-Domingo, K., (2022). “A descriptive analysis of 2020 California Occupational Safety and Health Administration COVID-19 related complaints”. *Social Science & Medicine—Population Health, In Press*
8. Wrigley-Field, E., Kiang, M.V., Riley, A.R., Barbieri, M., Chen, Y-H, **Duchowny, K.A.** Matthay, E.C., Van Riper, D., Jegathesan, K., Bibbins-Domingo, K., Leider, J.P. (2021) “Geographically-targeted COVID-19 vaccination is more equitable than age based thresholds alone”. *Science Advances, In Press*.
9. Chen, Y.H., Glymour, M.M., Riley, A., Balmes, J., **Duchowny, K.A.**, Harrison, R., Matthay, E., Bibbins-Domingo, K (2021). “Excess mortality associated with the COVID-19 pandemic among Californians 18–65 years of age, by occupational sector and occupation: March through October 2020”, *PloSOne, In Press*.
10. **Duchowny, K.A.** & Noppert, G. (2021) “The Association between Cytomegalovirus & Disability: Results from a Nationally Representative Sample of Older Adults”. *American Journal of Epidemiology, In Press*.
11. Cawthon, P.M., Patel, S.M., Harris, T., Kritchevsky, S., Newman, A., Santanasto, A., Kiel, D., Trivison, T., Lane, N., Cummings, S.R., Orwoll, E.S., **Duchowny, K.A.**, Kwok, T., Hirani, V., Schousboe, J., Karlsson, M., Mellström, D., Ohlsson, C., Ljunggren, O., Xue, Q., Shardell, M., Pencina, K., Fielding, R., Magaziner, J., Correa-de-Araujo, R., Bhasin, S., Manini, T.M. (2021) “What cut-point in gait speed best discriminates older adults with mobility complaints from those without? A pooled data analysis from the Sarcopenia Definitions and Outcomes Consortium”. *Journal of Gerontology: Medical Sciences, In Press*.
12. Matthay, E.C., **Duchowny, K.A.**, Riley, A.R., Galea, S. (2021) Projected all-cause deaths attributable to COVID-19-related unemployment in the United States”, *American Journal of Public Health, In Press*.
13. **Duchowny, K.A.**, Hicken, M., Cawthon, P.M., Glymour, M.M., Clarke, P. (2020) “Life Course Trauma and Muscle Weakness in Older Adults by Gender and Race/Ethnicity: Results from the Health and Retirement Study. *Social Science & Medicine—Population Health*.

14. Patel, S.M., **Duchowny, K.A.**, Kiel, D.P., Correa-de-Araujo, R., Fielding, R.A., Travison, T., Magaziner, J., Manini, T., Xue, Q.L., Pencina, K.M., Santanasto, A.J., Bhasin, S., Cawthon, P.M. (2020) “Prevalence, sensitivity and specificity for Sarcopenia Definition and Outcomes Consortium (SDOC) defined low grip strength in two nationally representative population-based cohorts”. *Journal of the American Geriatrics Society*.
15. Cawthon, P.M., Manini, T., Patel, S.M., Newman, A., Travison, T., Kiel, D.P., Santanasto, A.J., Ensrud, K.E., Xue, Q.L., Shardell, M., **Duchowny, K.A.**, Pencina, K.M., Fielding, R.A., Magaziner, J., Correa-de-Araujo, R., Bhasin, S. (2020) “Putative cut-points in sarcopenia components and their associations with incident adverse-health outcomes: A pooled data analysis from the Sarcopenia Definitions and Outcomes Consortium”. *Journal of the American Geriatrics Society*.
16. Zanker, J., Blackwell, T., Patel, S., **Duchowny, K.A.**, Brennan-Olsen, S. Cummings, S., Evans, W.J., Orwoll, E.S. Scott, D., Vogrin, S., Duque, G., Cawthon, P.M. (2020) “Walk speed and muscle mass estimated by the D3-Creatine dilution method are the strongest predictors of incident mobility disability in older men; a classification and regression tree analysis.” *Journal of the American Medical Directors*.
17. Cawthon, P.M., Blackwell, T. Cummings, S.R., Orwoll, E.S., **Duchowny, K.A.**, Kado, D.R., Stone, K.L., Ensrud, K.E., Cauley, J.A. Evans, W.J. for the Osteoporotic Fractures in Men (MrOS) Study Research Group. (2019). “Muscle mass assessed by D₃-Creatine dilution method and incident disability and mortality in community dwelling older men”. *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences*.
18. **Duchowny, K.A.**, Glymour, M.M., Cawthon, P.M. (2019) “Is Perceived Neighborhood Physical Disorder Associated with Muscle Strength in Middle Aged and Older Men and Women? Findings from the U.S. Health and Retirement Study”. *Journal of Epidemiology and Community Health*.
19. **Duchowny, K.A.**, Peters, K., Cummings, S.R., Orwoll, E.S., Hoffman, A., Ensrud, K.E., Cauley, J.A., Evans, W.J., & Cawthon, P.M. (2019). “D3-creatine Dilution is Associated with Changes in Muscle Mass, Walking Speed and Grip Strength”, *Journal of Cachexia, Sarcopenia and Muscle*.
<https://doi.org/10.1002/jcsm.12494>
20. Twardzik, E., **Duchowny, K.A.**, Gallagher, N., Alexander, N., Colabianchi, N. & Clarke, P. (2019) “Which Features of the Built Environment Matter Most for Mobility? Using Wearable Sensors to Capture Real-Time Outdoor Environment Demand for Mobility”, *Gait and Posture*.
21. **Duchowny, K.A.** (2018) “Clinical Muscle Weakness is Associated with Mortality in a Nationally Representative Sample of Older Adults: The Health and Retirement Study”, *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences*
22. Karvonen- Gutierrez, C., Peng, M , Peterson, M.D., **Duchowny, K.A.**, Nan, B., & Harlow, S. (2018) “Low grip strength predicts incident diabetes among mid-life women: the Michigan Study of Women’s Health Across the Nation”. *Age and Ageing*.

23. **Duchowny, K.A.**, Clarke, P.J., Gallagher, N.A., Adams, R.A., Rosso, A.L. & Alexander, N.A. (2018) “Using Mobile, Wearable, Technology to Understand the Role of Built Environment Demand for Outdoor Mobility”. *Environment & Behavior*.
24. **Duchowny, K.A.**, Clarke, P.J., Peterson, M.D. (2017). Muscle weakness and physical disability in older Americans: Longitudinal findings from the U.S. Health and Retirement Study. *The Journal of Nutrition, Health & Aging*. <http://doi.org/10.1007/s12603-017-0951-y>
25. **Duchowny, K.A.**, Peterson, M.D., Alexander, N.A. & Clarke, P.J. (2017) “Cut Points for Clinical Muscle Weakness Among Older Americans”. *American Journal of Preventive Medicine*, 53(1), 63-69.
26. Peterson, M.D., **Duchowny, K.A.**, Meng, Q., Wang, Y., Chen, X., Zhao, Y. (2017) “Low Normalized Grip Strength is a Biomarker for Cardiometabolic Disease and Physical Disabilities Among U.S. and Chinese Adults”. *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences* (2017): glx031.
27. Peterson, M. D., Zhang, P., **Duchowny, K.A.**, Markides, K. S., Ottenbacher, K. J., & Al Snih, S. (2016) Declines in Strength and Mortality Risk Among Older Mexican Americans: Joint Modeling of Survival and Longitudinal Data. *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences* 71.12 (2016): 1646-1652.
28. Bass, M. M., **Duchowny, K.A.**, & Llabre, M. M. (2009) The effect of therapeutic horseback riding on social functioning in children with autism. *Journal of Autism and Developmental Disorders*, 39(9), 1261-1267.

Submitted / Under Review

Chen, Y-H., Matthay, E.C., Chen, R., DeVost, M.A., **Duchowny, K.A.**, Riley, A.R., Bibbins-Domingo, K., Glymour, M.M. “Educational inequalities in excess mortality during the COVID-19 pandemic in California: March 2020 through February 2021”.

Ackley, S.A., Zimmerman, S.C., Flatt, J.D., Sevelius, J., **Duchowny, K.A.** “Discordance in Sex and Gender in the UK Biobank”.

Noppert, G.A., **Duchowny, K.A.**, Clarke, P.C. “The Scars of Early Life Trauma on the Immune System: Lifecourse Findings from the Health and Retirement Study”.

In Preparation

Duchowny, K.A., Cawthon, P., Molina, A., Kritchevsky, S., Newman, A., Hepple, R., Coen, P., Mau, T., Kramer, P., Toledo, F., Cummings, S. on Behalf of the Study of Muscle, Mobility and Aging. “Skeletal Muscle Mitochondrial Function and Early Life Adversity: Results from the SOMMA Study”.

Duchowny, K.A., Clarke, P.C., Noppert, G.A. “Does cytomegalovirus seropositivity mediate the relationship between neighborhood disorder and physical disability? Results from the Health and Retirement Study”.

Duchowny, K.A.*, Ackley, S.F*, Glymour, M.M. “The Association of a Genetic Risk Score for Mitochondrial DNA Abundance and Alzheimer’s Disease in the UK Biobank”.

*Denotes co-first author or senior author

CONFERENCE PRESENTATIONS

Oral Presentations

Noppert, G.A. & **Duchowny, K.A.**, “The Power of Surveillance: Who Decides, Who is Counted, and Who is Left Behind”. The Interdisciplinary Association of Population Health Science (IAPHS), October 2021.

Duchowny, K.A., Noppert, G.A., Clarke, P.J., “Does cytomegalovirus seropositivity mediate the relationship between neighborhood disorder and disability?” Gerontological Society of America, November 2021.

Duchowny, K.A. & Noppert, G.A “Cytomegalovirus and Disability in Older Adults: Results from the Health and Retirement Study”. Gerontological Society of America, October 2020.

Cawthon, P.M., Blackwell,T., Cummings, S.R., Orwoll, E.S., **Duchowny, K.A.**, Ensrud, K.E., Cauley, J.A., Evans, W.J. “The association between muscle mass assessed by D3Cr dilution with incident disability in community dwelling older men”. *International Conference on Frailty and Sarcopenia Research*, Miami, FL, March 2019.

Twardzik, E., **Duchowny, K.A.**, Gallagher, A., Alexander,N., Colabianchi, N., Clarke, P. "Which Features of the Built Environment Matter Most for Mobility? Using Wearable Sensors to Capture Real-Time Outdoor Environment Demand for Mobility", *American Public Health Association*, San Diego, CA, November 2018.

Duchowny, K.A., Peterson, M.D., Clarke, P. “Clinical Muscle Weakness is Associated with Mortality in a Nationally Representative Sample of Older Adults: The Health and Retirement Study”. *International Conference on Frailty and Sarcopenia Research*, Miami, Florida, March 2018.

Duchowny, K.A., Peterson, M.D., Clarke, P. “Risk of Physical Disability in Older Americans with Muscle Weakness: Longitudinal Findings from the Health and Retirement Study”. *International Association of Gerontology and Geriatrics World Congress Meeting*, San Francisco, CA, July 2017.

Duchowny, K.A., Peterson, M.D., Clarke, P. “Muscle Weakness and Physical Disability in Older Americans: Longitudinal Results from the Health and Retirement Study”. *International Conference on Frailty and Sarcopenia Research*, Barcelona, Spain, April 2017.

Karvonen- Gutierrez, C., Peterson, M.D., **Duchowny, K.A.**, Peng, M. & Harlow, S. “Association of Grip Strength With Incident Diabetes Among Mid-life Women”. *Gerontological Society of America Annual Meeting*, New Orleans, LA, November 2016.

Onwuka, A.R., **Duchowny, K.A.**, Brown, K. “Killed and Unaccounted For: Examining the Racial and Geographic Breakdown of Individuals Killed by Police in 2015”. *American Public Health Association Annual Meeting*, Denver, CO, November 2016.

Brown, K., **Duchowny, K.A.**, Onwuka, A. “Police Discrimination and Depressive Symptoms in the Chicago Community Adult Health Study”. *Epidemiology Congress of the Americas*, Miami, FL, June 2016.

Duchowny, K.A., Peterson, M.D, Clarke, P. “Grip Strength as an Indicator of Clinically Relevant Muscle Weakness in Older Americans: Identifying Cutpoints and National Prevalence Estimates by Race in the U.S. Health and Retirement Study”. *International Conference on Frailty and Sarcopenia Research*, Philadelphia, PA, April 2016.

Duchowny, K.A. “Weakness in Older Americans: Sex/Race-Specific Cutpoints and Prevalence Estimates from the Health and Retirement Study”, Research Presentation, *Health and Retirement Study Research in Progress*, Institute for Social Research, Ann Arbor, Michigan, April 2016.

Duchowny, K.A. “Muscle Weakness in Older Americans: A Silent Epidemic”, Research Presentation, *Center for Social Epidemiology and Population Health Seminar*, University of Michigan School of Public Health, Department of Epidemiology, Ann Arbor, Michigan, April 2016.

Duchowny, K.A., Toner, C., Cobb, L.K., Johnson, C.C. “Formative Research on Independent Restaurants in New York City: Opportunities for Sodium Reduction”. *The American Public Health Association Annual Meeting*, San Francisco, CA, October 2012.

Poster Presentations

Duchowny, K.A.*, Ackley, S.F.*, Zimmerman, S.C., Brenowitz, W., Caunca, M.R., Glymour, M.M. “The Association Between Handgrip Strength and Dementia Risk: Evidence from the UK Biobank”. *Society for Epidemiologic Research (SER)*, June 2021.

Duchowny, K.A., Glymour, M.M., Cawthon, PM. "Is Perceived Neighborhood Disorder Associated with Muscle Strength? Findings from the Health and Retirement Study”, *Society for Epidemiologic Research*, Minneapolis, MN, June 2019.

Duchowny, K.A., Hicken, M. & Clarke, P. "Life Course Stress and Trauma in Shaping Muscle Strength in Older Adults”, *Population Association of America*, Austin, TX, April 2019.

Duchowny, K.A., Hicken, M. & Clarke, P. "Life Course Determinants of Muscle Weakness: The Role of Stress and Trauma”, *Gerontological Society of America*, Boston, MA, November 2018.

McGrath, R., Vincent, B., Dieter, B., **Duchowny, K.A.**, Markides, K., Al Snih, S., Peterson, M. “Muscle Weakness and Diabetes Jointly Exacerbate the Rate of Functional Disability among Older Mexican Americans”. *American College of Sports Medicine*, Denver, CO, June 2017.

Duchowny, K.A., Brown, K., Onwuka, A. “The Counted: Enumerating the Number of Lives Lost Due to Police Killings in 2015”. *Epidemiology Congress of the Americas*, Miami, FL, June 2016.

Duchowny, K.A., Peterson, M.D., Clarke, P. “Weakness in Older Americans: Sex/Race-specific Cutpoints and Prevalence Estimates from the Health and Retirement Study”, *Gerontological Society of America Annual Meeting*, Orlando, FL, November 2015.

Brown, K., **Duchowny, K.A.,** Onwuka, A. “Police Satisfaction and Health Behavior in Chicago Adults”. *Reimagining Health in Cities: New Directions in Urban Health Research and Action*, Drexel University School of Public Health, Philadelphia, PA, September 2015.

Duchowny, K.A., Clarke, P., Gallagher, N., Adams, R., Kuo, A., Rosso, A., Alexander, N. A. “A Multisystem Approach to Understanding Real-World Mobility Difficulty using Mobile Technology in the Community Setting”. *Gerontological Society of America Annual Meeting*, Washington, DC, November 2014.

Duchowny, K.A., Dong, C., Guzman, J., Rundek, T., Elkind, M., DeCarli, C., Sacco, R.L., & Wright, C.B. “The Northern Manhattan global vascular risk score is associated with brain morphology”. *The Evelyn F. McKnight Center for Age Related Memory Loss*, Inter-institutional Annual Meeting, University of Florida, May 2010.

INVITED TALKS

“Uncovering the intersection between social determinants and musculoskeletal health to promote health equity”, *University of California, San Diego, Gerontology Research Collaborative*, June 2022.

“Examining the measurement and social determinants of muscle health in older adults”, *New York University, Department of Population Health*, February 2020.

“Muscle Weakness in Older Americans”, *Trinity College-University of Michigan Research Exchange, The Irish Longitudinal Study of Aging, Trinity College, Dublin, Ireland*, November 2016.

“Application of Generalized Linear Models in SAS”, Course Lecture, Applied Epidemiologic Data Analysis in SAS (*EPID 602*), *University of Michigan School of Public Health*, Ann Arbor, Michigan, April 2015.

RESEARCH EXPERIENCE

Predoctoral Fellow 2017- 2018
Center for Social Epidemiology and Population Health
University of Michigan Rackham Graduate School

T32 Predoctoral Trainee 2015- 2017
Center for Social Epidemiology and Population Health
University of Michigan School of Public Health

Graduate Research Assistant 2013- 2015
Social Environment & Health Program
University of Michigan Institute for Social Research

Project Coordinator & Evaluator 2010- 2013
Bureau of Chronic Disease Prevention and Tobacco Control

New York City Department of Health and Mental Hygiene

Research Assistant

2009- 2010

Sociomedical Sciences Research Group
University of Miami Miller School of Medicine

HONORS & AWARDS

University of Michigan Rackham Predoctoral Fellowship Award 2017-2018
For outstanding doctoral students working on dissertations that are unusually creative, ambitious and impactful.

A. Regula Herzog Young Investigator Award 2017
For outstanding emerging scholar conducting research on older populations.

Rackham Summer Award 2017

Harburg Student Award for Excellence in Social Epidemiology 2016
Awarded for best paper that understands the links between social determinants, psychological processes, behaviors in health research.

Rackham Graduate School Travel Award 2016

Department of Epidemiology Travel Award 2015

Gerontological Society of America Travel Award for Junior Investigators 2014

MaryFran R. Sowers Doctoral Summer Fellowship 2014

PROFESSIONAL ACTIVITIES

RacismLab 2016-2018
Member

University of Michigan School of Public Health Student Diversity Network 2013-2018
Doctoral Student Representative

University of Michigan Epidemiology Methods Journal Club 2015-2016
Lead Facilitator

University of Michigan Epidemiology Women's Group 2016
Founder

PEER REVIEW

Journal of the American Geriatrics Society (JAGS)
Social Science & Medicine—Population Health

Research on Aging
American Journal of Preventive Medicine
Journal of Gerontology: Medical Sciences
Journal of Gerontology: Psychological Sciences
Journal of Gerontology: Social Sciences
Osteoporosis International

MEMBERSHIPS

Gerontological Society of America (GSA)
International Association for Population Health Science (IAPHS)
Population Association of America (PAA)
Society for Epidemiologic Research (SER)

SELECTED MEDIA COVERAGE

Norton, A. (2021) “Pandemic Unemployment Has Taken Its Own Deadly Toll

Healthday News <https://consumer.healthday.com/2-26-pandemic-unemployment-has-take-its-own-deadly-toll-2650724205.html>

Beech, K. (2021) “Researchers rank deadliest jobs during pandemic, with line cooks topping the list: People of color also suffer some of the biggest risks”

<https://www.thedenverchannel.com/news/national/researchers-rank-deadliest-jobs-during-pandemic-with-line-cooks-topping-the-list>

Williams, B. (2018) People with Weak Muscles Are More Likely to Die Early, Says Study. **Men’s Health** <https://www.menshealth.com/health/a22851634/university-of-michigan-strength-mortality-study/>

Yenisey, Z. (2018) People with Strong Muscles Live Longer, According to New Study. **Maxim** <https://www.maxim.com/news/people-with-strong-muscles-live-longer-2018-9>

Rahhal, N. (2018) Want to live longer? Lift weights: People with weaker muscles are 50 percent more likely to die early, study suggests. **Daily Mail** <https://www.dailymail.co.uk/health/article-6103591/People-weaker-muscles-50-percent-likely-die-early-study-suggests.html>

Hosie., R. (2018) High Muscle Strength Could Help You Live Longer, Study Finds. **The Independent** <https://www.independent.co.uk/life-style/health-and-families/strength-training-muscle-stronger-live-longer-life-expectancy-increase-a8511491.html>