BIOGRAPHICAL SKETCH 2021

NAME: MOFFITT, TERRIE EDITH

eRA COMMONS USER NAME (agency login): TMOFFITT

POSITION TITLE: Nannerl O. Keohane University Prof (Duke), Prof of Social Behaviour & Development (KCL)

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of North Carolina, Chapel Hill	BA	05/1977	Psychology
University of Southern California, Los Angeles	MA	05/1981	Experimental Psychology
University of Southern California, Los Angeles	PHD	05/1984	Clinical Psychology
UCLA School Medicine, Neuropsychiatric Inst.	Other training	1983	Clinical Internship Neuropsych.
UCLA School Medicine, Neuropsychiatric Inst.	Postdoctoral Fellow	1984	Beh. Neuroscience, Geriatrics.

A. PERSONAL STATEMENT

I am Associate Director of the Dunedin Longitudinal Study, which follows a 1972 birth cohort in New Zealand (references 1,2). I also co-founded the Environmental Risk Longitudinal Twin Study (E-Risk), which follows a 1994 birth cohort in the UK. Longitudinal research is an inherently horizon-scanning enterprise, and I relish forward planning, anticipating new trends, and asking new questions. My work is about as interdisciplinary as it gets; my team often generates discoveries when we make dataset combinations across previously unconnected disciplines. I am a licensed clinical psychologist, with specialization in neuropsychological assessment. I have a published record of collaboration with criminologists, economists, geneticists, epidemiologists, sociologists, demographers, gerontologists, statisticians, neuroscientists, medical scientists, even ophthalmologists and dentists. The resulting products make impact **(Google scholar H-index of 205, January 2022)**. My team has a good track record as first adopters of new research technologies; for example, we were among the first cohorts to collect DNA, in 1996, and among the first cohorts to use retinal imaging, in 2009. I bring to projects expertise in longitudinal methods, developmental theory, clinical psychopathology, neuropsychological assessment, and genomics in behavioral science. I also draw on expertise from a broad network including the Pepper Center for the Study of Aging, Center for Computational and Genomic Biology, Social Science Research Institute, DUPRI Population Research Institute, CPHA Duke Center for Population Health and Aging (all at Duke Univ.), UNC Center for Developmental Science, University of Oslo PROMENTA center for youth mental health, and King's College London's Institute of Psychiatry Centre for Social, Genetic, and Developmental Psychiatry. Since 2010, we have turned to studying processes of aging in midlife (reference 3). My team emphasizes representing our science accurately to the media, and promotes public understanding of science (see reference 4; and www.altmetric.com). I have a track record of bringing in large-scale research projects on-time and on-budget. Over the past decade, I have provided data to over 100 senior investigators, at 50 Universities, in 14 countries. I also have an appetite for mentoring young scientists. I provide them with high-quality data with which they can train and develop independent ideas. I meet for 2 hours weekly with each graduate student or postdoc involved in my projects. I have trained 28 young scientists; have placed them in top-flight leadership positions; they have won more than 45 prestigious early-career awards and fellowships. I received the 2019 Postdoctoral Mentor award from Duke University. My Hispanic and African American trainees have held NIH minority supplement fellowships. My team also welcomes undergraduates;11 of them have co-authored publications in the past 5 years, and all have gone on to medical school or a PhD program. Web page with full publication list: www.moffittcaspi.com. Publication list: https://www.ncbi.nlm.nih.gov/myncbi/terrie.moffitt.1/bibliography/public/; http://orcid.org/0000-0002-8589-6760

1. Belsky, J, Moffitt, TE, Poulton, R, Caspi, A. *The Origins of You, How Childhood Shapes Later Life.* 2020 Harvard University Press.
2. Moffitt TE, Caspi A, Rutter M, Silva PA. *Sex Differences in Antisocial Behaviour: Conduct Disorder, Delinquency, and Violence in the Dunedin Longitudinal Study*. Cambridge University Press; 2001.
3. Moffitt, TE. Behavioral and social research to accelerate the geroscience agenda. *Ageing Research Reviews,* 2020, 63, PMID: 32814128; PMCID: PMC7894048, DOI: 10.1016/j.arr.2020.101146
4. Predict My Future, 4-episode documentary. http://www.moffittcaspi.com/content/science-us, https://app.curiositystream.com/video/1268, 2017. The episodes are now posted on Vimeo. The password for all episodes is ***dlsdls***. Episode 1 https://vimeo.com/154272698, Episode 2

https://vimeo.com/154683264, Episode 3 https://vimeo.com/155352142, Episode 4 https://vimeo.com/153469638

Ongoing and recently completed projects that I would like to highlight include:

NIA R01AG069939 Comprehensive portrait of long-term cannabis users: Are they ready for old age? 2020-2024. Principal Investigator

NIA R01AG032282 Aging in 1000 healthy young adults: The Dunedin Study. 2009-2021. Joint Principal Investigator (with A Caspi)
NIA (R01AG032282 SUPPLEMENT) Methylation signatures of Aging in 1000 healthy young adults. 2019-2020. Joint Principal Investigator (with A Caspi).
NIA (R01AG032282 SUPPLEMENT) Family history of Alzheimers and related dementias in Aging in 1000 healthy young adults. 2017-2020. Joint Principal Investigator (with A Caspi).

NIA R01AG049789 Neural signatures of healthy and unhealthy aging: The Dunedin Study. 2015-2021. Joint Principal Investigator (with A Hariri). Renewal scored 2 percentile Oct 2021.

NIA 1F99AG068432 Transition to Aging F99/K00 for Max Elliott: Training in lifespan behavioral, social, and neuroscience research connecting early-life cognitive decline to late-life ADRD. 2020-2022. My role is PI PhD advisor.

NIEHS 1F31ES029358 NRSA PhD fellowship for Aaron Reuben: Evaluating neurodegenerative risk in midlife among individuals exposed to lead as children. 2018-2022. My role is PI PhD Advisor.

UK MRC MR/P005918 Midlife pace of aging in the Dunedin study: Cognition. 2017-2021. Joint Principal Investigator (with A Caspi).

NICHD R01HDHD077482 Behavioral and genomic mechanisms linking childhood violence exposure to health: Phase 18 of the UK Environmental-Risk Longitudinal Twin Study. 2013-2019. Co-Investigator (with A Caspi PI).

B. POSITIONS, SCIENTIFIC APPOINTMENTS, AND HONORS

Positions and Employment

2019 -	Adjunct Professor of Psychology, University of Oslo, Norway
2010 - 2020	Board of Trustees, Nuffield Foundation, UK
2007 -	Nannerl O. Keohane University Professor, Duke University
1997 -	Professor, Social, Genetic, & Developmental Psychiatry Centre, Institute of Psychiatry, London
1991 -	Associate Director, Dunedin Multidisciplinary Research Unit, University of Otago, New Zealand
1985 - 2007	Assistant-, Associate- (1989), Full-Professor (1993), University of Wisconsin, Madison

Other Current/Recent Experience and Professional Memberships

- Board of Scientific Counselors, National Inst on Aging (2022-2024)
- Chair, Board on Behavioral, Cognitive, Sensory Sciences (BBCSS), National Academies of Sciences, Engineering, and Medicine (2021-2023)
- Chair, Health and Retirement Study Data Monitoring Board, National Inst on Aging (2021-2024)
- Chair, Jacobs Foundation Prize Jury, Switzerland (2015-2022)
- National Advisory Council on Aging, US NIH (2017-2020)
- American Journal of Psychiatry Associate Editors Board
- Natl. Register of Health Service Providers #50256; NC Licensed Psychologist #4428

Honors

2022 The Grawemeyer Award in Psychology http://grawemeyer.org/psychology/
2019 Postdoctoral Mentor Award, Duke University
2018 Matilda White Riley Award from NIH OBSSR
2018 Elected Fellow, National Academy of Medicine
2017 Honorary Doctorate, Catholic University of Leuven, Belgium
2016 Distinguished Career Research Award from American Psychological Assn.
2016 Luminary Prize from the Avielle Foundation, www.aviellfoundation.org
2014 Honorary Doctorate, Basel University, Switzerland
2013 In the world's top 400 biomedical scientists, Boyack et al. European J. of Clinical Investigation
2012 Top 10 Criminologists worldwide, Cohn & Farrington, Scholarly Influence in Criminology, NY: Nova.
2010 Ruane Prize for Outstanding Child and Adolescent Psychiatric Research, NARSAD
2010 Jacobs Research Prize for Productive Youth Development, Klaus J. Jacobs Foundation, Switzerland
2009 Elected Fellow, Association for Psychological Science
2009 The Klaus-Grawe Prize for Research in Clinical Psychology, Klaus-Grawe Foundation
2008 Elected Thorsten Sellin Fellow, American Academy of Political & Social Sciences
2008 Rema Lapouse Award, American Public Health Association
2008 Distinguished Scientific Contribution Award, Internatl. Soc. Study of Behavioral Development
2007 The Stockholm Prize in Criminology, Sweden
2006 Distinguished Research Award (Child-Adolescent Psychopathology), Am Psychol Assoc
2005 Elected Fellow, both Academia Europaea, and American Psychopathological Association
2004 Elected Fellow, British Academy
2003 Elected Fellow, American Society of Criminology
2003 Eleanor Maccoby Book Award, American Psychological Association
2002 Wolfson Merit Award, The Royal Society
1999 Elected Fellow, UK Academy of Medical Sciences
1993 Award for Early Career Contribution to Psychology, American Psychological Association

C. CONTRIBUTIONS TO SCIENCE (in order from most recent in my career to earliest)

Aging in young-to-midlife people, an opportunity for prevention. I am now leading the Dunedin Study in the study of aging. To prevent onset of age-related diseases and physical and cognitive decline, interventions to slow human aging and extend health span must eventually be applied to people while they are still healthy, before organ damage sets in. Yet most human aging research examines older adults, many with chronic disease, and little is known about aging in healthy younger humans. This huge knowledge gap is a barrier to extending health span. We have put forward the case that gero-science should invest in researching processes of aging in young-to-midlife adults. We developed a measurement model of the pace of aging in a birth cohort by using repeated waves of biomarkers collected across the third to fifth decades to quantify the pace of coordinated physiological deterioration across multiple organ systems (e.g., pulmonary, periodontal, cardiovascular, renal, hepatic, metabolic, and immune function). Our findings provided showed that it is possible to quantify individual variation in the pace of aging in young adults age 45 who are still free of age-related diseases. Using our measurement of the pace of aging, we are pinpointing factors that slow or speed the pace of aging, and factors that characterize slow-aging young adults. We compared 11 purported measures of aging (pace of aging, bioage, genomic methylation clocks, telomeres), a comparison which revealed that these measures are virtually uncorrelated and therefore cannot be measuring the same thing. We have developed a methylation version of the pace of aging for use as an outcome measure in preventive clinical trials of anti-aging therapies: DunedinPoAm4x.

a. Belsky DW, et al. and Moffitt TE. Quantification of biological aging in young adults. *PNAS Proceedings of the National Academy of Sciences.* 2015; 77:601-617. PMID: 26150497; PMCID: PMC4522793 DOI: 10.1073/pnas.1506264112

b. Moffitt TE, et al. The longitudinal study of aging in human young adults: Knowledge gaps and research agenda. *J of Gerontology: Biological Sciences and Medical Sciences.* 2017; 72:210-215. PMID:28087676; PMCID: PMC5233916 DOI: 10.1093/gerona/glw191

c. Belsky, DW, et al. and Moffitt TE. Quantification of the pace of biological aging in humans through a blood test: The DunedinPoAm DNA methylation algorithm, *eLife*. 2020; 9:e54870. PMID:32367804; PMCID: PMC7282814 DOI: 10.7554/eLife.54870. UPDATE: https://medrxiv.org/cgi/content/short/2021.08.30.21262858v1
d. Elliott, M, et al. and Moffitt TE. Disparities in the pace of biological aging among midlife adults of the same chronological age: Implications for future frailty risk and policy. *Nature Aging, 2021.* PMID: 33796868 PMCID: PMC8009092 DOI: 10.1038/s43587-021-00044-4

Early-life psychiatric disorder is a precursor to late-life physical and neurodegenerative diseases. Mental disorders peak in prevalence and incidence during adolescence and young adulthood. Physical and neurodegenerative diseases peak in prevalence and incidence in late life. We showed the same people tend to have mental disorders when young and physical diseases when old. This points out an important target for preventing diseases.
a. Moffitt TE, Caspi A. Psychiatry's opportunity to prevent the rising burden of age-related disease. *JAMA-Psychiatry*. 2019. PMID: 30916735 PMCID: PMC8327353 DOI: 10.1001/jamapsychiatry.2019.0037
b. Richmond-Rakerd LS, et al. and Moffit TE. Longitudinal associations of mental disorders with physical diseases and mortality among 2.3 million New Zealand Citizens. *JAMA-Network Open 2021.* PMID:33439264; PMCID: PMC7807295, DOI: 10.1001/jamanetworkopen.2020.33448
c. Wertz J, et al., and Moffitt TE. Association of history of psychopathology with accelerated aging at midlife. *JAMA-Psychiatry 2021.* PMID: 33595619 PMCID: PMC7890535 DOI: 10.1001/jamapsychiatry.2020.4626
d. Richmond-Rakerd LS, et al. and Moffit TE. Mental disorders in early life antedate Alzheimer Disease and Related Dementias in the medical records of 3 million New Zealanders. *2022, JAMA-Psychiatry.*

We introduced the fields of aging and human development to a new measure of accumulated chronic inflammation: SuPAR (Soluble Urokinase Plasminogen Activator Receptor). This cumulative and stable new measure of systemic inflammation has advantages over CRP and IL-6, acute inflammatory measures which fluctuate. A large number of studies are now proposing to assay suPAR, including studies in the NIA-funded Stress Network, NIA-funded Reversibility Network, and the HRS.
a. Rasmussen, LJH, et al. and TE Moffitt. Association between elevated suPAR, a new biomarker of chronic inflammation, and accelerated aging. *Journal of Gerontology, Medical Sciences,* 2020. PMID: 32766674 PMCID: PMC7812430 DOI: 10.1093/gerona/glaa178
b. Rasmussen LJH, et al. & A Caspi. Association of adverse experiences and exposure to violence in childhood and adolescence with inflammatory burden in young people. *JAMA Pediatrics, 2019* PMID: 31682707 PMCID: PMC6830440 DOI: 10.1001/jamapediatrics.2019.3875
c. Rasmussen, LJH, et al. & Caspi, A. Cumulative childhood risk is associated with a new measure of chronic inflammation in adulthood. *J of Child Psychology and Psychiatry, 2019* PMID: 29741788 PMCID: PMC6342676 DOI: 10.1111/jcpp.12928
d. Bourassa, K.J.*, Rasmussen, L.J.H.*, et al. & Caspi, A. Linking stressful life events and chronic inflammation using suPAR. *Brain, Behavior and Immunity.* In press.
e. Dowsett, Joseph et al. Eleven genomic loci affect plasma levels of chronic inflammation marker soluble urokinase plasminogen activator receptor. *Communications Biology* 2021 PMID: 34079037 PMCID: PMC8172928 DOI: 10.1038/s42003-021-02144-8

Exposure to lead during childhood is a source of poor brain health. The neurotoxin lead was added to paint and to automotive gasoline from the 1960's to the 1990's, a period that coincided with the childhood of the Dunedin cohort members, many of whom when tested at age 11 showed blood lead levels that far exceeded today's level of clinical concern. We reported that exposure to lead before lead additives were banned from paint and gasoline is a source of compromised brain-structure integrity, cognitive decline, and mental health problems in the baby-boomer generation. In other studies, lead exposure is completely confounded with low social class, which has made causal inference problematic, but in the Dunedin cohort, age-11 blood lead levels were wholly un-related to family social class. For this reason, this set of papers has had very high impact.
a. Reuben, A, et al. and Moffitt TE. Association of childhood blood-lead levels with cognitive function and socioeconomic status at age 38 years and with IQ change and socioeconomic mobility between childhood and adulthood. *JAMA,* 2017 PMID: 28350927 PMCID: PMC5490376 DOI: 10.1001/jama.2017.1712
b. Reuben, A, et al. Moffitt, TE, & Caspi, A. Association of childhood lead exposure with adult personality traits and lifelong mental health. *JAMA-Psychiatry*, 2019 PMID: 30673063 PMCID: PMC6450277 DOI: 10.1001/jamapsychiatry.2018.4192

c. Reuben, A, et al. & Moffitt TE. Association of childhood lead exposure with MRI measurements of structural brain integrity in midlife. *JAMA, 2020* PMID: 33201203 PMCID: PMC7672511 DOI: 10.1001/jama.2020.19998

The importance of self-control for health, wealth, life success, and healthy aging. One of our projects that has attracted the most attention from policy makers is about the importance of self-control skills mastered in childhood for success in all aspects of adult life. We reported that childhood self-control is more important than socioeconomic status (SES) or IQ for adults' physical health, addiction, crime, suicidality, wealth, life satisfaction, and parenting of the next generation. We showed in the Dunedin cohort that these poor outcomes cluster in the same small segment of the population, and in 2020 we replicated this in national registers totaling N=4 million people in New Zealand and Denmark. The findings have been viewed as lending support to the movement for quality early-childhood education, and the policy of a Universal Basic Income for adults unable to meet their own needs without government support. Our work on impulse-control goes back to a series of our highly-cited papers in the 1990's on the role of self-control in antisocial development.
a. Moffitt TE, et al. A gradient of childhood self-control predicts health, wealth, and public safety. *PNAS Proc Natl Acad Sci U S A*. 2011; 108(7):2693-2698. PMID: 21262822; PMCID: PMC3041102 DOI: 10.1073/pnas.1010076108
b. Caspi A, et al. and Moffitt TE. Childhood forecasting of a small segment of the population with large economic burden. *Nature Human Behaviour*. 2016; 1, 0005. PMID: 28706997; PMCID: PMC5505663 DOI: 10.1038/s41562-016-0005
c. Richmond-Rakerd LS, et al. and Moffitt TE. Clustering of health, crime and social-welfare inequality in 4 million citizens from 2 nations. *Nature Human Behaviour.* 2020. PMID: 31959926; PMCID: PMC7082196; DOI:10.1038/s41562-019-0810-4
d. Richmond-Rakerd LS., et al. and Moffitt TE. Childhood self-control forecasts the pace of midlife aging and preparedness for old age. *PNAS Proc Natl Acad Sci USA*. 2021. PMID:33397808; PMCID:PMC7826388 DOI: 10.1073/pnas.2010211118

Discoveries about mental disorder. We were the first to report, in 2003, that over half of adult patients with psychiatric disorder have their first diagnosable disorder before age 15 (and 75% before age 18), suggesting that most of the burden of adult mental disorder could be prevented by effective treatment of young people. We were also first to report, in 1998, that the underlying structure of adult DSM mental disorders comprises two factors, internalizing and internalizing. Continuing our work on the structure of psychopathology, we have confirmed that all adult psychiatric symptoms fit onto a single dimension of severity with symptoms of thought disorder at the extreme end, "p". We also initially reported that the lifetime prevalence of anxiety, depression, and substance dependence is at least double what the mental-health community has been led to believe by retrospective surveys. People markedly underreport the amount of mental illness they've suffered when they recall their history in interviews years after the fact. We demonstrated this by repeatedly assessing for mental disorders while following cohorts forward. These findings have all been replicated multiple times. At the least, our finding that most of us will experience an episode of mental disorder if we live long enough should reduce stigma against mental illness. Most recently we showed that, when followed for 4 decades, people shift disorders across families (internalising, externalizing, or thought disorders), which means it is not sensible practice to study one disorder at a time.
a. Krueger RF, Caspi A, Moffitt TE, Silva PA. The structure and stability of common mental disorders (DSM-III-R). *Journal of Abnormal Psychology.* 1998 May;107(2):216-227. PMID: 9604551
b. Caspi A, et al. and Moffitt, TE. The p factor: One general psychopathology factor in the structure of psychiatric disorders? *Clin Psychol Sci*. 2014 Mar; 2(2):119-137. PMID: 25360393; PMCID: PMC4209412 DOI: 10.1177/2167702613497
c. Caspi A, Moffitt, TE All for one and one for all: Mental disorders in one dimension. *American Journal of Psychiatry.* 2018; 175:831-844. PMID:29621902; PMCID: PMC6120790; DOI:10.1176/appi.ajp.2018.17121383
d. Caspi A. et al. and Moffitt, TE. Longitudinal assessment of mental disorders and comorbidities across four decades among participants in the Dunedin birth cohort Study. *JAMA-Network Open.* 2020. PMID:32315069; PMCID: PMC7175086; DOI: 10.1001/jamanetworkopen.2020.3221

Life-course persistent versus adolescence-limited antisocial behavior. In a 1993 theoretical paper, now cited over 10,000 times, I proposed that young people engaging in antisocial behaviors can be characterized in a taxonomy of two distinct types: One type of antisocial behavior is called "life-course persistent" (LCP). It is a

neurodevelopmental disorder afflicting primarily males, with very low prevalence in the population, genetic predisposition, adverse family environment, early childhood onset, and persistence of violent offending into midlife. The other type is called “adolescence limited” (AL). It affects females as well as males, is common, limited mainly to the adolescent developmental stage, and emerges in the context of peer social relationships. This developmental taxonomy has had wide ranging influence in psychology, criminology, psychiatry, neuroscience, and the law. It has been codified in the DSM diagnosis of conduct disorder, cited in Supreme Court decisions, and it won the prestigious 2007 Stockholm Prize and 2022 Grawemeyer Prize.

a. Moffitt TE. "Life-course-persistent" and "adolescence-limited" antisocial behavior: A developmental taxonomy. *Psychological Review*. 1993; 100:674-701.

b. Moffitt TE Male antisocial behavior in adolescence and beyond. *Nature Human Behaviour.* 2018; 2:177-186. PMID:30271880; PMCID: PMC6157602 DOI 10.1038/s41562-018-0309-4

c. Wertz, J, et al. and Moffitt TE. Genetics and crime: Integrating new genomic discoveries into psychological research about antisocial behavior: Replicated evidence from two birth cohorts. *Psychological Science.* 2018; 29:791-803. PMID: 29513605; PMCID: PMC5945301; DOI:10.1177/0956797617744542

d. Carlisi, CO, Moffitt TE, et al. Associations between life-course-persistent antisocial behavior and brain structure in a longitudinal birth cohort. *Lancet-Psychiatry.* 2020. PMID:32078822; PMCID: PMC7033555; DOI:10.1016/S2215-0366(20)30002-X

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/terrie.moffitt.1/bibliography/public/