

Award for Distinguished Scientific Contributions: Terrie E. Moffitt and Avshalom Caspi

The APA Awards for Distinguished Scientific Contributions are presented to persons who, in the opinion of the Committee on Scientific Awards, have made distinguished theoretical or empirical contributions to basic research in psychology. Two of the 2016 award winners are Terrie E. Moffitt and Avshalom Caspi, who received this shared award for “innovative research and theory on mental health and human development,” in which they have demonstrated “how early life experiences shape health disparities and how genetic factors shape and are shaped by environmental factors.” Moffitt’s and Caspi’s shared award citation, biography, and a selected bibliography are presented here.

Citation

“For innovative research and theory on mental health and human development. Using a diverse array of methods, Terrie E. Moffitt and Avshalom Caspi have fundamentally transformed our understanding of why some people suffer disproportionately from mental health problems, commit crimes, or grow up to have poor self-control. Using longitudinal studies, including the landmark Dunedin Longitudinal Study, Drs. Moffitt and Caspi have shown how early life experiences shape health disparities and how genetic factors shape and are shaped by environmental factors in the development of psychiatric disorders, personality, and health differences. Fittingly, their work has transcended psychology to influence thinking in psychiatry, genetics, criminology, epidemiology, sociology, and many other areas. Their influence in these diverse fields reflects, in part, their generous mentoring of numerous young researchers who have become prominent scholars in their own right.”

Biography

Moffitt’s and Caspi’s scientific contributions have been made by studying human development using the longitudinal birth cohort method. This method starts with a list of all babies born in a defined place (typically a city or a country), within a defined period (typically a year). This list is referred to as a “cohort.” The babies are enrolled in the study (sometimes before they are born) and then followed and assessed repeatedly throughout their lives as they grow up and grow old. Researchers and participants collaborate on the project together for many decades, which makes this method quite different from the sorts of research projects that most other psychologists do. The research participants generously give of themselves over and over all their lives, vouchsafing the scientists the details of their most intimate, delicate, and even dangerous behaviors and experiences, as well as their body tissues. The scientists, in turn, accept the ethical obligations to ask important questions, publish find-

ings rapidly, preserve the data carefully for use in future years, and guard the participants’ confidentiality at all costs. “Scientists” is pluralized in the last sentence because a longitudinal cohort study is too ambitious an enterprise to be undertaken by one or even two psychologists in their own lab. In fact, Moffitt and Caspi are joint recipients of this award because if they had worked alone, neither would appear here, and their collaborators share with them the award.

A longitudinal cohort study is a scientific instrument, not unlike a large Hadron particle collider, or a kilometers-wide radio-telescope antenna. Like one of these instruments, a cohort study is expensive but pays for itself because it is a resource for many scientists to make multiple discoveries. Such scientific instruments are science-magnets; they attract collaboration from many different fields and nations. Like other large scientific instruments, a cohort study demands sustained dedication to fundraising. Instruments also require loving care and maintenance; in the case of a cohort study, this means dedication to keeping as many of the original cohort members as possible participating for decades. Moffitt and Caspi are devoted to two such studies in particular. The Dunedin Study follows about a thousand people born in 1972–1973 in New Zealand. The Environmental Risk Study follows over a thousand pairs of twins born in 1994–1995 in Britain.

Using longitudinal studies, Moffitt and Caspi have trained their lenses on an evolving set of questions presented here, in reverse order, starting with what they are working on now.

Hidden Aging Takes Place Inside the Bodies of Young People

As humans age, their risk increases for all diseases. The ultimate scientific goal is to slow aging itself to prevent all disabling killers simultaneously. Antiaging therapies will soon be available and, for prevention purposes, therapies must target still-healthy young people. However, because



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gerontology studies senior citizens, virtually nothing is known about aging in young people. Moffitt, Caspi, and their team are tracking biomarkers of multiple organ systems (e.g., heart, lung, kidney, liver, metabolic, immune, and dental health) in people passing through their 20s, 30s, and 40s to quantify the pace of aging in young adults and to test hypotheses about factors that bring about accelerated or slowed variation in aging (Belsky et al., 2015).

Cannabis Users Have Both Healthy and Unhealthy Outcomes

Using longitudinal data, Moffitt and Caspi are helping to inform science and the public about cannabis: Cannabis use in adolescence increases risk for later psychosis; cannabis users who begin using as teens and continue as adults show declines in cognitive functions from childhood to midlife; long-term cannabis users end up in lower prestige occupations than their parents. Cannabis dependence is not associated with fewer harmful social problems than alcohol dependence. Importantly, harm is clearest for long-term daily cannabis smokers; harmful effects are uncommon in recreational users. On the bright side, long-term cannabis users (unlike tobacco smokers) stay physically healthy into midlife and do not develop health problems, with the notable exception of gum disease (Arseneault et al., 2002; Meier et al., 2012, 2016).

Genomic Psychology

Molecular genetics and psychology have come together in Moffitt's and Caspi's work to answer questions about risk

and resilience. One line of work focuses on gene-environment ($G \times E$) interactions. Humans' genetic endowment influences risk of mental illness in part by shaping response to environmental causes of mental illness. Of course, this idea was around for decades, but it was an abstract, theoretical concept in psychology until Moffitt and Caspi provided evidence of $G \times E$ interactions: Genes predicted which abused children developed later antisocial violent behavior, and genes predicted which highly stressed young adults developed depression. These findings have informed three lines of thought: They documented that gene discovery may be facilitated by studying people exposed to environmental causes of illness; encouraged experimentalists to bring genetics into the psychological laboratory, to interrogate genetic influences on sensitivity to the environment; and transformed the public's understanding of genetics by showing that genetic effects on health and behavior often depend on factors under human control, vividly contradicting genetic determinism.

A second line of work ushers in the post-Genome-Wide Association Study (post-GWAS) era by documenting how GWAS-discovered genetic risks shape the development of illness and health. GWAS findings are turning up "hits" for many diseases, and the next step is to uncover how these genetic variants work. Geneticists take the bottom-up approach, tracing pathways of gene function from the DNA up through proteins and cells, toward disease. Moffitt, Caspi, and their collaborators are leading the charge on the top-down approach, using the longitudinal method (a) to identify how genetic variants (e.g., for smoking, obesity, asthma, education) influence the developmental course of illness, health, and well-being; and (b) to pinpoint propitious points for intervention (Belsky et al., 2016; Caspi et al., 2002, 2003; Caspi & Moffitt, 2006).

Mental Disorders in the Population

Moffitt and Caspi's research has yielded three novel findings about the developmental epidemiology of mental illness. First, over half of adult patients with psychiatric disorders have their first diagnosable disorder before 15 years of age, suggesting that most of the burden of adult mental disorder could be prevented by effective screening and treatment for young people. Second, if people are followed long enough, while being assessed frequently for mental disorders, almost everyone will experience diagnosable anxiety, depression, or substance dependence. Less than 20% of a birth cohort makes it to midlife without ever experiencing any mental disorder. This surprising finding has been replicated by several longitudinal studies. Third, rather than distinct, categorical conditions, common *Diagnostic and Statistical Manual of Mental Disorders (DSM)* psychiatric disorders in adulthood may be characterized by two underlying core psychopathological processes: an in-



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ternalizing dimension, indicating liability to experience mood and anxiety disorders, and an *externalizing* dimension, indicating liability to experience substance disorders and antisocial disorders. Continuing work on the structure of psychopathology suggests that all psychiatric symptoms a person ever experiences can fit onto one single dimensional scale of severity (the “p factor”), with symptoms of thought disorder at its extreme end. As a result of these studies, researchers are asking why so many people experience mental disorder and what this means for the way we define mental health, design research, deliver psychiatric services, and count the economic burden of mental illness. At the least, the finding that most people will experience disorder if they live long enough should reduce stigma against mental illness (Caspi et al., 2014; Kim-Cohen et al., 2003; Krueger, Caspi, Moffitt, & Silva, 1998; Moffitt et al., 2010).

Continuity of Temperament, Personality, and Psychopathology

Moffitt and Caspi’s research documents that preschool personality rivals social class and intelligence in shaping a child’s life; it can predict most of the important outcomes in life, including educational attainment, mental illness, physical health, criminal behavior, love relationships, and financial success. It is often forgotten that when Moffitt and Caspi embarked on this work in the 1980s, there was widespread skepticism about whether childhood personality existed, could be measured, and influenced people’s lives. Today this is accepted. Because of longitudinal studies of temperament and personality, early-years intervention to build character has become national policy.

Longitudinal research has also provided new information about the course and sequelae of different psychological disturbances. For example, by interviewing the same people in childhood and adulthood, Moffitt and Caspi discovered that a nontrivial percentage of children report having hallucinatory experiences and delusional beliefs, and many such children years later develop schizophrenia (or another serious disorder). Age 10 to 12 years is the right age to ask, because children are old enough to understand hallucinations and delusions but too young to have learned by sad experience that they must keep them secret. Children should be assessed for psychotic symptoms by pediatric mental health professionals because these symptoms are often the first sign of mental illness yet to come. Sometimes longitudinal research reveals unexpected discontinuities, such as the observation that childhood and adult attention-deficit/hyperactivity disorder (ADHD) may not be the same disorder; although both are impairing conditions, they appear to have distinct etiologies (Caspi, 2000; Moffitt et al., 2011, 2015; Poulton et al., 2000).

Life-Course Persistent Versus Adolescence-Limited Antisocial Behavior

According to a developmental taxonomy, young people engaging in antisocial behaviors belong to two types: One type is called “life-course persistent.” It is a neurodevelopmental disorder afflicting primarily males, with 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.” It affects females as well as males, is common, is limited mainly to the adolescent developmental stage, and emerges in the context of peer relationships. The taxonomy has been tested and confirmed in studies around the world. It has focused psychological, sociological, and biological research into antisocial personality and violence toward the most promising causal variables. It has been applied to improve the clinical diagnosis of childhood disorders and to guide intervention planning tailored for the two types of children and adolescents. The idea has also influenced American law regarding death penalty and life sentences for young offenders (Caspi et al., 2004; Moffitt, 1993; Moffitt, Caspi, Rutter, & Silva, 2001; Odgers et al., 2007).

Summary

None of these findings would have been possible without the longitudinal cohort method. When longitudinal research succeeds, it is for the following reasons. First, longitudinal research is an inherently horizon-scanning enterprise that involves anticipating new trends and asking new questions, even when it means waiting years to learn the result. For

example, the Dunedin Study was the first to interview children about hallucinations and delusions 30 years ago, and this paid off by yielding insights into the origins of psychosis. Second, it is essential to incorporate new technologies into cohort studies as soon as these became available. For example, Moffitt, Caspi, and their collaborators began collecting DNA in the 1990s; interviewed participants with life-history calendars based on advances in cognitive psychology; integrated administrative databases and electronic health records into their longitudinal research; geocoded physical environments using Google Streetview; and worked with ophthalmologists to adopt retinal imaging as a tool to study brain health. Third, crossing disciplines boosts creativity. In graduate school, Moffitt trained in clinical psychology, criminology, and the neuropsychology of aging, and Caspi studied child development, life-course sociology, and personality psychology. They collaborate with economists, geneticists, criminologists, neuroscientists, medical scientists, and even dentists. Their research is most innovative when it makes surprising data combinations across previously unconnected disciplines (addiction research and dentistry; neuropsychology and criminology; cardiovascular research and economics). Many of their highest impact studies were not part of any grant, because they fell in gaps between traditional disease-oriented funding agencies. Fourth, some of the best ideas are inspired by paying close attention to research participants in longitudinal studies. As they grow and change, so do research foci, demanding that Moffitt and Caspi constantly retool and retrain to keep up with their cohorts.

Previously, when writing essays to accompany their respective APA Early Career Awards, Moffitt (1993) and Caspi (1995) thanked their mentors. Here, they acknowledge the students, postdoctoral fellows, and young(er) faculty who make the collective enterprise broader and deeper, more innovative, and fun: Louise Arseneault, Anna Bardone, Amber Beckley, Daniel Belsky, Wiebke Bleidorn, Mary Cannon, Magda Cerda, Andrea Danese, Miriam Ehrensaft, Helen Fisher, Miguel Fullana, Sidra Goldman-Mellor, Alice Gregory, Bill Henry, Salomon Israel, Sara Jaffee, Karstan Koenen, Bob Krueger, Julia Kim-Cohen, Don Lynam, Lyn Magdol, Maria Melchior, Rich Miech, Madeline Meier, Jon Mill, Barry Milne, Denise Newman, Candice Odgers, Alex Piquero, Guilherme Polanczyk, Richie Poulton, Aaron Reuben, Brent Roberts, Rick Robins, Jon Schaefer, Idan Shalev, Rebecca Shiner, Karen Sugden, Alan Taylor, Kali Trzesniewski, Rudolf Uher, Jennifer White, and Brad Entner-Wright. They also thank Honalee Harrington, best data manager.

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