



## The Longitudinal Study: A Bridge to the Future

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Our *Journal* like most scientific journals, has a dual function: to develop a knowledge base for the field and to provide the latest information for clinical practice. For years, there was little connection between the two. Research was dominated by cross-sectional, retrospective studies of highly selected clinical cases, with all the distortions inherent in that method. Then, in the 1980s, came our own “Framingham studies,” prospective longitudinal studies of community-based samples. They promised not just to predict prevalence, but also to show us how symptoms develop, which symptom trajectories persist as disorder, and which ones change. The basic question was, what leads to what? Not only would the studies offer us a needed bridge between research and practice, they would examine the developmental process, too. They promised to change our cherished developmental theory into a developmental science.

These studies came not just from the United States, but also from around the world. One of the most unique, one that separated it from the others, was the Dunedin Multidisciplinary Health and Development Study from the University of Otago Medical School in New Zealand. The investigators were a group of behavioral scientists (including a child psychiatrist), most of whom were practicing clinicians and epidemiologists. The research team followed a complete birth cohort of more than 1,000 babies born in 1972 at St Mary’s Hospital, Dunedin, a small university town on New Zealand’s South Island (home to a world-famous albatross colony) that looks as if it were plucked right out of Scotland. The researchers felt 1,000 was a cohort large enough to study psychiatric disorder for statistical purposes, yet small enough to obtain high-quality data longitudinally. Indeed, these 1,000 children were followed comprehensively every 2

years—from infancy into preschool, from preadolescence through adolescence—and into adulthood. The evaluations were labor-intensive, emphasizing face-to-face standardized assessments supplemented by parent and teacher reports. (The Dunedin Study group was also evaluated at ages 26 and 32. The next assessment is planned for age 35.)

Although the study was correlational, these factors, and the high retention rate (well over 90%), strengthened the potential for causal inferences. As the then-new editor of the *Journal of the American Academy of Child & Adolescent Psychiatry*, I paid a visit to Dunedin to examine this extraordinary retention rate. The team’s director, Phil Silva, generously allowed me behind the scenes to observe the face-to-face subject assessments and team meetings. I was impressed to see how they worried with the individual families through various crises and agonized over such ethical issues as confidentiality versus responsibility when maltreatment was uncovered.

It was clear the families were proud to be part of this longitudinal project. Government support even allowed subjects who had moved away from Dunedin to return for their biannual evaluations or, if necessary, for the investigators to go out to them.

But here is what made it most unique: the study coincided with the emergence of *DSM-III*, and thus it became the first generally accepted criterion-based longitudinal study.

The *Journal* published several of the Dunedin Study’s early reports,<sup>1-6</sup> not just about prevalence, but studies following the trajectory of symptoms, charting continuity and discontinuity of disorder from school age through adolescence and into young adulthood. They identified which disorders begin early and which later, and which ones grouped together to form externalizing and internalizing disorders in boys and girls, suggesting some degree of common underlying psychopathology. They uncovered the frequency and complexity of comorbidity and suggested predictors of disorder.



An interview with the author is available by podcast at [www.jaacap.org](http://www.jaacap.org).

der. Indeed, that turned out to be a limitation of the study's perspective. Risk factors of social disadvantage were the predictors of the 1980s and 1990s.

But if you think about it, the real secret of success for a longitudinal study is more than a stable sample of subjects. It is a generational mix of investigators, in early and midcareer, so that a natural transition of leadership takes place and the study can continue. Several of its postdoctoral students later joined the Dunedin Study as newly minted academics and have become its new leaders. The current director, Richie Poulton, was only 9 years old when the study began. He and its associate director, Terrie Moffitt, have taken the baton passed from the original leaders and have struck off in new directions as the original Dunedin research cohort has entered adulthood. One example, published in our *Journal* in 2007,<sup>7</sup> reported interviews across three generations of the study families, suggesting that family history of externalizing disorders distinguished between childhood-limited, adolescent-onset, and life-course-persistent conduct problems. In other words, brief family-history questions can help clinicians refine the diagnosis of conduct disorder and identify children who most need treatment.

Moffitt, herself an internationally renowned researcher, puts it so well (written communication, January 2010): "I think one secret to the study's success is that we are by nature inclined toward horizon scanning. Caspi, Poulton, and I constantly look 5 to 10 years into the future to sniff out where the science is going, what new technologies are coming on line that we can incorporate into the study. For example, we initiated DNA for genetic studies as a part of the study in 1996. Being first adopters allowed us to be among the first teams to test hypotheses of gene-environment interaction using measured genotypes . . . . At present, we are bringing on board a palette of new biomarkers, including gene expression."

Yes, theirs was the groundbreaking study of gene-by-environment interaction published in *Science* in 2002,<sup>8</sup> suggesting that it is the combination of the MAOA gene and childhood maltreatment that is the key to vulnerability/resilience. That genotype can modulate sensitivity to the environment offers an answer to the puzzle of why some victims of child abuse grow up antisocial and others do not. It also suggests that genetic effects operate as a crucial aspect in the underlying pathophysiology of disorder. Although replications of these findings are still mixed, the researchers have

suggested we keep in mind an important principle: that genes by themselves tell us very little; that it is the combination of gene and environment that really matters, and that our continued effort to modify the environment is still a very sensible intervention strategy.

Meanwhile, the Dunedin Study just keeps on giving.

Caspi and Moffitt (written communication, February 2010) have launched a repeat of the original study, called the UK Environmental Risk Longitudinal Study, studying a birth cohort of British twins born from 1994 to 1995. It allows them to extend the Dunedin findings to a contemporary cohort of children, at the same time correcting for inadvertent omissions or mistakes in the Dunedin Study's early years. An example from this new study was published in the *Journal* in 2009,<sup>9</sup> detailing school, neighborhood, and family factors associated with children's bullying involvement. The most recent of their gene-by-environment reports, linking genotype with the development of emotional problems in bullying victims, was also published in this *Journal*.<sup>10</sup>

I used to think that epidemiology would draw us a much-needed map of childhood disorder, but there is much more to it than that.

Projects like the Dunedin Study are our "Global Positioning System" for clinical practice in the future. &

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In celebration of its 50th anniversary, the *Journal* presents a year-long series of editorials that discuss and reflect upon pivotal research published in these pages over the past five decades. The editorials show how the foundations of the science in child and adolescent psychiatry have been laid, describe how they influence us today, and suggest how they will continue to guide us over the next fifty years and on.

Dr. McDermott is Professor and Chair Emeritus of Psychiatry with the John A. Burns School of Medicine, University of Hawaii. He is an editor emeritus of this *Journal*, serving as its fourth editor from 1988 to 1997. The American Academy of Child and Adolescent Psychiatry recently established an assistant editor-in-residence position in his honor. It offers a young child and adolescent psychiatrist, selected from a national competition, a 3-year experience learning the ropes of "journal editing" at its source. Dr. McDermott's other honors include the American Psychiatric Association's Agnes Purcell McGavin Award, its highest recognition for career achievement in child and adolescent psychiatry, and the American Academy of Child and Adolescent Psychiatry's Jean Spurlock Award for Culture and Diversity. He is the first nonminority honoree to be selected.

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