THE RELATIONSHIP CODE

Deciphering Genetic and Social Influences on Adolescent Development

DAVID REISS

with

JENAE M. NEIDERHISER

E. MAVIS HETHERINGTON

ROBERT PLOMIN

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Foreword

It is a pleasure to introduce Harvard University Press's new series, entitled Adolescent Lives, with *The Relationship Code* by David Reiss and his colleagues Jenae Neiderhiser, Mavis Hetherington, and Robert Plomin. I could not imagine a better beginning for the series. This inaugural book captures the spirit of scholarship on the development of lives through time, in this case a unique and rather lengthy time, the second decade of life.

The Relationship Code also provides a blueprint for what the next two decades of developmental study might bring—more nuanced portrayals of how biological, psychological, and social processes contribute to the unfolding of lives. I would add economic, anthropologic, and political-scientific processes as well, even though this book does not address these fields. The goal of this volume, and the series more generally, is to bring together the separate worlds that make up adolescent lives, as David Reiss says, rather than relying on somewhat disparate and often immixable views of development.

My belief is that path-breaking studies of the next two decades, like *The Relationship Code,* will systematically break down the barriers between disciplinary views of development. In their place will be offered a more synthetic framework, one that recognizes and celebrates the interconnections between biology and psychology, and in addition situates this intersection within a social, economic, and historical context. *The Relationship Code* is a prototype of such integrative foci. At the same time, this book is not atheoretical; nor is it so integrative that the differences between behavioral geneticists and family sociologists and psychologists are ignored. David Reiss and his colleagues sagely articulate the areas of

convergence and divergence among scholars with varying perspectives. They also present their arguments as a thesis, an antithesis, and a synthesis—a brilliant method of crystallizing and testing their premises about the ways in which behavioral genetics influences family interactions and families are experienced. It is my hope that other scholars will adopt the convention of specifying their hypotheses as well as the counterfactuals to their arguments, rather than presenting all-encompassing, difficult-to-test theories of human development. The Adolescent Lives series is based on the premise that lively debate and careful scholarship go hand-in-hand.

The focus on adolescence is deliberate. The second decade of life is characterized by changes in physiology, appearance, internal mood states, identity, relationships, and ultimately residence, means of financial support, and life-style choices. The ways in which adolescents are treated, perceived, and provided with opportunities offer a window on a particular society in a specific historical period. The authors of this volume chose to focus on adolescence because it is a time when the contribution of genetic factors as well as nonshared environmental factors may increase or at least be altered. Additionally, during adolescence sibling relationships may be studied not only by observation but also by direct report.

Aspects of the adolescent experience perplex us. Even reconstructing our own youths and recalling our relationships with parents, peers, and siblings does not seem to lessen adult ambivalence and confusion about this extraordinary period of development. A recent national survey has indicated that about two-thirds of all adults in the United States perceive teenagers very negatively and vastly overestimate the percentage who have difficulties in school and at home. Many scholars wish to temper these notions with more realistic (and sometimes highly complex) snapshots of youth. Ultimately, when we look long and hard and carefully enough, we find what we should have known all along: that teens are as diverse and multifaceted as everybody else.

Jeanne Brooks-Gunn
Virginia and Leonard Marx Professor
Teachers College, Columbia University
November 1999

Preface

I wrote this book and prepared its graphics to describe the results of an extraordinary collaborative project. Thirteen years ago Mavis Hetherington, Robert Plomin, and I set out to merge two perspectives on psychological development: behavioral genetics and family process. We sought to explore a phenomenon that had great relevance for both perspectives: the distinctive differences between siblings in the same family. Robert was just then preparing his very influential review of startling data from behavioral genetics studies. These findings confirmed that siblings in the same family are quite different in personality, cognitive abilities, and psychopathology. Further, environmental factors played a major role in these differences. Even more significantly, these environmental factors shaping differences in siblings in the same family were much more influential than those environmental factors responsible for similarities between siblings. These distinctive environmental factors are now referred to collectively as the "nonshared environment." Behavioral genetics had provided an estimate of the importance of these environmental factors but few clues as to what they might be. They might be physical or social, prenatal or postnatal, random or systematic.

Mavis, Robert, and I thought they might be siblings' differential experience of their current social environment, particularly in their families. That is, even though siblings grow up in the same family and social community, they may experience them differently. We planned a study to explore that idea. We thought of adolescence as a cauldron of social experience that probably left an enduring mark on each youngster's psychological development. Thus, discovering important nonshared environmental influences during this period might provide clues to the origins of

important differences among adolescents and adults. We concentrated on the adolescents' household families but also assessed their experience of their extended family, peers, and teachers. In this work we drew heavily on Mavis's long experience in studying the family as a social system. She and her team had developed many measures of the important family subsystems—marital, parent-child, and sibling—as well as approaches to assessing both the successful and the problematic aspects of psychological development in children and adolescents.

The most unique feature of our work was our use of siblings who varied in genetic relatedness. We used not only identical and fraternal twins but also, in response to an innovative idea of Robert's, full sibs who had not experienced a divorce, as well as full, half-, and genetically unrelated siblings in step-families. Mavis's extensive experience in studying step-families was essential to fleshing out Robert's idea. Our study design provided information on genetic as well as social factors in adolescent development. We also hoped that by extending our genetic design beyond the traditional use of twins, our findings might be more generalizable, although, as many parts of the book point out, we are still not certain about this.

Thirteen years after beginning this unusual venture, we have concluded that the household family is not an important source of nonshared environment for adolescents. Further, our preliminary assessments of other social worlds of the adolescent have provided few, if any, clues as to what the main source might be. Instead, we have encountered a set of striking findings relating to genetic influences. Indeed, the strongest clues emerging from our work may reflect mechanisms of gene expression and a possible role for family process in these mechanisms that we could not have dreamed of when we began our study.

This book describes our major findings and the significance they may have for psychological development. Robert and Mavis graciously supported my role in writing up these findings. They carefully read and reviewed each chapter and made countless comments and corrections that have strengthened every one. When I began this book more than four years ago, Jenae Neiderhiser had just joined our research group at George Washington University after completing graduate studies under Robert's direction at Penn State and serving as a central member of the Penn State

project team, a major component of our multisite collaboration. We invited Jenae to join our efforts to write this book.

When Jenae and I reviewed the scores of publications from our project, we decided against a simple tactic: depending heavily on reusing already-published data to tell our story. Rather, we chose a more difficult strategy, opting to redo all the analyses using the simplest and smallest variety of analytic models that would fit the complexity of all the data. Jenae's leadership of the analytic team supporting this book provided a uniform framework for all the analyses readers will encounter here. Jenae supervised this entire program of data analysis and prepared the appendixes.

The data we analyzed for this book reflect the work of four closely linked research units at four separate university sites. George Washington University, under my direction, was the main site. There, George Howe served as project coordinator for our work in earlier adolescence, and Danielle Bussell organized our work in later adolescence. Each, in turn, had the task of harmonizing the work among all other units. Other critical members of the George Washington unit were Sam Simmens, Victoria Wegener, Katherine Matsey, Jeannette Nearing Steward, David Leidner, Erica Spotts, Mignon Murray, Judy Piemme, Melody Millando, and Elizabeth Carroll.

The University of Virginia unit, under Mavis's direction, developed many of the measures used in this study and performed all the videotape coding, perhaps the most ambitious effort at coding of observed family interaction ever undertaken. All the work at the Virginia site was coordinated by Sandra Henderson. Tracey Law headed the coding team. Other central members of the Virginia team were Ed Anderson and Tom O'Connor. In addition, fourteen graduate students and twenty-eight undergraduates helped to refine the coding procedure and perform the coding.

The Penn State unit, under Robert's direction, played the central role in data preparation and data analysis. Rarely has any data-analysis group faced the challenges of this project: filing, cleaning, and preparing data from more than seven hundred four-member families studied on two occasions, and utilizing data drawn from children's self-reports, parents' self-reports, teacher reports, and coded video data. Central members of the Penn State unit included Alison Pike, Shirley McGuire, Beth Manke,

Richard Rende, Heather Chipuer, Michael Rovine, Elana Pyle, and Sylvia Vignetti. Many other graduate students and postdoctoral fellows also provided crucial assistance in the project.

The National Opinion Research Center (NORC) of the University of Chicago collected all the data, using more than fifty interview teams in forty-seven states. NORC achieved excellent levels of cooperation from the families, and the data they collected through interviews, questionnaires, and videotapes were of unusually high quality. This study reflects the first effort to collect and code videotaped data from a nationally distributed sample of families. NORC's experience with collecting data nationwide, using novel data-collection techniques, and their experience in enlisting people for research and interviewing them were essential. The NORC team was headed by Alisu Schoua-Glusberg and Ann Cederlund. The success of NORC's work reflected, as well, the dedication of its interview teams.

Over the four and a half years of its evolution, the manuscript for this book received helpful readings and critiques from Lyman Wynne, George Howe, David Mrazek, Virginia Colin, Elizabeth Knoll, Jo Ann Reiss, and thoughtful and constructive anonymous reviewers for Harvard University Press. Jerry Weiner, the former chair of George Washington's Department of Psychiatry, provided me with valuable leave time to write the book.

The project was supported by two large grants from the National Institute of Mental Health (MH 43373 and 48825); Della Hann, as project officer during much of the period of NIMH support, provided important help at many junctures. Our work was also supported by the William T. Grant Foundation, allowing us to add twins to our sample.

Joy Schulterbrandt was the initial NIMH project officer. Indeed, long before this work was funded, she recognized the potential of this project. She arranged a conference on the nonshared environment at the Center for Advanced Studies in the Behavioral Sciences in Palo Alto; the conference convinced Robert, Mavis, and me that this study was essential. Joy encouraged us to plan this project and came to George Washington for the very first meeting of our fledgling research team. This book is dedicated, with gratitude, to her, not only for her assistance to this project, but also for her visionary support of family research during her distinguished career at NIMH.

The completion of this book is also a tribute to an extraordinary synergy of talent, enthusiasm, and dedication, along with grueling and meticulous work by our large team. It has been the privilege of a lifetime for me to be a part of this effort.

David Reiss
Washington, D.C.
January 1, 1999

Reader's Guide

This book was written for a wide audience of people interested in children and families. At the same time, it is the only full summary of the findings of a major, complex study of psychological development. I wanted the book to provide enough information to researchers about the study to serve as a useful reference for further research on psychological development. More important, I wanted all readers, whatever their professional background, to feel entirely comfortable exploring this book: the rationale of our study, its observational and statistical methods, its findings, and its hypotheses. Toward these ends I provide at the outset a quick guide to the book's major features, which were designed to make our findings fully accessible.

First, the book tells a story in a familiar format. It states a thesis, then an antithesis, and finally a synthesis. This format is designed to emphasize the paradoxes not only in the data from our study but also in the field of psychological development more generally at the close of the millennium. It is also designed to emphasize the importance of hypotheses and speculation as major tools for resolving paradoxes in science.

Second, the first four chapters introduce some of the central assumptions in both psychosocial and genetic research on psychological development. These are intended, in part, to make sure all readers are fully prepared for the description of our study and for the analyses of its results. Indeed, experienced behavioral scientists may be tempted to skip these chapters altogether. But they are not primers; they take a distinctive stand. They show the parallels in the logic of psychosocial and genetic analyses and carefully prepare each reader for our synthesis, which combines both perspectives.

Third, from Chapter 6 onward, the summaries that begin each chapter emphasize the chapter's role in the thesis, antithesis, or synthesis. Fourth, all statistical procedures are fully explained in plain English with many examples of how we go from observations to results of quantitative analyses. This book does not presume the reader has any training in statistics. Further, all the quantitative findings are presented in graphs, not in tables. The visual format is used to emphasize patterns of findings and to help the reader see important similarities and differences of findings across the entire book. Statistically minded readers will find appendixes that provide a technical account of our analyses and tables that provide a more detailed report of our findings. An index of all tables and figures precedes the General Index.

Finally, at the end of the book readers will find a glossary that defines terms commonly used throughout the book.

D. R.

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Chapter 1

INTRODUCTION: RECONCILING SOCIAL AND GENETIC INFLUENCES ON ADOLESCENT DEVELOPMENT

Until now, psychosocial and biological studies of human psychological development have been conducted in separate worlds. The major research findings from each of these domains present a paradox to all who wish to understand development. On the one hand, persuasive studies argue for the primacy of the social environment of the developing child. On the other hand, there is strong evidence for the role of genetic factors that contribute not only to differences among children and adolescents, but also to the developing child's relationships with family and peers.

Researchers advocating the social viewpoint do not neglect biology, including genetics; but they do not pay explicit attention to biological and genetic factors in development nor systematically include them in their concepts and theories. Biological and genetic researchers acknowledge the importance of the social environment but rarely measure it effectively and comprehensively. With rare exceptions, theories of psychological development built around an understanding of genetics and brain function do not contain a sophisticated or nuanced grasp of social relationships or how they might influence development.

It's time to bring these two lines of thinking together. With this goal in mind, we have assembled an interdisciplinary team of researchers drawn from the fields of genetics, social development, and psychoanalysis. Using a design whose methods and theory give equal weight to genetics and social relationships, we have chosen to study adolescence, a period of singular importance in psychological development. Adolescents who can establish strong social and academic skills, as well as overall psychological maturity, are well prepared to take on the major challenges of adult life.

Additionally, we think of adolescence as a remarkable window on developmental processes more generally. Both the history of work in this field and current research constitute powerful testimony to the yawning chasm between the social and the genetic perspectives in research. We believe that a careful study of adolescence, incorporating both genetic and psychosocial designs, is an important tool in the effort toward reconciliation of these two viewpoints.

We begin our account with the most fundamental convergence between the social and the genetic viewpoints. Both are preoccupied with individual differences among adolescents and with understanding the factors that account for these differences. Indeed, adolescents and their parents are well aware that young people are very different from one another. Some children negotiate the transitions of adolescence with ease; they emerge as competent young adults fully prepared to face more challenges as their lives unfold. In contrast, other children experience difficulties throughout this period: the social, academic, and psychological problems they face are a precarious platform from which to deal with the challenges of both adolescence and young adulthood. Somewhere in between are children who show more transient difficulties in adolescence. Although their problems may at times seem quite severe, they gradually diminish and the adolescents enter young adulthood with reasonably good prospects.

Several important trends in the twentieth century have heightened an interest in these differences in adolescent development. One such trend has been a shift toward child-centered families, accompanied by a preoccupation with children's psychological development. Consequently, parents are now seen as responsible not only for the basic protection of their children, but also for what their offspring become as they reach maturity and establish families of their own. Recent years have also seen a trend toward adolescence as an increasingly important period of choice for young people. Now more than ever they are expected to understand their own wishes and abilities, as well as how to apply these to the demands and opportunities of the adult world. With the growing emphasis on parental responsibility and the widening of choices for young adults, the issue of adolescent failure has come to the fore, particularly in the last two decades. From an economic and occupational standpoint, some adolescents are

seen as at great risk of failure: failure to complete the schooling and training necessary for complex and demanding work, and failure to find and sustain satisfactory employment. From a clinical perspective, there is widening recognition that severe psychological difficulties and psychiatric syndromes often appear in adolescence, which may place young people at risk for drug use, criminality, and suicide, as well as for psychiatric disorders and impaired personal relationships throughout their lives (Furstenburg et al., 1987; Kandel and Davies, 1986; Kandel et al., 1986; Moffitt, 1993).

Researchers seeking to understand these differences in adolescent development have turned, with few exceptions, to the influence of social relationships and social institutions in which adolescents are embedded. Although most studies have focused on the family, researchers are also looking carefully at the impact of adolescents' friendships, schools, and neighborhoods, as well as at the economic circumstances of their families (Baumrind, 1991; Bell and Bell, 1983; Conger et al., 1991; Conger et al., 1992; Conger et al., 1994; Conger et al., 1995; Dornbusch et al., 1987; Ensminger et al., 1982; Gjerde et al., 1991; Grotevant and Cooper, 1985; Snyder et al., 1986; Steinberg et al., 1992; Whitbeck et al., 1991). In general, all these components of the adolescent's social world have been associated with individual differences in psychological development. Researchers have understandably concluded that these associations indicate the important causal role of the social environment in producing the striking differences among adolescents.

New research studies of the effects of genetic factors on adolescent behavior suggest, however, that the conclusions of psychosocial research on adolescent differences may have to be revised for two reasons. First, data indicate that genetic influences are much more important in adolescent development than previously thought, substantially affecting many aspects of adjustment, such as self-esteem, cognitive ability, personality, and psychopathology (Cadoret et al., 1983; McGuire et al., 1994; Rende et al., 1993; Rende, Plomin, and Reiss, 1992; Rose and Ditto, 1983; Scarr et al., 1981; Scarr and Weinberg, 1978; Scarr and Weinberg, 1983). More important, different studies suggest that adolescents' genes influence how they are treated by others in their social world. Factors such as parenting, the quality of sibling relationships, and characteristics of peer groups are