

The Trouble with Twin Studies: A Reassessment of Twin Research in the Social and Behavioral Sciences

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PART I: Studies of Reared-Apart Twins: Scientific Proof or Scientific Illusion?

Chapter 1: Introduction

Chapter 1 of [The Trouble with Twin Studies: A Reassessment of Twin Research in the Social and Behavioral Sciences](#) introduces readers to twin research and to the main fields that carry it out. Behavioral science fields include psychology, psychiatry, and cognitive science. Social science fields include political science, economics, sociology, and anthropology. Brief histories of both twin research and the field of behavioral genetics are provided, along with a brief description of important research methods, terms, and concepts. Since the 1920s, twin studies have been put forward as scientifically validated “natural experiments” that assess the relative importance of heredity and environment. Identical (MZ) twin pairs are said to share 100% of their segregating genes, whereas (like ordinary siblings) fraternal (DZ) pairs are said to share only 50% on average. After reaching its low-point in the early 1960s, twin research began a comeback that continues to this day, as twin studies are widely cited in support of important genetic influences on a great variety of psychological characteristics, behaviors, psychiatric disorders, and common medical conditions. Almost all studies investigate twin pairs reared together in the same family home, while a tiny yet influential handful have studied what researchers and others refer to as “reared-apart” twin pairs. According to one estimate over

800,000 twin pairs have been studied, and research is now being conducted in 28 countries and involves over 70 twin registries. Most genetic researchers and their critics agree that the results of a (non-twin) family study, where a behavioral characteristic is found to “run in the family,” can be explained entirely by non-genetic factors. Adoption studies are much rarer, and have their own set of methodological issues and questionable assumptions. In light of gene discovery failures, twin research continues to supply the main scientific evidence put forward by the nature (genetic) side of the “nature-nurture” debate.

Chapter 2: Studies of Reared-Apart Twins: Origins, Publications, and Scandal

Chapter 2 marks the beginning of a five-chapter evaluation of the six existing reared-apart twin studies, which have focused on areas such as IQ and personality. The most often cited are the three “classical” reared-apart twin studies published between 1937 and 1965 by Horatio Newman and colleagues in the United States, James Shields in Great Britain, and Niels Juel-Nielsen in Denmark, and the highly publicized “Minnesota Study of Twins Reared Apart” (MISTRA) by Thomas J. Bouchard, Jr. and colleagues, whose most frequently cited publications appeared in the 1980s and 1990s. Other topics include the “Cyril Burt scandal” and fraudulent or unethical practices in the social and behavioral sciences in general, and the controversy surrounding Berkeley psychologist Arthur Jensen’s claim that IQ score differences between various ethnic groups are due largely to genetic influences. This chapter focuses on the classical studies and looks at problems associated with them from new and interesting perspectives. The author includes tables with information on all 75 reared-apart identical twin pairs (MZA, or monozygotic twins reared apart) described in the three classical studies, and shows that most MZA pairs were reared together for periods of time, had frequent or regular contact, and/or had a close emotional bond with each other. Most MZA pairs, therefore, were only *partially* reared apart. The MISTRA is introduced, with a more detailed discussion and analysis of this study reserved for later chapters. The author also argues that widely reported anecdotal single-case reports of the supposedly “eerie” or “spooky” similarities of reunited MZA pairs, which have been put forward by journalists and researchers for decades, prove nothing about genetic influences on human behavioral differences.

Chapter 3: Studies of Reared-Apart Twins: The Critics Respond

In Chapter 3 the author discusses the works of several key authors who have written critically about reared-apart twin studies, who have argued that these studies contain many biases and depend on many questionable assumptions. The chapter concludes with a table listing 22 potentially invalidating flaws and biases discussed by these critics.

Chapter 4: Studies of Reared-Apart Twins: Basic Assumptions and Potential Fallacies

Chapter 4 introduces readers to several key yet controversial concepts, which include “IQ,” “personality,” “heritability,” and “model fitting.” Many potential flaws, biases, questionable assumptions, and environmental confounds related to these concepts are also explored. The author explains how behavioral similarity can result from the fact that, although theoretically they are raised in different family environments, both members of an MZA pair are the same age and sex, are very similar in physical appearance, and usually grow up in very similar cultural and socioeconomic environments in the same eras. Other topics discussed in this chapter include psychometrics, epigenetics, and the meaning of twins’ answers on personality tests.

Chapter 5: The Minnesota Study of Twins Reared Apart I: Biases, Assumptions, and Other Problem Areas

Chapter 5 begins a two-chapter focus on the influential and widely cited MISTRA, based in part on an analysis of MISTRA researcher Nancy Segal’s 2012 book describing and defending the study, *Born Together—Reared Apart: The Landmark Minnesota Twin Study*. The author describes the logic and methods of the study in greater detail, and examines the questionable basis upon which the researchers arrived at genetic interpretations of their data. He also focuses on problem areas such as the many similarities of the twins’ social and cultural environments, the questionable assumptions underlying the researchers’ model fitting procedures (some of which the researchers themselves recognized are “likely not to hold”), sample size issues, recruitment bias, and a reliance on twins’ potentially unreliable accounts of their degrees of separation and behavioral similarity. The Minnesota researchers’ decision to deny critically minded independent reviewers access to their raw data is also examined. Segal believed that the “burden of proof lies with the critics” to show that the study contained invalidating biases. “Bias must be demonstrated, not assumed,” she wrote. This has placed critics in a difficult “Catch-22”-like position because, if they were known to be inclined to look for bias, the Minnesota researchers denied them access to the raw data. The author concludes that it is unlikely that the MISTRA twin sample achieved higher levels of separation and environmental dissimilarity when compared with the earlier classical studies, which he showed in Chapter 2 were based largely on twin pairs only partially reared apart.

Chapter 6: The Minnesota Study of Twins Reared Apart II: IQ and Personality Studies

Chapter 6 focuses on the MISTRA studies of IQ and personality. A major issue has been the failure of the Minnesota researchers to publish and evaluate their full-sample reared-apart fraternal twin (DZA, or dizygotic twins reared apart) IQ score correlations, even though they

reported full-sample DZA correlations for *non-IQ* behavioral characteristics in various MISTRA publications. This occurred despite the fact that IQ (cognitive ability) was the main focus area of the study, and that the researchers had designated DZA twins as the MISTRA control group. To this day, the researchers have not published and evaluated the results for all tests completed by the full sample of twin pairs they studied. Nevertheless, based on the incomplete data that have been published, there does not appear to be a statistically significant Wechsler (WAIS) IQ or Raven Progressive Matrices IQ correlation difference between the MISTRA MZA and DZA groups—a result that runs counter to genetic predictions and theories, and by itself would invalidate genetic interpretations of the MISTRA IQ studies. Because MZA pairs are more similar genetically than are DZA pairs, an MZA sample correlation not higher than the corresponding DZA sample correlation at a statistically significant level suggests that non-genetic (environmental) factors alone are responsible for raising both correlations above zero. The author concludes that, contrary to how the authors of authoritative works usually write about the MISTRA, the study failed to provide scientifically acceptable evidence in support of genetic influences on IQ, personality, and other types of behavior—a conclusion consistent with the ongoing failure to uncover genes for these behavioral characteristics at the molecular genetic level.

PART II: Studies of Reared-Together Twins

Chapter 7: The MZT-DZT “Equal Environment Assumption”: The Achilles Heel of the Classical Twin Method

Chapter 7 turns to the much more common studies that compare the behavioral resemblance of *reared-together* identical (MZT, or monozygotic twins reared together) versus reared-together same-sex fraternal twin pairs (DZT, or dizygotic twins reared together), which use a procedure called the “classical twin method.” The author shows that the twin method’s controversial MZT-DZT twin “equal environment assumption” is not supported by the evidence, and that MZT pairs grow up experiencing much more similar environments and treatment, and experience much greater levels of identity confusion and psychological attachment, than experienced by DZT pairs. He examines in detail the two main arguments that twin researchers nevertheless continue to put forward in support of the equal environment assumption and the twin method, and shows that both arguments are faulty. The greater behavioral resemblance of MZT versus DZT pairs, therefore, can be completely explained by environmental factors. The author concludes that because the twin method is clearly unable to disentangle the potential influences of genes and environment, genetic interpretations of all past, present, and future MZT–DZT twin method comparisons in the social and behavioral sciences must be rejected outright.

Chapter 8: Twin Research in Psychiatry

Chapter 8 evaluates twin research in psychiatry in the context of over four decades of gene discovery failures in the field. Psychiatric twin studies are based on MZT-DZT comparisons (the twin method), and constitute the most frequently cited evidence that the major psychiatric disorders have an important genetic component. Although supporters of psychiatric twin studies argue that the equal environment assumption has been tested and upheld, the best-replicated disconfirmation of this key assumption consists merely of all the psychiatric twin studies ever performed. Nine decades of such studies have shown consistently that pairs experiencing similar environments and high levels of identity confusion and attachment—MZTs—resemble each other more for psychiatric disorders than do pairs experiencing less similar environments and much lower levels of identity confusion and attachment—DZTs. The author also examines mainstream psychiatry’s position that psychiatric disorders are valid medical conditions that can be reliably diagnosed, and argues that the current emphasis on (scientifically unsupported) biological and genetic theories in psychiatry causes the field to overlook or de-emphasize many environmental factors that have been shown to play an important role. Additional topics include how the development of the 2013 Fifth Edition of the American Psychiatric Association’s *Diagnostic and Statistical Manual* (DSM-5) was based on expected genes discoveries that never materialized, and the distinct possibility that the field of psychiatric genetics will one day cease to exist due to its continuing failure to supply meaningful scientific information.

PART III: Approaching a Post-Behavioral-Genetics Era?

Chapter 9: Molecular Genetic Research: The Ultimate Test of Genetic Interpretations of Twin Studies

Chapter 9 documents the ongoing decades-long failure to identify genes for behavioral characteristics such as IQ, personality, and the major psychiatric disorders, and examines some new methods that have been developed in the past few years. The author performs this analysis in the context of what genetic researchers have referred to since 2008 as the “missing heritability problem,” and proposes an alternative understanding—that the best explanation for “positive” twin study findings in combination with negative molecular genetic results is not that “heritability is missing,” but that something is wrong with genetic interpretations of twin data. The numerous assumptions, decisions, conclusions, and claims made by leading twin researchers and others have been tested under the microscope of molecular genetic research, and the (negative) results are now in.

Chapter 10: The Crumbling Pillars of Behavioral Genetics

Chapter 10 examines over 35 years of gene finding claims and predictions by Robert Plomin, one of the world's leading behavioral genetic researchers and authors. This chapter examines Plomin's writings from 1978 to 2014, where until about 2003 he frequently wrote that gene discoveries for various behavioral characteristics and disorders had already been made, were in the process of being made, or would be made in the very near future. The author again concludes that the ongoing failure to discover genes, as well as Plomin's continuing optimism, has been based largely on the mistaken interpretation of twin study results in favor of genetics.

Chapter 11: A Human Genetics Parable

Chapter 11 presents a parable illustrating the potential folly of approaching the causes of human behavioral differences and common medical conditions from the genetic perspective, even when genetic factors or predispositions may be present. Informed readers will recognize the corresponding ideas, research strategies, interest groups, publications, and historical controversies related to nature-nurture issues. The author also discusses how institutions and groups with political and economic interests in promoting genetic theories attempt to steer public thinking, and research agendas, in the genetic direction.

Chapter 12: Summary and Conclusions

In Chapter 12 of *The Trouble with Twin Studies* the author provides summaries of the previous chapters, and arrives at some general conclusions. He concludes that twin studies published to date have failed to supply scientifically valid evidence in support of genetic influences on the behavioral characteristics studied in the social and behavioral sciences. Taken together with his previous work, he concludes that (non-molecular) behavioral genetic and psychiatric genetic research methods are (to varying degrees) unable to disentangle the potential roles of genetic and environmental influences on differences in human behavior, and that the main research methods and "landmark" studies of these fields are massively flawed and environmentally confounded. It is clear that family, social, cultural, economic, and political environments—and not genetics—are the main causes of psychiatric disorders and differences in human behavior.

Appendices

There are three appendices. The first is a discussion of the MISTRA researchers' decision to accept major funding from controversial sources, such as the Pioneer Fund. The second is a review of a little-known behavioral genetic adoption study of personality, whose results stand in striking contrast to the results of twin studies. The third contains a list of quotations from leading twin researchers attempting to uphold the twin method, who use an argument that the author showed in Chapter 7 is a circular one.

Psychologist Jay Joseph's previous books are [*The Gene Illusion: Genetic Research in Psychiatry and Psychology under the Microscope*](#) (2004), and [*The Missing Gene: Psychiatry, Heredity, and the Fruitless Search for Genes*](#) (2006). For additional information and a complete list of Dr. Joseph's publications, see [the "Publications" page at his website](#).