A ‘Blueprint’ for Genetic Determinism

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By Jay Joseph, PsyD

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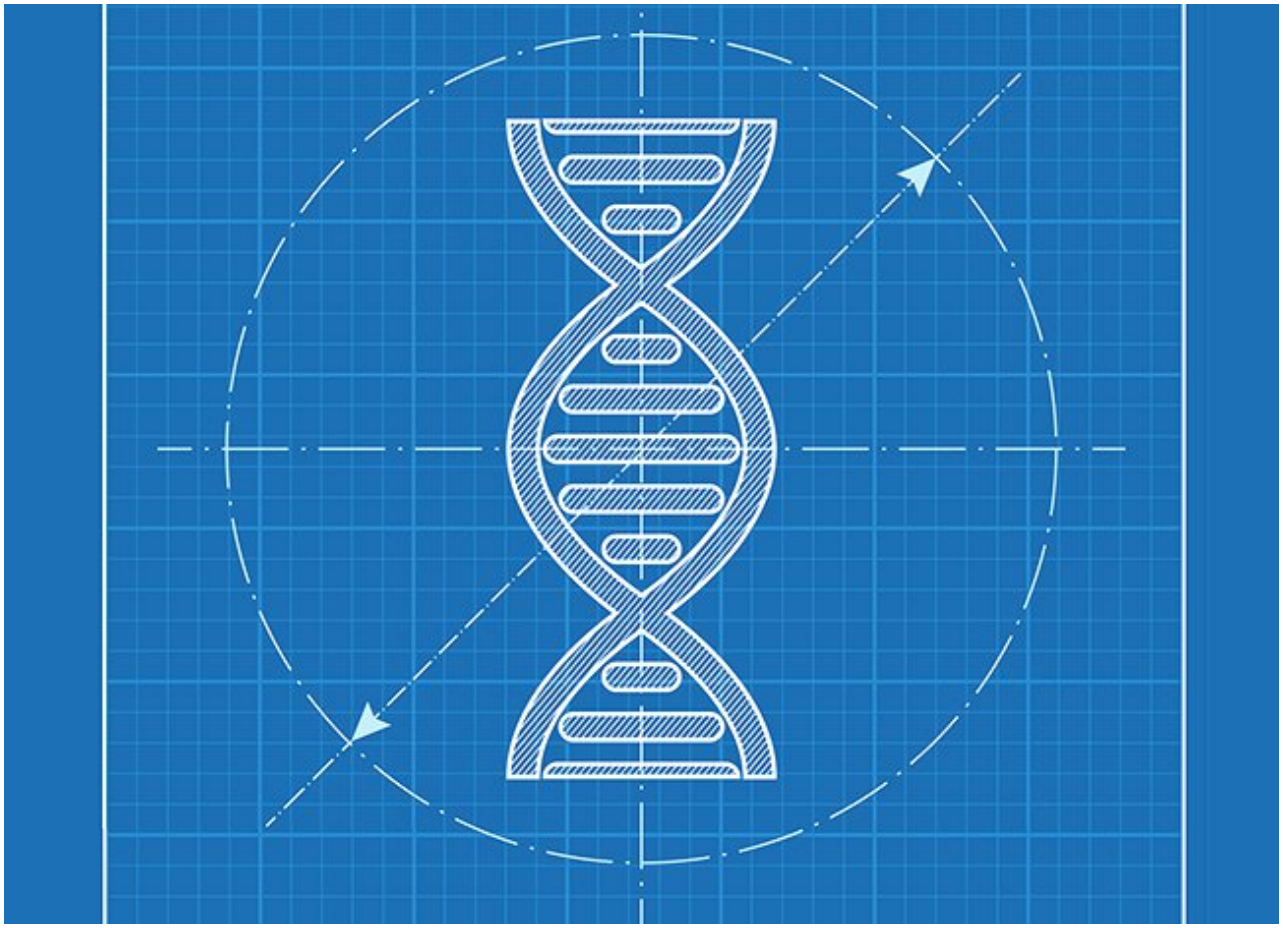

In November, 2018 behavioral geneticist Robert Plomin published *Blueprint: How DNA Makes Us Who We Are*. In this book, Plomin argued that DNA is the main factor that determines differences in human behavior, that most environmental influences on behavior should be counted as genetic influences, that true environmental influences are mostly random and “we cannot do much about them,” and that the molecular genetic “polygenic score” method is a “new fortune-telling device” that uses a person’s genetic profile to “predict psychological traits like depression, schizophrenia and school achievement” (*Blueprint*, p. vii). Plomin described the polygenic score method as a molecular genetic technique that finds statistically non-significant individual “SNP” hits (single nucleotide polymorphisms), and combines them to produce a polygenic (composite) score.

Plomin’s thesis was that “the DNA differences inherited from our parents at the moment of conception are the consistent, lifelong source of psychological individuality, the blueprint that makes us who we are” (p. ix).

Plomin, who was born and educated in the United States and has lived and worked in England since 1994, has been a leader of the behavioral genetics field since the 1980s. He was awarded the American Psychological Association's (APA) "Award for Distinguished Scientific Contributions" in 2017. He has conducted "quantitative genetic" twin and adoption studies since the 1970s, and since the early 1990s he has also conducted molecular genetic studies in an attempt to discover genetic variants that he believes underlie "general intelligence" (IQ) and other areas of behavior.

In the spring of 2019, psychologist/behavioral genetic researcher Eric Turkheimer published a review of *Blueprint* in a peer-reviewed academic journal. Turkheimer is known as a critic, from within behavioral genetics, of some of his field's theories and claims. "The great era of behavioral genomics was on the horizon" 20 years ago, Turkheimer wrote, "but it never arrived." Countless studies (and accompanying media reports) have appeared over the past few decades reporting the discovery of genes that influence behavior, but they could not be replicated, leading to what he characterized as the current "failure of the gene-finding project."

Nevertheless, Turkheimer wrote, *Blueprint* is "hardly the product of a gloomy author," but is instead "a declaration of victory of nature over nurture, a celebration of the vindication of Plomin as a scientist and of behavioral genetics as a field of study." Because Plomin relied on the polygenic score method, in Turkheimer's view he had abandoned "the original task of figuring out which gene does what on a biological level," because "polygenic scores achieve their predictive power by abdicating any claim to biological meaning."

Turkheimer criticized Plomin's triumphalist theme that the polygenic score method provides vindication of the behavioral genetic research program. In fact, as Ken Richardson (author of the 2017 book *Genes, Brains, and Human Potential*) and Michael C. Jones showed in a 2019 analysis, polygenic scores may be "confounded by formidable biological, social, and statistical, as well as technological difficulties." The "most important source of spurious associations," they wrote, is the "pervasive problem" of "unrecognized population structure (also called population stratification)." (See also the *Blueprint* review by Steve Pittelli.)

In his concluding remarks, Turkheimer took the formerly gene-environment "interactionalist" Plomin to task for his new stance that "DNA makes us who we are," a phrase that Plomin used in *Blueprint's* title and repeated in a similar form no fewer than 25 times in the book. Genetic (biological) determinism has been defined as "the idea that most human characteristics, physical and mental, are determined at conception by hereditary factors passed from parent to offspring….largely [but not entirely] unaffected by environmental factors."

Turkheimer suggested that Plomin had arrived at a determinist/hereditarian position in order to declare the victory of "nature" in the nature-nurture debate, and to settle accounts as he neared the end of his 45-year career:

“All the scientistic bluster about DNA fortune-tellers is unbecoming in someone with an intellectual pedigree as interactionist as Plomin’s, and it leaves one wondering why so many social scientists start with a commitment to complex gene-environment interplay but wind up committed to blunt hereditarian overstatement. The obvious explanations—provocation for its own sake, hawking books, settling scores—are beneath a scientist of Plomin’s stature, although there is some of all that in *Blueprint*.”

When a figure as authoritative as Plomin “overstat[es] the science of human behavioral genetics,” Turkheimer wrote, it “comes with the greatest price imaginable: it encroaches on human freedom and justice.”

Turkheimer highlighted a sentence by Plomin that “may in fact be the worst ever written by an important behavior geneticist.” According to Plomin, “Put crudely, nice parents have nice children because they are all nice genetically” (p. 83). This led Turkheimer to ask, “And not-so-nice parents? Criminals, beggars, the unintelligent, the miserable, and the insane? What of them and their children? He can’t have it both ways.”

“Genetic determinism,” Turkheimer concluded, “is a cheap nostrum for an unhappy social scientist late in his career, but its side effects are poisonous.”

Major Problem Areas in *Blueprint*

I will now describe some important problem areas in *Blueprint* (while skipping over numerous less important problem areas), with an emphasis on areas that were not covered, or were mentioned only briefly, by other reviewers.

Plomin as Historian

In *Blueprint’s* Prologue, Plomin grossly misrepresented the history of genetic research in the area of human behavior. He wrote that genetic researchers, using twin and adoption studies, started accumulating evidence in favor of genetics in the 1960s, and that environmental theories had been dominant until then. For example, “From Freud onwards, the family environment, or *nurture*, was assumed to be the key factor in determining who we are. In the 1960s geneticists began to challenge this view” (p. vii). He also claimed that “genetics had been ignored in psychology” until the early 1970s (p. xi). In fact, twin and adoption studies go back to the 1920s and earlier, and a belief in the power of heredity has a long history. By making these claims, Plomin overlooked the worldwide eugenics movement of the first half of the 20th century, German psychiatric genetics, sterilization laws, top American psychologists’ claims that intelligence was largely innate and fixed, and so on.

In the first four decades of the 20th century, hereditarian and eugenic theories were mainstream, and American psychologists played a major role in promoting eugenic theories and policies. See, for example, Stephen Jay Gould’s *The Mismeasure of Man*, Leon Kamin’s *The Science and Politics of I.Q.*, and *The Legacy of Malthus* by Allan Chase. The field of psychology (and especially its psychometrics subfield) has always held that genetic

factors play a role in causing differences in cognitive ability (IQ) and other behavioral characteristics, although the emphasis, meaning, and especially the weight given to genetic influences changes from era to era.

In an era when genetics supposedly "had been ignored in psychology," Edward Thorndike, listed by the APA as the #9 "most eminent psychologist" of the 20th century (Plomin was #71), concluded in his 1905 twin study of "mental traits" that "it is highly probable from the facts given…that the similarity of twins in ancestry and conditions of conception and birth accounts for almost all of their similarity in mental achievement—that only a small fraction of it can be attributed to similarity in training."[4] In 1923, leading American psychologists wrote that intelligence testing had demonstrated the "definite intellectual superiority of the Nordic race," while warning American "citizens" not to "ignore the menace of racial degeneration."[5] No "dog whistles" were needed in this era, as it could be openly proclaimed by psychologists in scholarly works that "science" had found that the "Nordic race" was intellectually/genetically superior to all other "races." Nineteen years later, the question of whether "defective" American children should be put to death for eugenic and other purposes in a "euthanasia" program similar to Germany's was openly debated by two doctors in the July, 1942 edition of the *American Journal of Psychiatry* (*AJP*). Between 1944 and 1965, the *AJP* published a eugenics- and compulsory-sterilization-friendly annual report with the title, "Review of Psychiatric Progress: Heredity and Eugenics." As recently as 1972, the eugenically oriented British-American psychologist Raymond Cattell (#16 on the APA's "most eminent psychologist" list) discussed the desirability of promoting what he called "genthanasia," which he described as the "phasing out" and "ending" of genetically "moribund cultures."[6]

The general post-World War II era view on the nature-nurture issue in American psychology is found in a 1958 article by Anne Anastasi, who later became APA president. Anastasi wrote that the "heredity-environment question" was a "dead issue," because "it is now generally conceded that both hereditary and environmental factors enter into all behavior."

Plomin wrote that "thirty years ago [circa 1988] it was dangerous professionally to study the genetic origins of differences in people's behaviour and to write about it in scientific journals" (p. xi). This simply is not true, although in the wake of the social struggles of the 1960s it *was* "dangerous" to come out in favor of eugenics, or to promote genetic explanations of racial group differences in IQ, criminal behavior, and other areas.

Ignoring the Critics

In *Blueprint*, all behavioral genetic concepts and methods, including twin studies, adoption studies, "heritability," genetic and environmental variance-partitioning "model-fitting" techniques, and "general intelligence" (IQ) were presented as valid concepts and methods. Plomin did not mention the names, arguments, or publications of the critics, or the fact that these concepts, techniques, and methods have always been controversial. (Critics of twin research, the use of heritability estimates, and model fitting can point to a

2019 twin study where, using all three methods, the researchers concluded that "genetic factors largely contributed to dog ownership, with heritability estimated at 57% for females and 51% for males.")

Ignoring the Most Controversial and Crucial Assumption in Twin Research

Behavioral genetic claims rely heavily on the "classical twin method," which compares the behavioral resemblance or psychological test-score correlations of reared-together MZ (monozygotic, identical) and reared-together same-sex DZ (dizygotic, fraternal) twin pairs. MZ pairs are said to share a 100% genetic resemblance, whereas same-sex DZ pairs are said to share an average 50% genetic resemblance.

Genetic interpretations of the usual twin method finding that MZ pairs behave more similarly than DZ pairs are based on the long-controversial "equal environment assumption" (or "EEA"). This assumption states that MZ and DZ pairs grow up experiencing roughly equal behavior-shaping environments, and that the only factor distinguishing these pairs is their differing degree of *genetic* relationship to each other (100% vs. 50%). The EEA as it relates to behavioral twin studies is obviously false, since when compared with same-sex DZ pairs, MZ pairs grow up experiencing (1) much more similar treatment by parents and others, (2) much more similar physical and social environments, and (3) identity confusion and a much stronger twin emotional bond. Because the EEA is false, the greater behavioral resemblance of MZ versus DZ twin pairs can be completely explained by environmental (non-genetic) factors. This means that genetic interpretations of twin method results—past, present, and future—must be rejected outright.

In *Blueprint*, Plomin did not say a word about this crucial assumption, and he failed to mention that genetic interpretations of his own "Twins Early Development Study" (TEDS) twin studies, which he discussed throughout the book, were based entirely on the validity of the EEA.

Adoption Studies

Plomin wrote that in behavioral genetic adoption studies, birthparents "share nature but not nurture with their children" (p. 13). However, even if children are adopted away at birth, they and their birthmothers share several environmental similarities. These include the prenatal environment, social class, racial or ethnic background (often resulting in oppression or privilege), culture, religion, and so on. Additional biases and environmental confounds in adoption research include attachment rupture and its impact on an abandoned/rejected child's developing brain, late separation from the birthparent, late placement after separation, selective placement, and range restriction. Plomin's claim that adoption studies are able to "disentangle nature and nurture" (p. 13), therefore, is simply wrong.

In Plomin's own 1998 "Colorado Adoption Project" adoption study of personality, he and his colleagues found an average personality test-score correlation of .01 (that is, zero) between birthparents and their 240 adopted-away 16-year-old biological offspring, a correlation that Plomin believed "*directly indexes genetic influence*, unlike the indirect comparisons between nonadoptive and adoptive relatives or between identical and fraternal twins" (italics added). Although he found a way to conclude in favor of genetic influences on personality (a classic example of confirmation bias), the results of Plomin's large and carefully planned 1998 adoption study showed no genetic influences on personality—a result that stands in remarkable contrast to his later claim in *Blueprint* that "DNA makes us who we are."

Reared-Apart (Separated) Twin Studies

Plomin also cited reared-apart (separated) twin studies in support of his positions, which included his own "Swedish Adoption/Twin Study on Aging" (SATSA) of the 1980s and 90s. Critics, however, have described the massive flaws and biases found in these studies, and have shown that most twins in these investigations were only *partially* reared apart. In the SATSA, for example, Plomin and colleagues defined twin pairs as "reared-apart" if they had been "separated *by the age of 11*" (italics added). The twins, who averaged 65.6 years of age, had been "separated" from each other for an average of only 10.9 years at the time of testing.

Plomin repeated the standard behavioral genetic assumption that only genetic factors can account for reared-apart MZ (identical) twins' behavioral similarity (p. 18), an assumption that is completely false because reared-apart MZ twins are the same age and gender (sex), are similar in appearance, and experience numerous non-familial cohort influences in common. (My analysis of Bouchard and colleagues' "Minnesota Study of Twins Reared Apart" can be found HERE; the abridged version can be found HERE.)

The Most Important Question Is Interpretation, Not Replication

Behavioral genetic studies are well replicated, Plomin emphasized (pp. 32-33), but he failed to address the long-controversial assumptions underlying these studies. If a key assumption is false, such as the twin method's EEA, genetic interpretations of hundreds or even thousands of studies finding similar results will ***all*** be wrong. The most important question that independent analysists should ask about a behavioral genetic study is not whether its results have been replicated, but how its results *should be interpreted*.

The Fallacy of Counting Environmental Influences as Genetic Influences

The "nature of nurture" argument, which was a major component of Plomin's polygenic score "fortune teller" claim, states that "what looks like environmental effects are to a large extent really reflections of genetic differences," which "implies that parents don't make much of a difference in their children's outcomes beyond the genes they provide at

conception" (pp. 82-83). Plomin's justification for counting most environmental influences as genetic influences is that "we select, modify and even create our experiences in part on the basis of our genetic propensities," meaning that "the environmental effect of parenting on children's psychological development actually involves parents responding to their children's genetic differences" (p. ix).

Plomin promoted the general theme that parental and other environmental influences are not important. As he put it, true environmental effects are "mostly random—unsystematic and unstable—which means that we cannot do much about them" (p. xii). He even rejected the metaphor that "parents are…like gardeners, providing conditions for their children to thrive." In Plomin's view, "parents are not even gardeners, if that implies nurturing and pruning plants to achieve a certain result" (p. 215).

The "nature of nurture" argument is based on what we have seen are very problematic research methods, such as twin studies and adoption studies, and largely ignores basic common sense as well as decades of research from other areas of the social and behavioral sciences that record the importance of environmental influences. It also overlooks or denies the behavior-shaping influences of culture, class, religion, nation, region, the mass media, peer groups, and so on.

Do children "create" family environments containing physical, sexual, and emotional abuse? If children who are forced to endure such abuse experience depression, low self-esteem, and even suicidal behavior as adults, should we conclude that this is caused by their DNA? Do children "create" alcoholic or drug-addicted parents and the accompanying psychologically damaging environments caused by addiction? And what about children who grow up in neglectful, cold and distant, or psychologically invalidating family environments? Do children and adults of color "create" psychologically harmful racist environments? How does the oppression of women and the LGBT community factor in? The list of examples is endless.

The bottom line is that Plomin's "nature of nurture" argument makes no sense, since it portrays children as being able to create their environments on the basis of their inherited behavioral blueprints, while simultaneously portraying *parents* as possessing an amazing ability to override *their own* behavioral blueprints by "responding to their children's genetic differences." Even in this mythical parent-child Battle of the Blueprints, the family environments created by the parents will still prevail because parents possess power and authority in addition to their rigid behavioral blueprints, and because they have experienced many more years of "random" and "unsystematic" behavior-shaping events. Children would be largely unable to "select, modify, and create" their family environments for the simple reason that they would be no match for the blueprint-driven behavior of their parents!

Amazingly, the absurd claim that "the environment is to a large extent genetic" forms the basis of the most important behavioral genetic positions (the validity of the EEA and the twin method, for example), and genetic "heads I win, tails you lose" arguments of this

type were a central aspect of the famous yet severely flawed Minnesota reared-apart twin study.

The "nature of nurture" is not a behavioral genetic "big finding," as Plomin claimed, but is in reality a nonsensical and illogical claim.

The Claim that the Environment "Doesn't Make a Difference"

The entire discussion in Chapter 8, where Plomin wrote that parents, schools, and life experiences "matter," but "don't make a difference," is confusing and contradictory. If something doesn't make a difference, it doesn't much matter. It certainly "mattered" and "made a difference to" American football coaching brothers Jim and John Harbaugh that they grew up with a father who was a career football coach.

Plomin's "blueprint" theory cannot explain countless other real-world and historical examples showing that the environment is massively important. To cite four examples, his theory cannot explain (1) why Australia has a relatively low crime rate despite having been founded and settled by convicted criminals, (2) why political and other types of behavior are very different in North Korea compared with South Korea, (3) why religious beliefs and practices have increased dramatically in Russia since 1991, and (4) the fact that IQ scores have risen "massively" during the past century (the "Flynn Effect"). Once again, the list is endless.

A major theme of Plomin's previous writing had been that, in addition to genetics, "behavioral traits are substantially influenced by non-genetic factors."[11] The reasonable/moderate pre-*Blueprint* Plomin wrote things like, "As the pendulum of fashion swings from environmentalism to biological determinism it is important that it be caught mid-swing, because behavioral genetic research clearly demonstrates that both nature and nurture are important in human development."[12] To sell the new DNA blueprint story, he had to make these "substantial" and "important" non-genetic influences disappear.

Let's compare two quotations. The first is found on page 96 of *G Is for Genes*, a 2014 book Plomin co-authored with Kathryn Asbury. The second is found in *Blueprint* (p. ix).

Plomin, 2014

"The truth is that next to nothing is determined by genes, and our environments are hugely powerful."

Plomin, 2018

"The DNA differences inherited from our parents at the moment of conception are the consistent, lifelong source of psychological individuality, the blueprint that makes us who we are."

What happened between 2014 and 2018? Did the "hugely powerful" impact of the environment somehow disappear in those years, or did Plomin decide to greatly diminish its influence in order to make the case for his DNA blueprint claim?

"Contradictions and Logical Non Sequiturs"

In a December 14th, 2018 *Scientific American* article promoting his book, Plomin wrote,

"We would essentially be the same person if we had been adopted at birth and raised in a different family. Environmental influences are important, accounting for about half of the differences between us, but they are largely unsystematic, unstable and idiosyncratic —in a word, random."

As psychologist Scott Barry Kaufman pointed out in his January 18th, 2019 *Scientific American* blog, it is "impossible to make this claim based on what we currently know about genetics. Not only that, but these two sentences contradict themselves. First he says we would be the same, but then in the *very next sentence* he says of course we wouldn't be the same." Although Kaufman in general is an admirer of Plomin's work, he wrote that many of Plomin's 2018 statements were "riddled with contradictions and logical non sequiturs, and some of his more exaggerated rhetoric is even potentially dangerous if actually applied to educational selection."

Academic Achievement

On the question of whether sex differences influence academic achievement, Plomin wrote,

"How much do boys and girls actually differ in school achievement? The answer is that sex differences account for less than 1 per cent of the variance. In other words, if all you know about a child is whether the child is a boy or a girl, you know practically nothing about their propensity to achieve at school." (p. 30)

In the context of Plomin's entire argument, this statement could be interpreted as implying that the "propensity to achieve at school" of people of color, of the poor, of immigrants to Europe or to the United States, and of members of the working class is lower because of their inherited DNA. In addition, although Plomin's claim about the lack of a relationship between gender and school achievement may be true currently in the U.K. and the U.S., it is completely false historically. In the past (and in some countries currently), when women were discouraged or prohibited from getting a good education, a child's gender *was* a good predictor of his or her propensity to achieve at school. This is because, in previous eras, social conditions and political policies were very different, and massive social and political struggles were needed to change them.

Plomin's Interpretations of His Own Polygenic Scores

Plomin offered several explanations for why some of *his own* polygenic scores did not match his reality. For example, his schizophrenia score was in the 85th percentile, even though "I don't feel at all schizophrenic, in the sense of having disorganized thoughts, hallucinations, delusions or paranoia" (pp. 149-150). Rather than offer this result as evidence that polygenic scores cannot be trusted, he seemed to suggest that his high score could be the result of his creative thinking and genius. "A nicer way of thinking

about my higher than average polygenic risk score for schizophrenia," Plomin wrote, "is to contemplate possible aspects of what at the extreme is called schizophrenia. The best example is a possible link between schizophrenia and creative thinking. Aristotle said 'no great genius was without a mixture of insanity'" (p. 151).

"First Law of Behavior Genetics"

In his October 29th, 2018 "Gloomy Prospects" blog posting, Turkheimer complained that in *Blueprint*, Plomin took credit for his "First Law of Behavior Genetics," which Turkheimer had developed two decades earlier. According to Turkheimer's 2000 "First Law," "All human behavioral traits are heritable" to some degree. Plomin cited a 2016 article that he (Plomin) wrote as the source of the "First Law" (p. 195), and in the main body of *Blueprint* he did not mention the name of any of his behavioral genetic colleagues or mentors.

As Turkheimer wrote in this 10/29/2018 blog posting, Plomin "endorses a hard-line hereditarianism," but "doesn't bother to actually defend his ideas from even the most obvious objections. Faced with arguments or data that might contradict him, he ignores them, demagogues them, or, as he mostly does with me, pretends that the inconvenient ideas were actually his all along." *Blueprint*, in Turkheimer's view, is "simultaneously grandiose, boring and dangerous."

Psychiatric Disorders are Both Non-Existent and Highly Heritable

In *Blueprint's* Chapter 6, Plomin called for ending the idea that specific behavioral or psychiatric disorders exist, arguing that they are caused not by genes specific to each disorder, but are instead influenced by "generalist genes" falling into "three broad genetic clusters." This means that we will have to "tear up our diagnostic manuals based on symptoms" (p. 68). Plomin predicted the "demise" of psychiatric diagnoses, since "there are no disorders to diagnose and there are no disorders to cure" (p. 165). At the same time, he cited research claiming that these (for him non-existent) disorders are "under substantial genetic influence" (p. 5), and can be predicted by polygenic scores. What he failed to explain is how psychiatric disorders can be studied, predicted, and "substantially genetically influenced" if they do not exist.

If Plomin's claim is true that DNA "inherited from our parents at the moment of conception…makes us who we are," it follows that MZ twin concordance rates for schizophrenia and other psychiatric disorders should approach 100%. (Concordance means that both twins are diagnosed/labeled with the same disorder.) In fact, MZ concordance rates for the major psychiatric disorders are well below 100%. Most textbooks report the schizophrenia MZ concordance rate as 50%, and the pooled rate for the better-performed studies appearing after 1960 is less than 25%.[14] A 2018 Danish study by Rikke Hilker and colleagues found a very un-blueprintlike 12 of 81 MZ pairs (14.8%) concordant for schizophrenia, meaning that when one twin was diagnosed with schizophrenia, 85% of the time his or her identical-DNA co-twin was not so diagnosed.[15]

Four Decades of Unfulfilled Gene Discovery Claims and Predictions

According to Plomin, we have been in the midst of a "DNA revolution" since 2015-2016. Previously, decades of studies had failed to produce the expected genes for behavior, and he was ready to give up, and take up sailing in his retirement (pp. 122-123). For Plomin, his earlier failed attempts to identify genes that underlie intelligence reminded him of "the cartoon about a scientist with a smoking test tube who asks a colleague, 'What's the opposite of Eureka?'" (p. 122).

It is important to understand that whatever Plomin says now about his own or other researchers' past failed gene-finding attempts, he usually said something different when these failures were actually occurring. His first published behavioral gene discovery claim appeared in 1978, when he and a colleague wrote that "evidence has accumulated to indicate that inheritance of bipolar depression involves X-linkage in some instances."[16] In a 1994 article appearing in the prestigious journal *Science*, Plomin and colleagues reported that genetic linkages and associations had been found for reading disability, sexual orientation, alcoholism, drug use, violence, paranoid schizophrenia, and hyperactivity.[17] Four years later, Plomin and Michael Rutter informed their fellow psychologists that genes associated with behavioral dimensions and disorders were "beginning to be identified."[18] In the 2008 (fifth) edition of the textbook *Behavioral Genetics*, Plomin and colleagues reported gene associations or discoveries in the areas of attention-deficit/hyperactivity disorder (ADHD), reading disability, schizophrenia, panic disorder, personality, and antisocial behavior. (Many more examples can be found HERE, expanded and updated in Chapter 10 of *The Trouble with Twin Studies*.)

As an example of Plomin's use of the media to publicize his own tentative findings that later became non-replicated "smoking test tubes," on May 14th, 1998 the *New York Times* published an article by Nicholas Wade, entitled "First Gene to Be Linked with High Intelligence Is Reported Found." As Wade described it,

"Dr. Plomin has sought to move the debate forward by arguing that if genes for intelligence exist it should be possible to track some of them down through the powerful new genetic scanning techniques that have recently become available. Searching through a small part of the human genome, the long arm of chromosome 6, he found that a particular variant of a certain gene was twice as common in his sample of children with ultra-high I.Q.'s than in those with average I.Q.'s The gene has a very small effect, accounting for about 2 percent of the variance, or 4 I.Q. points, Dr. Plomin said."

When Plomin's claims and predictions fell through, his tendency since the late 1980s has been to cover up failure, "misery" (p. 123), non-replication, and "getting depressed" (p. 122) through the frequent use of published words and phrases such as "breathtaking pace," "exciting," "on the cusp," "spectacular advances," "dawn of a new era," "revolutionary advance," "revolutionary genetic research," "begun to revolutionize," "genetic advances are just around the corner," "momentum of genomic science," "missing heritability," "golden post-genomic era," "the future looks bright," "threshold of the post-genomic era," and "accelerating pace."

Plomin has a 40-year track record of unfulfilled gene discovery claims and predictions. He again made bold new claims and predictions in *Blueprint*, yet he did not mention this dreadful track record, nor was there any hint of embarrassment about it. There is every reason to believe that Plomin's new polygenic score claims and predictions are merely a continuation of this 40-year trend.

Fears of Genetic Claims and Genetic Determinism Are not "Misplaced"

The implications of Plomin's claimed "DNA revolution" are enormous, and if true would require re-writing all human history. He danced around the potential eugenic and racial differences implications of his claims—while at the same time airbrushing out of history the crimes committed, and the pseudoscience promoted, in the name of genetics and eugenics—and wrote that the IQ genetics debate raged due to earlier environmentalist critics' "misplaced fears about biological determinism, eugenics, and racism" (p. 53). Why misplaced? Is Plomin aware of books such as *The Science and Politics of I.Q., The Mismeasure of Man, The Legacy of Malthus, Murderous Science, Racial Hygiene: Medicine Under the Nazis, The Surgical Solution, The Nazi Doctors*, and *War Against the Weak*? Few readers of these books would conclude that fears of biological determinism, eugenics, and racism are misplaced!

Plomin claimed that "no specific policies necessarily follow from genetic findings" (p. 105). In fact (early 20th century left-wing supporters of eugenics, and Plomin's stated support for the British Labour Party notwithstanding), a whole set of politically conservative and right-wing beliefs, policies, and actions flow from genetic determinist claims. Genetic determinism supports the idea that human beings, for the most part, are in their biologically destined places in society and in the world. It helps justify inequality and huge income disparities, and supports the belief that changing or improving the environments of individuals, ethnic groups, economic classes, and nations won't accomplish very much. It is a worldview perfectly suited for the former colonial and current neo-colonial powers, and for the tiny handful of billionaires who currently own as much wealth as the 3.6 billion people who make up the poorest half of humanity.

Regardless of his intentions and beliefs, Plomin's "blueprint" claims provide pseudoscientific support to the appalling agendas and actions of the growing number of far-right and white-nationalist fascist groups in the United States and Europe. These groups are all about "biological determinism, eugenics, racism," and anti-Semitism. Perhaps this is one aspect of what Turkheimer saw as *Blueprint's* "poisonous side effects."

The historian of biology Nathaniel Comfort wrote in his October 5th, 2018 Genotopia blog entry:

"Plomin is spreading a simplistic and insidious doctrine that says 'environmental intervention is futile.' I don't care whether Plomin himself, in his heart of hearts, wants to ban public education; he gives ammunition to people who *do* want to ban it. 'Race

realists' and 'human biodiversity' advocates—modern euphemisms for white supremacy—read this stuff avidly."

Comfort's 2018 *Nature* review of *Blueprint* can be found HERE. Behavioral genetic researcher Paige Harden also weighed in on this issue:

"Genetic research on human behavior is entangled, both in historical fact and in popular imagination, with the horrors of eugenics. Plomin sidesteps this history. He also avoids any mention of race, the typical flashpoint of controversy for genetics books. Both omissions will strike many readers—particularly in America, where racial divisions loom large—as irresponsible. Scientific racism never went away, and any discussion of genetic influence unwittingly attracts a swarm of far-right fanboys."

A "Sales Pitch" for Direct-To-Consumer Genetic Tests

In various places, Plomin promoted direct-to-consumer genetic tests such as 23andMe as being able to provide polygenic scores for various behavioral characteristics. In his own words, his book included a "sales pitch" (p. 161) for people to purchase these tests. Plomin informed his readers that the test costs less than £100 (about $125.00 U.S.). He specifically promoted the purchase of 23andMe tests, and mentioned the 23andMe founder's self-serving belief that it is the "duty of parents to arm themselves with their child's blueprint" (p. 178). "Millions of people," Plomin wrote, "have already voted with their credit card by paying to have their genomic fortunes foretold, even before polygenic scores are available" (p. 184). It is worth noting that *Blueprint* did not contain a statement that its author had no financial conflict of interest in his role as a scientist promoting the large-scale purchase of direct-to-consumer genetic tests.

Conclusions

Behavioral genetic researchers don't like to be called "genetic determinists," which might explain why Plomin made occasional statements that "the environment is important" (p. 32), and that "genes are not destiny" (p. 92). And yet, in *Blueprint* he repeatedly conveyed the message that genes *are* destiny, and that environmental influences are not important.

The polygenic score method will likely become the latest in a long line of failed gene-finding methods in the area of human behavior, whose failures are usually only recognized after the latest-and-greatest method is said to have finally found the long-lost "genes for behavior." The most reasonable explanation for these failures is that Plomin and other researchers have been massively misled by twin and adoption studies, and by their strong genetic biases. Molecular genetic studies of behavior are characterized by the publication of false-positive results followed by non-replication, systematic error, and a reliance on false assumptions and dubious heritability estimates. These errors are repeated year after year, and decade after decade, and are the most likely explanation for a much-publicized August, 2019 report that genes contribute to same-sex sexual behavior.

What appears to matter most to Plomin now are "fortune-telling" polygenic scores, and his claim that researchers have found genetic "gold dust, not nuggets. Each speck of gold was not worth much, but scooping up handfuls of gold dust made it possible to predict genetic propensities of individuals" (p. 187). Most likely, Plomin's "gold dust specks" are the latest version of the genes-for-behavior *fool's gold* that molecular genetic researchers have been collecting, and the corporate media has been misreporting as real gold, for the past half century or so.

Future historians of science may well see *Blueprint* as marking the beginning of the behavioral genetics field's decline. Turkheimer recognized the decades-long "failure" of the behavioral genetic "gene-finding project," whereas Plomin attempted to snatch victory from the jaws of defeat as he neared the end of his long career. Plomin has gone *all in* with polygenic scores in an attempt to escape from the "genes for behavior" corner he had painted himself into, but the only real "big finding" that his field of behavioral genetics has ever produced is, paradoxically, the finding that such genes might not even exist.

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13. In 1920, after decades of social struggle, the United States ratified the 19th Amendment to its Constitution, which granted women the right to vote. Knowing

whether American adults had two X chromosomes, or only one X chromosome, would have told us a lot about whether they had the "propensity" to vote in U.S. presidential elections held prior to 1920, whereas the number of X chromosomes would have told us "practically nothing" about American adults' propensity to vote, for example, in the *1964* presidential election. Paradoxically, behavioral genetic "predictions" usually reflect the influences of the environment (or in the case of gene discovery predictions, don't come true), and not the direct actions of genes.

14. Joseph, J., (2013), "'Schizophrenia' and Heredity: Why the Emperor (Still) Has No Genes," in J. Read & J. Dillon (Eds.), *Models of Madness: Psychological, Social and Biological Approaches to Psychosis* (2nd ed.; pp. 72-89), London: Routledge.
15. Hilker et al., (2018), Heritability of Schizophrenia and Schizophrenia Spectrum Based on the Nationwide Danish Twin Register, *Biological Psychiatry, 83*, 492-498. The 14.8% MZ concordance rate is based on the "pairwise" concordance rate method, and uses results found in Table 2 of the study. Hilker et al. calculated a 33% MZ concordance rate, based on their use of the "probandwise" concordance rate method.
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