

Why Genes Determine Parenting and Children's Development

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Abstract: *Parenting*—defined as how parents rear and interact with their children in physical practices, how parents provide emotional support, and what environment parents provide for their children—plays an important role in children's development. People usually think of parenting from nurturist perspective, but this is not exactly true. In fact, parents' and children's genes will affect parenting and the environment children seek. Cultures may shape parenting differently, but children in different cultures could be born with different genes, which makes them have different susceptibility to types of parenting behaviors. Therefore, genes are crucial to parenting behaviors.

1. Introduction

Parenting is a crucial factor in children's development. Past research shows that how parents treat their children strongly predicts children's future personalities and behaviors. For example, harsher parenting results in children displaying more aggressive adolescent behavior [1]. Further, children who receive corporal punishment are more likely to display aggressive behaviors [2], as compared to children exposed to positive parenting, which is more likely to elicit prosocial behavior [3]. The parents' level of emotional stability also strongly correlates with children's prosocial and aggressive behaviors. That is, parents low on emotional stability struggle to control their emotions and have difficulties coping with stressors; this, in turn, may make parents sometimes have uncontrolled reactions to others. Children, as a result of having such parents, might exhibit more externalizing behaviors by imitating their parents' behaviors [4]. Furthermore, children's temperaments, as shaped by parenting, could influence their life in the future. For instance, children who are distressed or sad throughout their first year of life tend to experience more negative emotions throughout their development. Those negative emotions also predict mental illness outcomes later in life [5]. Therefore, how parents treat their children is important for children's development.

In addition, some of parents' influences on their children are actually caused in part by qualities of the children themselves. Not only do parents influence their children, but children's personalities also influence their parents' behaviors. For example, children with positive emotionality and high effortful control personality traits (low impulsivity and compliance) tend to elicit higher responsiveness from their parents. This is because children with these two traits make more social bids for interactions, make fewer bids related to negative moods, and are more responsive to their parents' behaviors. Therefore, parents are more likely to be responsive to children with positive emotionality and responsiveness [6]. Another research study on nonclinical elementary-school-aged children found that children low in benevolence and consciousness may cause their parents to use overreactive discipline or coercive parenting behavior to regulate their children [7]. Therefore, the personalities of children are important in determining their parents' behaviors.

The previous paragraphs show how children's personalities and parenting will be shaped or influenced by children's and parents' genes. That is, children's genes may influence their behaviors and personalities. Then, as illustrated in the previous paragraph, children with different personalities are likely to seek different environments. Throughout the following paragraphs, I will discuss in detail about how genes affect how parents treat their children, and children's different susceptibility to parenting and cultural and environmental impact on parenting.

2. How Genes Affect How Parents Treat Their Children

Genes determine how children or parents react to the environment, and the effect of genes will predict more of children's development. The following paragraphs will investigate in detail the relationship between "parents' genotypes and children's genotypes" and "parents' phenotype and children's phenotype." *Genotype* can be defined as the genetic makeup of an individual. *Phenotype* can be defined as one's personalities and one's appearances. A heritable genotype can be passed from parents to children. Children's genotypes will affect their phenotypes. This process is called a maturational sequence. That is, new structures continuously emerge from the maturation, from genotype to phenotype. Therefore, the development unfolds based on the transitions from genotype to phenotype [8]. Genes are like the helmsman of a big ship that organizes the direction of children's development and ways of interacting with the world.

Therefore, children with different genotypes may actively seek out different environments that foster their genetic propensities [8]. Some examples below are illustrated how children's genotypes affect their phenotypes through using evocative gene–environment correlations and active gene–environment correlation. *Evocative gene–environment correlation* refers to how children's different genotypes evoke different responses from the environment. The evoked responses will then shape children's development. For example, children's genotypes may make them become operative and attentive preschoolers. Attentive preschoolers will receive more positive responses from their parents, compared with uncooperative children. Those positive or negative responses, in turn, will affect children's environment. In addition, the *active gene–environment correlation* means that children actively choose their own environment based on their genotype differences. In other words, children with different phenotypes will choose different environments based on what they find stimulating and comfortable. For example, children's phenotypes influence which universities children want to attend, what major they want to pursue, or what kind of relationship they expect. Thus, these factors determine the environment based on children's phenotypes [8].

Moreover, the parents' genotypes may lead to the parents' phenotypes. The phenotype differences may cause parents to impose different parenting when raising their children. For example, a low conscientiousness parent tends to act before thinking and to use low discipline to shape their children. This makes their children have low inhibitory control [4, 8]. The parenting, then, as previously illustrated, may cause the children to have different personalities.

Another gene–environment correlation that illustrates how parents' genotype affect parents' phenotype and then affect their parenting is the passive gene–environment correlation. Here, *passive gene–environment correlation* means that children passively accept the genes and the environments their parents provide them. More specifically, children's genes correlate with their parents' genes, and their parents' genes are related to what kind of rearing environment they provide to their children. To illustrate this with an easy example, parents who love reading may provide their children with more opportunities to read, thereby creating a "reading" environment. Then the children may come to enjoy reading or become good readers because they have the "reading" genes and experienced a positive reading environment. Even if children are not skilled readers at first, the "reading" parents may provide a more enriched environment that could foster children's reading abilities. As a result, the children will become skilled readers because of their genes and environment. Thus, the passive gene–environment correlation causes the children passively accept parenting which is affected by parents' genes [8].

Prosocial behavior also helps illustrate "how genes affect the environment." *Prosocial behavior*, behavior that is intended to benefit others, is determined by parenting behaviors. That is, positive parenting (parents' warmth, autonomy support, use of reasoning, and induction) are positively correlated with children's prosocial behavior, whereas negative parenting (use of power-assertive discipline such as corporal punishment) are negatively correlated with children's prosocial behavior. Genes will determine both parenting and children's prosocial behavior. More specifically, parents' genotypes may affect their own phenotypes, and this then shapes their own parenting behaviors. For instance, they may use positive parenting (e.g., high warmth toward their children), which results in children's prosocial behavior. The parents are then more likely to react prosocially to their prosocial

children, and prosocial children are more likely to elicit positive responses from their parents. Ultimately, the children will then become more social. In another way, parents' genotypes may determine their children's genotypes. Then children's genotypes will lead to prosocial behavior. Parents will then react prosocially to their prosocial children. This makes children become even more prosocial. Overall, the prosocial children become more prosocial, whether as a result of the parents' genotypes or the children's own genotypes [3]. Thus, genes play an important role in shaping children's prosocial and other behaviors.

To summarize, children's genes will determine children's phenotype and then determine the parenting behaviors through active gene–environment and evocative gene–environment correlations. In addition, through passive gene–environment correlation, parents' genotypes will affect both parents' phenotypes and their parenting. In other words, how parents treat their children will affect their development. Therefore, parenting and children's development are greatly influenced by genes.

3. Individuals' Different Susceptibility

While parenting has some influence on children's behaviors, children's genes will determine whether the children will be more or less affected by parenting.

To start with, extravert and introvert children usually have different susceptibility to parenting behaviors. Past literature about twin studies suggested that parents' introversion and extraversion personalities are highly heritable to their children. Therefore, children's genetic makeup determines whether they are introverts or extraverts [9]. In addition, parenting behaviors influence introverted children to a greater extent than extraverted children. This may be because introverted individuals are likely to be conditioned, which means they adapt to the environment faster, according to the research involving twin studies [10]. Therefore, introvert and extravert children (whose determination depends on by their genetic makeups) have different susceptibility to the family environment [10].

From a broader perspective, the example of introvert and extravert children highlights how some individuals are born with different levels of sensitivity to the influence of parenting. This means that children have different susceptibility in accepting environmental differences. Some children have some "plasticity genes" that make them more sensitive to all kinds of parenting, bad or good. More specifically, there are *resilient* children and *plastic* children. Defined by a Swedish idiomatic expression, resilient children are the "dandelion children" who will survive and thrive in either bad or good environments, whereas plastic children are the "orchid children" who are vulnerable to both adversity or positive experiences. Evolutionary psychologists would argue that children's plasticity characteristics are evolutionarily favored [11]. This is because parents are shaped by natural selection, allowing that they can bear children with different plasticity. Therefore, if one effect of parenting is proven to be disadvantageous, children who are stable and not sensitive to parenting will not have to bear the cost of a bad parenting [12]. Thus, children are born with different susceptibility to either bad parenting or good parenting, which can help to maximum benefits evolutionarily.

A look at the impact of insensitive parenting provides an example of how plasticity genes affect children's susceptibility to insensitive parenting. According to research done on preschool children, insensitive parenting (always unresponsive to children's needs) will cause children to have externalizing behaviors in later life. However, not all children reared with insensitive parenting will have externalizing behaviors. More specifically, children who are born with 7-repeat DRD4 allele will exhibit more externalizing behaviors when experiencing insensitive parenting, compared with children without 7-repeat DRD4 [12]. The 5-HTTP allele also illustrates the theory that children experience more or less negative emotions due to insensitive parenting. Individuals with 5-HTTP allele are more sensitive to stressful life events, as compared with people without 5-HTTP allele. This sensitivity to stressors leads to higher suicidal and depression rates. And children with 5-HTTP are more likely to elicit negative emotions and usually have higher depression rates when experiencing low warmth parenting [13]. Therefore, insensitive parenting may cause higher suicidal

and depression rates among children, but children's 5-HTT allele will make them affect by the insensitive parenting more or less.

Notably, while most of the theories on plasticity utilize Western samples, it is also important to consider the cross-cultural differences because children from different countries may be born with different plasticity genes. For example, it is found that Asian children usually have fewer 5-HTT alleles than children in Western countries [13]. Therefore, compared with Western children, Asian children are less likely to have negative emotions and feel depressed when they experience low warmth parenting. Therefore, children in different cultures are also born with different amount of plasticity genes, which makes them more or less susceptible to a particular parenting.

4. Cultural and Environmental Impact on Parenting

Some research still shows how different cultures and environments shape parenting, so nurturists may still have a lot of ground to stand on. But we can still think culture from biological perspective.

Different cultures have diverse impact on parenting, thus influencing child behaviors. More specifically, cultures shape how parents interact with their children: what kind of activities they do with their children, what activities they encourage their children to engage in, and so on. For example, there are many differences between Eastern and Western parenting. Eastern cultures lean more toward collectivism, and Western cultures lean more toward individualism. *Collectivism* means the culture places more value on interdependence and cooperation, whereas *individualism* means the culture places more value on independence and the importance of "self." In other words, parents in western and eastern cultures would like to do different activities with their children to shape children's independent or interdependent personalities [14]. For example, Chinese mothers engage in more body contact (e.g., carry a child) with their children, as compared to Euro-American parents, who make more efforts to move their children's attention to an object that they have touched or that their children have touched. Body contact is linked with the developmental pathway of interdependence and relatedness, whereas the efforts to move children's attention to an object are linked with the autonomy and independent developmental pathway. Therefore, the collectivist culture encourages Chinese mothers to treat their children that promotes interdependence, and the individualist culture shapes Euro-American parents treat their children toward independent behavior [15]. Another example in the United States is that U.S. parents are more likely to motivate their babies to express positive emotions by soothing their children once the babies start expressing negative emotions, thereby making U.S. babies more likely to enjoy high-stimulating activities and less likely to feel unhappy when experiencing something upsetting. Therefore, U.S. parents discourage their kids from expressing negative emotions (e.g., cry) by body touching and using positive words. This could make U.S. children more likely to express positive emotions [14]. In general, then, parenting is crucial to children's development, and parents can develop different parenting behaviors according to their cultural differences.

However, while different cultures shape how parents interact with their children, parenting itself changes children's personalities partly because of the activities parents do with their children, but also partly because the environments children experience further changes their genes' regulation and expression. That is how epigenetics works on children's development. *Epigenetics* investigates how the environment changes DNA modification—for example, DNA methylation predicts children's personalities [16]. As another example, bad maternal care can negatively alter offspring's epigenetic profiles. When expectant moms consume a bad maternal diet when pregnant, the children will have low body weights at birth. In addition, prenatal exposure to maternal stress, such as depression or anxiety, could put children at higher risk for psychopathology in later life [17]. Pregnant mothers who experience depressed moods will increase the methylation of the human glucocorticoid receptor gene (NR3C1). This gene methylation will cause 3-month-old infants to have more cortisol stress reactivity [16]. Notably, however, epigenetics can differ across cultures. In other words, the "racial inequalities in health" cause different racial and ethnic groups to have unequal burdens of disease and different psychosocial exposure. In turn, such differences make people across races and cultures have different chronic diseases in their nature [16]. The racial

inequalities across cultures may also explain why parents in different cultures use different parenting ways when rearing children. In general, these differences in cultures will result in the differences in children or mother's genes. Thus, parenting can affect children's development differently as a result of cultural and environmental differences between cultures.

5. Conclusion

Admittedly, environment will exert some impact on the parenting and children's development. However, it is crucial for researchers to understand that the importance of how genes impact parenting has been overlooked. More specifically, most researchers currently focus on how parenting influence children's development through genetic expression [1, 14, 15], but fewer researchers investigate how parenting are shaped and affect children's development through genetic expression.

While this article aims to highlight importance of genes, this does not mean that parenting and children's development are 100% shaped by genes. However, it is difficult to separate the two because they correlate and interact with each other. More specifically, everything in children's development is a product of two. It is not determinable that for one particular phenomenon, how much is due to genetic influence and how much is due to environmental influence. Children's development is a complex process, and one small move may cause the butterfly effect in children's development. In addition, as previously illustrated, children's genotypes will alter phenotypes and then alter the environments children seek. In comparison, from an epigenetics approach, environment will alter how the genes are expressed. The genotype → phenotype and epigenetics debate both considers the effect of and the correlation between genes and environment. Genes are not responsible for 100% of one phenomena. Rather, environment may affect genes, and genes may also affect environment. With so many individual and environmental differences, it is virtually impossible to say that one personality trait or one result is only because of one variable [8, 16]. Therefore, it is time for researchers to focus on how genes and environment correlate with each other.

Moreover, while most research on parenting behaviors and genes and environment is being done on Western cultures, it is also important to note that there are various cultural differences that can lead to the genes' and environmental differences. As previously illustrated, collectivism cultures and individualism cultures are shaping parenting behaviors differently. Different parenting behaviors will, in turn, shape children's development. Further, children in different cultures are born with different plasticity genes. For example, Asian children are born with fewer 5-HTT alleles, which makes them less affected by negative parenting. Therefore, when conducting research on parenting, children's development, and the genes' and environmental effect, researchers must consider the cultural influences on parenting and children's susceptibility to parenting behaviors [14, 15]. In addition, more research is needed on various ethnic and racial backgrounds in order to understand the cultural differences in parenting behaviors.

In general, the purpose of this article was to highlight the importance of how genes contribute to parenting, children's susceptibility to parenting and children's development. Cultural may shape parenting behaviors, but cultural can also connect with genes. That is, children born in different cultures may born with different susceptibility to parenting and cultures may shape parents' and children's genes differently through epigenetic modification. Ultimately, more research is needed to further investigate the cultural differences in parenting, children's development, and how does cultures shape genes and environment.

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