Chapter 4
Genetic–Memetic Model of Mental Illness – Migration and Natural Disasters as Illustrations

Contents

We have so far developed an epigenetic model of mental illness based on gene × meme interaction. Important in the equations are the nature of genes themselves (e.g., polymorphisms) and the culture that forms the meme pool in early life as well as childhood stress memes. Adult stress conditions result in an influx of new stress memes that may stimulate the replication of dormant pathogenic memes, as a carcinogen may trigger the uncontrolled growth of a cancer-prone (e.g., BRCA gene activated) cell. We will examine two stress conditions that affect large populations and consider the gene × meme interaction that may result in mental illness.

4.1 Migration

When an individual emigrates to another country, there is usually a change in culture (meme pool) to which the person has to adapt (stress).

In a classic 1932 study in Minnesota, Odegaard found a much higher incidence of state hospital admission for schizophrenia among the Norwegian immigrants as compared to native born, and even compared to Norwegians in Norway (Odegaard, 1932). More recent study in The Netherlands showed an increased risk of schizophrenia and other psychosis in immigrants from Morocco, Surinam, and Dutch Antilles but not in those from Turkey or western Europe (Schrier et al., 2001; Selten et al., 2001). There was an increased risk of psychosis among immigrants, especially in those from East Africa (Zolkowska et al., 2001). It is generally accepted that highest rates of psychosis occur in immigrants who are socially and economically disadvantaged and have poorer housing, less educational, and employment opportunities. A recent finding by Patino et al. indicates that there was a fourfold increase in the risk of psychotic symptoms in children who had a history of both immigration and family dysfunction (Patino et al., 2005).

H. Leigh, *Genes, Memes, Culture, and Mental Illness*,
DOI 10.1007/978-1-4419-5671-2_4,

Ndetei reviewed the phenomenology of mental illness of different cultural groups (Ndetei, 1988). The role of migration in West Indian immigrants to England has been studied extensively. West Indian patients admitted to a mental hospital in England and normal West Indians with no history of mental illness both shared a fundamentalist acceptance of the god and the devil having a personal control of one's health and disease as well as beliefs in the existence of ghosts and spirits of the dead. In the patients, religious delusions and persecutory delusions were common, i.e., an exaggeration of commonly held beliefs (memes). Some patients also had grandiose delusions of having special powers to help others, again congruent with the widely held belief in magic. West Indians in a mental hospital in London were found to have an excess of paranoia, somatic, and persecutory symptoms irrespective of actual diagnosis compared to English patients. The delusions found in West Indians were predominantly paranoid in nature (77%), and the hallucinations were predominantly auditory (92%) (Tewfik and Okasha, 1965).

Most of the West Indians who emigrated to England are descendents of slaves brought to the West Indies from West Africa. Thus, the West Indian culture contains a mixture of memes from traditional African culture and European cultures. There are also mutations such as the West Indian version of Pentecostal Christian beliefs to which some 25% of the Jamaican population subscribe. The traditional African beliefs include beliefs in witchcraft and evil spirits.

In Africans living in Africa, e.g., Sudan, Guinea Coast, and Congo, there is widespread belief in witchcraft that did not seem to be altered significantly by levels of education and Westernization (Ndetei, 1988). Even Christians returned to the traditional belief/behavior when under stress. This may indicate that the witchcraft and evil spirit memes may have lain dormant in the brains in which Western or Christian memes became dominant, but that the dormant memes awakened and multiplied under conditions of stress.

According to traditional African beliefs, health signifies peace with the spirits of ancestors and supernatural beings. When sick, they often go to the Western doctor for treatment of the illness, but also to the witch doctor to divine the cause of the disease. This practice may cut across educational and socioeconomic levels.

Ndetei states that any actions, beliefs, traditions, and cultural ways of thinking of many Africans are based on local laws of causality, i.e., every misfortune or disease is the doing of witches or evil people. Thus it makes sense to feel paranoid, i.e., an external agent is responsible, when one feels dysphoria. Since such external spirits exist, it is also natural to hear them in the form of auditory hallucinations. In memetic terms, brains infected with memes like witches and evil spirits are at a higher risk of paranoid forms of psychosis under stress.

The impact of migration on the individual would be different between voluntary migrants and involuntary ones. The voluntary immigrants who choose to migrate would have had increased and regular contact with the new culture (memes) to prepare for the migration, usually for economic or educational advancement, i.e., the infusion of the new memes would be gradual and in harmony with existing memes because of the positive affect attached to the new memes. Further, the voluntary immigrants are more likely to be either better educated, from a higher

socioeconomic class, or novelty-seeking. Involuntary migration, as in refugees, exiles, and slaves, on the other hand, is often sudden and associated with negative affect. The exposure to the new culture and memes is unprepared and may result in a "culture shock." The loss of familiar culture (re-enforcing meme pool) and cultural identity (influx of memes contrary to dominant memes in the brain) may cause an acute grief reaction and has been called *cultural bereavement* (Bhugra and Becker, 2005; Eisenbruch, 1984).

Even among voluntary immigrants, the degree of acceptance by the new land and the degree of discrepancy between expectations and achievements play a role in the stress level and thence the risk of mental illness. High ethnic density (thus re-enforcing meme pool for familiar memes) may have a protective effect. Bhugra observed that there may be particular difficulties for individuals who migrate from a collectivistic or socio-centric societies, and who themselves are socio-centric, into individual or ego-centric societies (Bhugra and Becker, 2005). Obviously, there would be memetic conflict between the dominant socio-centric memes in the brain and the incoming ego-centric memes from the newly dominant meme pool.

While migration is generally stressful in the sense that there is an adaptational demand to a new location and culture, it is not universally pathogenic. For some groups of immigrants same or lower rate of psychiatric illness compared to indigenous people have been observed. For example, the East Asians (East Indians and Pakistanis) in England had similar or lower rates of psychosis compared to native-born English (Bhugra, 2000; Cochrane, 1977). This finding may be attributed to the increased social support in these groups. Social support in these groups may be in the form of frequent access to familiar meme pools from the original culture, and gradual and, therefore, filtered introduction of new memes.

People who emigrate might also be more sturdy individuals who are unafraid of change, and some such individuals may already harbor memes of the new culture through active exposure to books, films, etc. (Cochrane, 1979).

So far, we discussed the interaction of resident memes with stress that increases the risk of psychosis in some immigrants. What might be the role of genes in this interaction?

One hypothesis is that persons with genes associated with a higher risk for schizophrenia, i.e., eccentric, asocial, or unstable personalities, may be more predisposed to emigrate. The fact that many psychotic symptoms seen in immigrants do not seem to be "core symptoms" of schizophrenia but rather exaggerations of memes of culture of origin, tend to cast doubt to the completeness of this explanation. On the other hand, the so-called core symptoms, e.g., Schneiderian first-rank symptoms such as auditory hallucinations, have been reported to vary depending on culture (Ndetei, 1988). Therefore, given genetic vulnerability to psychosis, whether in native land or new land, the memes denoting psychosis (or memes that tell you how to be "crazy") may proliferate under stressful conditions.

An intriguing finding in monkeys may be relevant. Male rhesus monkeys leave their maternal group when they reach adolescence and roam in bands of male-only groups. The serotonin transporter promoter polymorphism discussed in Chapter 2 seems to determine the age of such departure. Those with the short

alleles of 5-HTTLPR tended to leave the maternal troop earlier than those with the long alleles. Those with the short alleles tend to be antisocial, aggressive, and stress-sensitive, and also have lower levels of the serotonin metabolite, 5-hydroxyindoleacetic acid (5-HIAA), in the cerebrospinal fluid (Trefilov et al., 2000). Another study found that males with low central serotonin levels (and therefore low 5-HIAA) delay migration if they stayed until adolescence and show high levels of violence and premature death, but those that survive achieve higher dominance rank in the new troop (Howell et al., 2007). Perhaps, some humans who migrate might also be genetically more prone to be adventurous, more stress-sensitive, but can be more sturdy and achieve mastery if they survive the initial adjustment.

While there is clearly a higher rate of psychosis among immigrants, the rate of depression and anxiety seems lower, especially among the Asian immigrants to England. This might be due to resident memes that cause reluctance to express dysphoria or due to fatalistic memes or external locus or control that may be protective (Bhugra, 2004). Existing memes may also influence immigrants to express dysphoria as somatic symptoms rather than emotional suffering (Iwata et al., 2002; Ndetei, 1988). In other words, it is possible that there is a greater prevalence of memes denoting or describing depressive states in the Western culture so that the immigrants' expression of depressive memes may be smaller in comparison even in those whose brains may be experiencing a depressive state. On the other hand, there may be more memetic expression of somatic discomfort.

In summary, migration serves as an example of stress that may differentially affect different individuals depending on several factors. One is clearly the genetic composition of the individual and the early memetic environment that may have predisposed the individual to be stress-sensitive or stress resistant. Another factor is the memes that the individual has absorbed in early life, memes for expressing dysphoria and memes for being "crazy," and overarching memes that explain nature and misfortune. Then the degree of conflict or congruence between the pre-existing memes and the new meme pool of the new land would play a role, as well as the degree of support or filtering available from the sub-meme pool in the immigrant community playing a protective role.

4.2 Natural Disasters

Natural disasters such as tsunamis, floods, and hurricanes are well known to cause depression and posttraumatic stress disorders. However, not everyone who has been exposed to such disasters develops psychiatric syndromes. Kilpatrick and colleagues recently reported an association among the serotonin transporter promoter gene polymorphism (5-HTTLPR), the amount of exposure to disaster, and social support in the risk of development of depression and PTSD (Kilpatrick et al., 2007). They studied 589 victims of the 2004 Florida hurricane through interviews and DNA analysis to determine the extent of stressful exposure to the disaster, symptoms of depression and PTSD, and social support. Social support during the 6 months before

the hurricanes was assessed, consisting of emotional (e.g., "someone available to love you and make you feel wanted"), instrumental (e.g., "someone available to help you if you were confined to bed"), and appraisal (e.g., "someone available to give you good advice in a crisis") aspects. In this study, the prevalence of post-hurricane PTSD was 3.2% and the prevalence of post-hurricane major depression was 5.6%. Low social support was associated with both PTSD and major depression and high hurricane exposure was associated with PTSD but not major depression. The serotonin transporter genotype by itself was not associated with the risk of PTSD or depression, but the short allele of 5-HTTLPR in interaction with the degree of exposure to stress and lack of social support increased the risk of depression and PTSD. This genotype-by-environment effect was found in both males and females.

Though no specific memetic data are available, this study shows the power of social support whose effect is largely memetic (someone to love you, make you feel wanted, give good advice, etc.) that may attenuate or exacerbate the stress of natural disasters.

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