

Domestic Violence and Schizophrenia

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Keywords: Schizophrenia; Domestic Violence; Childhood trauma; older adults; psychosis.

Abstract: There are a large number of studies and reviews talking about the relationship between environmental factors and psychosis. However, less study reflects that there is a link between domestic violence and schizophrenia. Domestic violence such as childhood trauma or abuse cause victims to experience pressure psychologically and become stressed, which is one contributor to mental disorders. Other studies also indicate that environmental factors should be considered as one of the etiologies of schizophrenia. These papers potentially constructed a bridge for the investigation of the connection between domestic violence and schizophrenia. Therefore, we sorted related reviews and studies and renewed the topic. Although most of the studies relied upon reports of psychotic symptoms, rather than a diagnosis of schizophrenia, there is no doubt that violence indeed has the connection with mental disorders, which could be triggered to schizophrenia, bipolar disorder, or other kinds of severe psychosis at any time and anywhere.

1. Introduction

Schizophrenia is a serious mental disorder characterized by positive symptoms, such as hallucination and delusion, and negative symptoms, such as anhedonia and flattening. Globally, about 21 million people suffer from the disease. Although schizophrenia has a low incidence rate with a median value of 15.2 per 100,000 persons per year [2], it has significant severity. Patients with schizophrenia occupy about 25% of all psychiatric hospital beds [3], and the lifetime prevalence for schizophrenia is 1.25%, compared with 0.31% for bipolar disorder and 0.33% for depression [4]. Usually, schizophrenia starts from 16 to 30 years old. Schizophrenia is a combined result of genetic factors and environmental factors. It has been found that violence is related to psychotic disorders. In a study, 46% of psychiatric patients have experienced at least one type of childhood adversity [5]. In another study, 49% of the women who had been through violence suffered mental disorders, compared with 19.6% of the women who hadn't experienced violence develop mental disorders [6]. Domestic violence is prevalent in all kinds of violence. It typically includes physical abuses, emotional abuses, financial abuses, sexual abuses and so on. Accordingly, In China, a woman faces domestic violence every 7.4 seconds [7]. In America, 1 in 3 women and 1 in 4 men have experienced domestic violence [8]. Domestic violence causes not only physical health damage but also mental trauma. Many researchers have explored the relationship between life adversities and psychotic disorders in general. But few of them have analyzed the exact relations between particular adversity and disorder. Therefore, this review aims to analyze the effects of domestic violence on schizophrenia. We collect data from other articles to make a summary of domestic violence and schizophrenia. This review covers pathology and risk factors of schizophrenia, how domestic violence stimulates schizophrenia, effects of domestic violence on people at a different age, and recovery from schizophrenia.

2. Schizophrenia

2.1 Pathophysiology of Schizophrenia

Current evidence supports that multiple risk factors account for the occurrence and development of schizophrenia, including genetics, brain chemistry and environment.

It has been intensively studied that aberrance of certain neurotransmitters, such as dopamine, glutamate and serotonin, might contribute to schizophrenia. In general, hyperactivity of dopamine and hypoactivity of glutamate as well as serotonin is involved.

2.1.1 Dopamine

The dopamine hypothesis is one of the most prevailing hypotheses of schizophrenia. This classical hypothesis comprises three well-documented processes of dopamine metabolism, i.e., the synthesis, release and receptors of dopamine. Several studies have suggested an increase in the synthesis capacity of the presynaptic terminal [9], with effective size ranging from 0.63 to 1.89 [10]. By using PET and SPECT, researchers have detected doubled radio tracer displacement in patients with schizophrenia compared with controls, suggesting an increased dopamine release. Elevation in dopamine release could also be testified by an increase in the baseline occupancy of D2 receptors in schizophrenia patients. Additionally, the dopamine theory is also based on increased dopamine release in the acute phase rather than the stable phase [9].

Dopamine receptors are G-protein coupled receptors and are classified from D1 to D5. Three meta-analyses have demonstrated a 10%-20% increase in striatal D2/D3 receptors in patients with schizophrenia [9]. And such increase is related to positive symptoms such as hallucination and delusion and are what the dopamine hypothesis focuses on. On the other hand, dysfunction of the D1 receptor in the prefrontal cortex is correlated to negative symptoms such as lack of concentration and social withdrawal. However, it is currently controversial whether the dysfunction is triggered by an increase or decrease of D1 receptors.

2.1.2 Glutamate

As researches uncovered that classical antipsychotics are not effective in relieving negative symptoms [11], a new hypothesis related to glutamate has been proposed. Although some studies suggested no difference in glutamate levels between patients and controls, other studies, including the first one that initiated the glutamate hypothesis in 1980, detected a relation between reduced glutamate level and schizophrenia [12]. Glutamate conducts its function through glutamate receptors, which could be divided into two categories-ionotropic receptors, including the most frequently studied NMDA receptor and metabotropic receptors. However, there is inconsistency in the opinions of the trends of mRNA and protein levels of receptors. In a review by Wei Hu et al., structural changes in glutamate neurons were studied in the perspectives of somal volume, dendrite arborization, dendritic spine density, and axon boutons. Although variations exist on how exactly these structures alter, most studies reported a difference in these structures between schizophrenia patients and controls [13].

2.1.3 Serotonin

It has been proposed for decades that hyperactivity of serotonin induces schizophrenia. 5HT is the receptor of serotonin, and by using PET-CT, Ngan et al. discovered a decreased binding potential of a 5-HT 2A ligand in the DLFL and ACC, suggesting the increased occupancy of serotonin [14].

2.2 Risk Factors of Schizophrenia

Schizophrenia is a multifactorial mental disease developing from gene-environment interactions with involved vulnerability factors. Genetic factors include disease-causing genes and family heredity. Environmental factors are divided into biological factors such as infection and inflammation and psychosocial factors such as urbanization, life experience and immigration.

2.2.1 Genetic Factors

The heritability of schizophrenia is estimated between 70% and 80% [15]. To be specific, nearly 50% of persons are affected if their parents are patients [16], and 60% to 84% of people are affected if their monozygotic (100% sharing genes) twins are patients [17]. The gaps in heritability suggest that there must be factors that cause the variants. Indeed, multiple factors contribute to genetic mutations. For example, interestingly, heritability is associated with parental age. According to records in Demark from 1955 to 2006, schizophrenia risk increases for offspring of older fathers (> 45 years). And another study showed that offspring of teenage parents also had increased risk [18]. Although it was first speculated that a single gene was to blame for schizophrenia, scientists now agree that multiple genes contribute to schizophrenia. At least seven candidate genes such as *NRG1* and *DISC1* are suspected to be related to schizophrenia. Moreover, in the ground-breaking meta-analysis of genome-wide association study (GWAS) of schizophrenia, 108 schizophrenia-associated loci were found [19]. They controlled calcium channel regulation, dopamine synthesis, immunity, and glutamate neuroreceptors. However, this whole bunch of genes and the subsequent GWAS study explain only a small portion of the variability in schizophrenia risk in the general population, which means that the reasons in majority to induce the disorder could be due to gene-environment interactions or epigenetic mechanism reflecting the influence of environmental factors [20].

2.2.2 Environmental Factors

Biological factors such as diabetes, smoking during pregnancy, rubella, and cardiac disease might increase the risk of schizophrenia. However, since it is not the common case, it is supposed that such diseases lead to genetic mutations or brain development deficiency and hence stimulate psychotic disorders indirectly.

Psychosocial factors play a very important role in the development of schizophrenia. For example, poverty and lower class have a strong connection with increased risk of schizophrenia [21]. Furthermore, urban environments increase schizophrenia risk by 2.39 times than most rural areas [22]. Besides, interactions among family members greatly influence the development of schizophrenia. In the next section, we will explore how domestic violence affects schizophrenia.

3. Domestic Violence

Domestic violence is a kind of bully that occurs in the family unit. It covers every age group, whether during childhood or adulthood, and even occupies the patient's whole life [23]. Domestic violence is a general term and can be divided into the following forms: 1) physical abuse; 2) sexual abuse; 3) emotional/psychological abuse; 4) neglect; 5) bullying. From the victim's perspective, they are traumas that can cause physical and psychological damage simultaneously. In a meta-analysis of case-control, prospective, and cross-sectional cohort studies, Varese and his colleagues came out with strong evidence that these different kinds of trauma increased the risk of psychosis during adulthood [24]. In the British National Survey of Psychiatric Morbidity, Bebbington et al. realized that there was a three-time risk of a definite or probable psychotic disorder presenting sexual abuse took place at some point in the lifetime of a patient [25]

4. Impact of Domestic Violence on Schizophrenia in Different Age

4.1 Older Adults

4.1.1 Common Types of Domestic Violence and Severity

Older adults face problems such as loneliness, illness, and mental security. And many cases of domestic violence are derived from these older-age problems. Generally, domestic violence can be physical and emotional. In older adults, violence occurs more emotionally than physically. In research in Germany, of women over the age of 65 from 7257 women of all ages, 1% described past year physical or sexual violence, compared to 8% of women aged 16–49, and 3% of women aged 50–65

[26]. The data support the idea that physical violence reduces as age increases. Such a trend is suggested to be related to development in frontal lobes and associated neuronal tracts [27]. Besides, economic advances slightly, from 12% in women aged 16–49 to 13% in women over the age of 65 [26].

A study in Germany reported that intimate partner violence was 27% for women over the age of 65, 30% for women aged 50–65, and 33% for women aged 16–49. Although odds of such domestic violence decrease as age increases, the impact of domestic violence is severe for older adults. According to a study, the odds of serious mental health after domestic violence is 2.96 for women aged 16–49, 2.45 for women aged 50–65, and 2.53 for older women [26]. As we can see in the data, the incidence rate is much higher for women older than 50. By the same token, in a telephone interview of 16000 American women, a chronic mental health condition was reported among 14.8% of the older age cohort, compared to 3.2% by the younger age cohorts [28]. Although several other studies disagree with this idea, the general trends show the robust relation between mental disorders and domestic violence in older adults.

4.1.2 Psychology of Older Adults

Apart from the same experience as working-age adults and teenagers, such as loneliness and neglect, older adults have additional experience enduring domestic violence. For example, older adults might endure domestic violence for a longer period. Such long-term torment increases the negative effect. According to a woman in a study by Band-Winterstein and Eisikovits, “Fifty years isn’t enough? I am a sick woman, and he doesn’t give me any rest ... He can’t do anything to me anymore. I said that the social worker should take him to a nursing home. I hate him. I can’t look at him. I won’t forgive.” Also, older adults usually have physical illness and illness, and domestic violence could cooperatively lead to a higher rate of schizophrenia. Moreover, because older adults have been in their family for most of their life, they might be less able to leave the family and less likely to ask for help [23].

4.2 Children

4.2.1 Childhood Trauma

Childhood trauma significantly increases the likelihood of schizophrenia. In a study in Netherland, physical, emotional, and sexual violence before age 16 is responsible for a seven-fold increase in psychotic symptoms [29]. In community service, 46% of the people with schizophrenic symptoms have suffered from childhood physical abuse or sexual abuse [30]. And in a study, among the 200 adult out-patients, 35% of those who have childhood trauma developed two or more schizophrenic symptoms. In contrast, only 19% of those without childhood trauma developed such symptoms [31]. Besides, schizophrenia patients who have experienced childhood trauma have earlier onset, experience longer periods of hospitalization, require enhanced treatment, and manifest more severe symptoms.

4.2.2 Particular Childhood Trauma and Symptoms of Schizophrenia

Accordingly, different types of domestic violence in childhood can stimulate and increase the severity of particular symptoms of schizophrenia. In general, physical and sexual abuse is related to positive symptoms such as hallucination and delusion. At the same time, emotional neglect is associated with negative symptoms such as social withdrawal and lack of motivation. For positive symptoms, in a New Zealand study, 53% of those who experienced child sexual abuse, 58% of those who experienced childhood physical abuse, and 71% of those who suffered both abuses developed hallucinations [32]. In another study, paranoid delusion occurs in 40% of the out-patients with child sexual abuse, compared with 23% of the non-abused patients [33]. Additionally, sexual abuse may greatly account for hallucinatory experiences, whereas physical abuse has been found associated with persecutory delusions. However, due to the complexity of schizophrenia, it’s not a conclusive pattern. For negative symptoms, research reported that neglect and stress in childhood lead to increased cortisol levels and HPA axis hyperactivity, and therefore inducing negative symptoms. Also, some

studies suggest that childhood trauma and negative symptoms might set up a relationship based on psychosis and hospitalization [34].

4.2.3 Mechanism of Childhood Trauma Stimulating Schizophrenia

A robust link had been found between schizophrenia and childhood trauma (Figure 1). Some severe positive symptomatology like hallucinations usually accompanies patients with schizophrenia. When experienced traumas like sexual abuse or physical bullying, child victims would be at high risk of hallucinating and emotional symptoms [35].

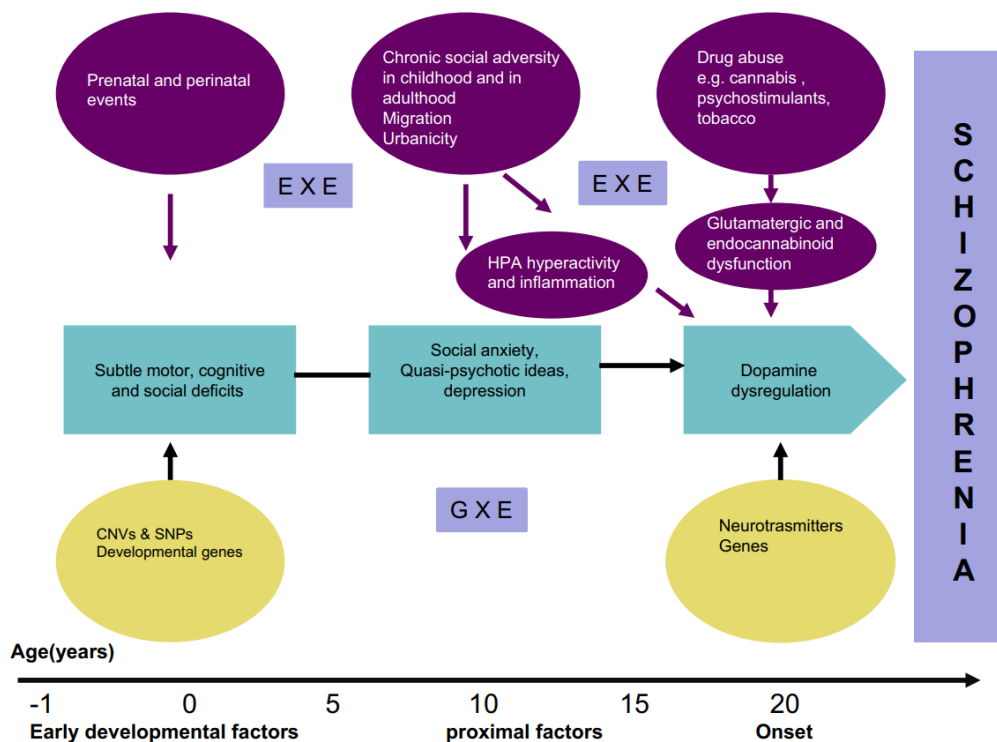


Figure 1. It is reported that three risk factors—cannabis use, childhood trauma, and urbanicity—could be the environmental induce factor working with that of genetic for constructing the foundation of schizophrenia. (.CNV, copy number variations; SNPs, single nucleotide polymorphisms; ExE, environment–environment interaction; GxE, gene–environment interaction) [40]

This information is also confirmed by a meta-analysis done by Trotta and his colleagues in 2015, which said that there was a 1.8-fold increase in the incidence rate of hallucination and delusion in the general population samples when exposed to childhood trauma [36]. According to a theory of mind task reflecting social cognition, there was also an association between childhood trauma and the activation of the posterior cingulate gyrus, precuneus, and dorsomedial prefrontal cortex in patients with schizophrenia. The connectivity between the posterior cingulate/precuneus region and the amygdala would decrease when patients experienced high levels of sexual abuse and physical neglect during childhood, damaging cognitive abilities by unbalancing specific brain networks [35]. In addition, Childhood trauma is also a severe form of stress, making individuals more likely to develop schizophrenia. Physical and mental traumas in domestic violence might bring psychosocial stress to the victims, which could trigger schizophrenia disorder, explained by the diathesis-stress model. When patients received a certain amount of pressure, the weakness threshold for the disorder was lowed so that schizophrenia would become more easily to achieve [35]. There was a relationship between stress sensitization and dysregulation of the hypothalamus-pituitary-adrenal (HPA) axis. Following the neurobiological pathway (figure 2), stress capability regulates the HPA axis, which is the major stress neuroendocrine system that controls the production of the stress hormone cortisol by the adrenal glands [37, 38]

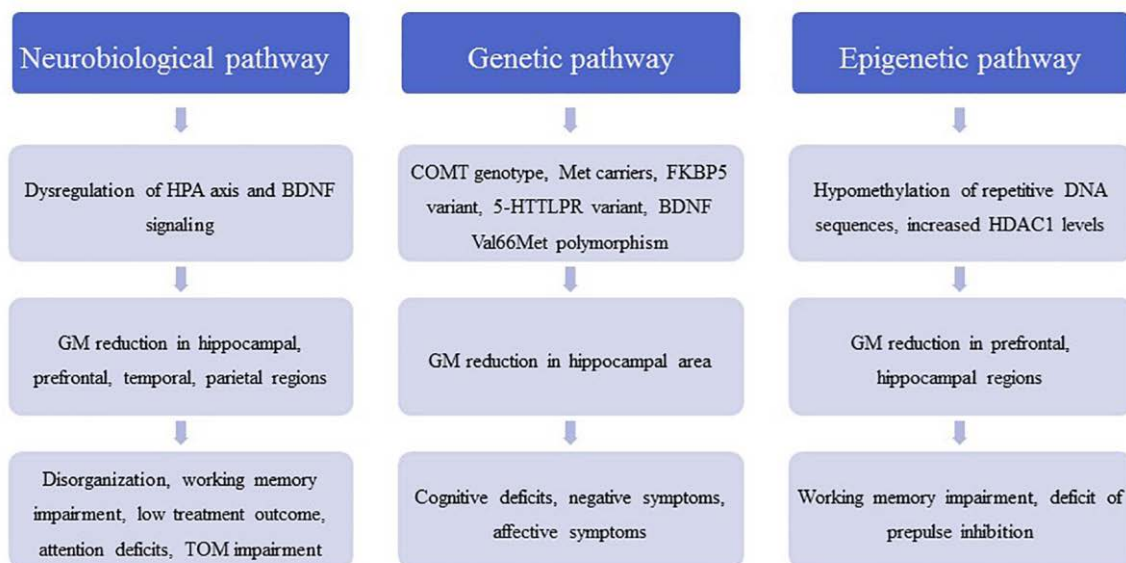


Figure 2. The figure above displays three main pathophysiological pathways (neurobiological, Genetic, and epigenetic) between childhood trauma and schizophrenic symptoms. (HPA, hypothalamic–pituitary–adrenal axis; BDNF, brain-derived neurotrophic factor; COMT, catechol-O-methyl transferase; FKBP5, FK506 binding protein 5; 5-HTTLPR, serotonin-transporter-linked polymorphic region; HDAC1, histone deacetylase 1; TOM, theory of mind.) [35].

Breaking through the limit of stress capability, patients experienced a kind of pressure-induced mechanism that could stimulate the mesolimbic areas and increase stress-induced striatal dopamine release. When dopamine levels were supersaturated, D2 receptors in different regions of the brain were overstimulated, which is a hypothesis that of the pathophysiology of schizophrenia, associated with the antipsychotic effects of dopamine receptor antagonists, announced by Falkai et al. in 2011 [39].

4.2.4 Psychology and childhood trauma

Children who suffer from domestic violence have a defect in emotional recognition, emotional expression, and emotional regulation. In one aspect, they might have difficulties identifying different stimuli, such as threat cues and safety cues. In another aspect, they might be afraid of responding to external stimuli or not incapable of controlling their response and generating abnormal behaviors. In addition, children are vulnerable groups without strong self-protection ability. So, it is less likely that they could revolt against the persecutors successfully or have the ability to leave the current abusing situation. Also, children are at a stage of mental development, long-term domestic might change how they perceive the world.

5. Domestic violence and the recovery from schizophrenia

Domestic violence can be the trigger of the person having psychosis like schizophrenia and bring influence the recovery of patients with the disorder. Gandhi and Jones researched factors affecting recovery from schizophrenia from a caregiver’s angle. They interviewed some caregivers and proposed a fact that whether recovery from schizophrenia would be successful depends on unnoticed childhood problems, negative family emotional climate, negative attitude towards the illness, and poor family support. “In childhood, [...] he used to run away whenever we scold him. We didn’t give much importance to that. Later, we came to know that it was abnormal; had to seek treatment. If we could identify at that time, the result might have been far better.” (Caregiver 12) “There was a lot of issues at home. There were quarrels between father and mother earlier. Nobody, including my father, was talking to her, and my father was not supportive. If there is any chance for the illness to come

back, that can be only because of my father and also by missing the medicines.” (Caregiver 5) “In between, he used to go to his sister’s place. She won’t take care properly, will not give medicines... they would say that it is not required.... Nobody supports him. He has that feeling.” (Caregiver 16) It would be harmful if patients were exposed to scolding, neglect, and an oppressive environment, especially in the family. These negative factors brought severe mental stress to patients, making it difficult for patients to recover or even relapse.

6. Conclusion

Risk factors from genetic level and environment bring many pathology possibilities for schizophrenia. Neither of them can work on their own. Factors need to be induced and triggered by each other. Recent etiology studies of schizophrenia turn out the fact that a number of hypotheses are made to explain the difference of body mechanism, brought by risk factors, between patients and healthy populations. Patients with dopamine dysfunction have a high probability of having psychosis because supersaturated dopamine could spread around every different region of the brain, which causes the overstimulation of D2 receptors. Schizophrenia also has an association with reduced glutamate levels. Most studies done by Wei Hu et al. prove that differences did exist in glutamate neural structure between patients and controls. In addition, hyperactivity of serotonin induces schizophrenia could be reviewed in other studies as well.

Among many environmental factors, domestic violence such as childhood trauma or sexual abuse has a serious mental impact on its victims. It brings psychological pressure to patients, causing them to react in common with their genetic defects. Domestic violence also influences patients who have been recovered from schizophrenia. From caregivers’ perspective, domestic violence is not limited to serious abuse on physical, sexual, emotional and psychological but minor stimuli such as scolding, neglect, and an oppressive environment, which could bring a harmful message to patients.

Future research is recommended to be carried out in conjunction with the census. It is one of the best ways to meet different types of families. Meanwhile, research can be conducted based on the families of patients with schizophrenia in local hospitals as well. Although most recent studies relied upon reports of psychotic symptoms, rather than a diagnosis of schizophrenia, there is no doubt that violence indeed has the connection with mental disorders, which could be triggered to schizophrenia, bipolar disorder, or other kinds of severe psychosis at anytime and anywhere.

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