Untangling pathways between childhood trauma and psychosis
van Dam, D.S.

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Chapter 1
General introduction
This thesis focuses on the relationship between childhood trauma and psychosis. Childhood trauma often has negative consequences for mental health and is related to the development of several serious psychiatric disorders both in childhood and adulthood. Recently, research on the relationship between childhood trauma and psychosis has rapidly expanded. In this introductory chapter I will briefly discuss the concepts of childhood trauma and psychosis. This includes a discussion of the literature that provided the background for this thesis. I will conclude with the aim and outline of this thesis.

Childhood trauma

The word ‘trauma’ is Greek for wound. In psychology and psychiatry, the word ‘trauma’ is used to refer to the emotional consequences caused by severe and distressing events.

In psychiatric research, the term ‘childhood trauma’ has been used to capture a range of severe adverse experiences before the age of eighteen. Within this categorization, a distinction can be made between ‘Type I’ and ‘Type II’ trauma. Type I trauma refers to isolated traumatic events and includes for example natural disasters or being involved in an accident. Type II trauma refers to traumatic events that are chronic in nature such as child maltreatment, which is typically divided into child abuse and neglect. Abuse involves harm or risk of serious harm caused by (intentional) harmful behaviour through ‘action’. We speak of neglect when a caregiver fails to ‘act’ and as a result, poses (a risk) of harm to a child.

Prevalence rates of childhood trauma vary considerably across studies depending on factors such as target population, the method used to assess trauma, and the definition of trauma. In the United States the prevalence rates of childhood traumatic events range between 25 and 68 per cent. In a general population sample of children going to elementary school in the Netherlands, a prevalence rate of 24 per cent was reported.

While type I trauma is closely linked to the development of post-traumatic symptoms (e.g. intrusions and hyper arousal) and post-traumatic stress disorder, type II trauma has been found to be frequently related to enduring emotional and behavioural problems. Individuals who are exposed to type II childhood trauma may have an increased risk of developing difficulties forming and maintaining social relationships and of developing a distorted, negative view of the self, others, and the world in general. The earlier in life traumatic events occur, the more damaging the long-term effects are likely to be.

Psychosis

Psychosis is a term used to describe an abnormal state of mind during which the individual loses touch with reality. Similar to ‘trauma’, the term is derived from Greek, where ‘psychosis’ literally refers to an ‘abnormal condition’ or ‘derangement’. For example, it is not uncommon that people hear voices, or think that someone else is controlling their mind during a psychosis.

Psychosis is thought to exist along a ‘psychosis continuum’, which implies that the symptoms seen in patients with psychotic disorders can also be seen in a milder form in the general population. In fact, mild psychotic experiences, such as distortions in perception, thought and reality testing, are relatively common in the general population. Population-based studies have shown that the lifetime prevalence of psychotic experiences is around eight per cent, which is significantly higher than the three per cent prevalence of clinically diagnosable psychotic disorders.

The DSM-5, the diagnostic guide of psychiatry, distinguishes eight symptom dimensions to categorise different psychotic disorders: (1) delusions, (2) hallucinations, (3) disorganized thinking, (4) negative symptoms, (5) impaired cognition, (6) depression, (7) mania, and (8) psychomotor symptoms. Hallucinations, delusions and disorganized thinking are called ‘positive’ symptoms, because they refer to the presence of distortions in perception, thought and reality testing, which are normally absent. In contrast, negative symptoms refer to the absence of normal emotion and behaviour. Examples are lack of motivation, reduced (expression of) emotions and loss of speech and movement.

Both the type and severity of symptoms vary greatly between the different psychotic disorders. Schizophrenia is considered the most severe psychotic disorder and is characterised by delusions, hallucinations, disorganized thinking, and presence of negative symptoms. The disorder is associated with significant impairments in psychosocial functioning.

Childhood trauma and psychosis: an overview of the literature

Although it has been established that the experience of childhood trauma may have serious effects on mental health, studies concerning its relationship with psychotic disorders have only expanded recently. Psychosis was always thought to be a predominantly biologically based disorder and psychological factors were only thought of as triggers of the expression of a genetic predisposition.

In the 1990s the first studies started to emerge, showing individuals diagnosed with a psychotic disorder who also experienced childhood trauma reported more severe positive symptoms than those who did not have such experiences. In addition, research showed a relationship between childhood trauma and psychotic experiences in the general population. Read and colleagues conducted a review in 2001 and reported that childhood trauma was associated with psychosis in general and schizophrenia in particular. Moreover, they found evidence of similarities between the effects of childhood trauma on the developing brain and the biological abnormalities found in individuals with psychosis.
and schizophrenia. In their groundbreaking article the authors urged researchers to further explore the association of childhood trauma and psychosis.

In 2004 the first general population studies were published. In two of the three studies, childhood trauma was found to predict the development of psychotic symptoms in adulthood. Based on the results set out above, Read and colleagues argued that childhood trauma might be a causal factor in the development of psychosis. However, the authors stipulated that better designed studies were required to support this idea. From that moment on, research into the association between childhood trauma and psychosis expanded rapidly.

The majority of psychosis studies found that compared to those without childhood trauma, patients with childhood trauma have more severe positive symptoms. Moreover, they are more frequently hospitalized and have more suicidal thoughts, depressive symptoms, and cognitive deficits. Furthermore, studies showed that most types of childhood trauma are associated with an increased co-occurrence of both delusions and hallucinations.

Varese and colleagues performed a meta-analysis and found that patients with childhood trauma have a threefold increased risk of psychosis. They also found a dose-response relationship between childhood trauma and psychotic experiences, meaning that more childhood trauma was associated with more severe psychopathology. In further support of a causal association, Kelleher and colleagues demonstrated that in adolescents who had been exposed to childhood trauma, cessation of traumatic experiences was associated with a lower incidence of psychotic experiences compared to adolescents with ongoing exposure to traumatic experiences.

Childhood trauma has also been related to the content of psychotic experiences in clinical populations. For example, Hardy and colleagues found that in patients with a psychotic disorder who also reported childhood trauma, hallucinations were often related to their trauma. Similarly, Shervin and colleagues found that psychotic symptoms with sexual content were associated to sexual trauma from the past.

A few years after the relationship between childhood trauma and psychosis was established, researchers broadened their scope to the ultra-high risk (UHR) phase. Criteria have been established to identify people at increased risk for developing a psychotic disorder who also reported childhood trauma, hallucinations were often related to their trauma. Similarly, Shervin and colleagues found that psychotic symptoms with sexual content were associated to sexual trauma from the past.

Childhood bullying and psychosis
The relationship between psychotic symptoms and bullying, has not received much attention. However, growing evidence indicates that childhood bullying is also a form of childhood trauma. Childhood bullying often results in responses of avoidance, intrusive thoughts, dissociative experiences and nightmares that persist for years and has negative consequences on mental health. If an association between childhood bullying and psychotic symptoms is present, it is important to create specific programmes aimed at prevention and intervention of psychotic experiences.

How to explain an association between childhood trauma and psychotic symptoms?
There are various predominantly biological and psychological models explaining the relation between childhood trauma and psychosis.

The biological models state that traumatic experiences lead to a dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis. The HPA axis plays an important role in making sure human beings can adapt to stressful situations. However, in case of prolonged exposure to stress, permanent changes to the HPA axis may occur. Amongst others this could result in over-activation of dopaminergic circuits. Dopamine is a neurotransmitter in the brain, a chemical released by nerve cells to send signals to other nerve cells. Dopamine plays a major role in reward–motivated behaviour. A more general psychological mechanism in which dopamine neurotransmission is implicated is salience attribution. The ‘aberrant salience’ model proposes that psychotic symptoms emerge when increased levels of dopamine release leads to the attribution of significance to stimuli that would normally be considered irrelevant.

Psychological models propose that childhood trauma contributes to increased vulnerability to form negative beliefs about oneself, others and about social interactions. It is suggested that these negative beliefs in turn result in increased vulnerability to develop psychotic symptoms, for example paranoia. Social withdrawal in particular may contribute to the development of psychosis by reducing the possibility of reality testing in social interaction. Attachment theory, which provides a model about relationships, states that experiences with significant others form mental representations about the ‘self’ and ‘others’. These mental representations contribute to the development of a personal attachment style, guiding thoughts, feelings and behaviour in social interactions throughout life. A secure attachment style is reflected in a general positive view towards the self and others, while insecure attachment styles refer to more negative views about the self and others. Growing evidence suggests that an insecure attachment style is related to psychosis in both clinical and non-clinical groups. Childhood trauma is considered to be one of the most important causes of insecure adult attachment.
One of the suggestions put forward is that attachment forms a mediating mechanism between childhood trauma and the development of psychosis\(^9\).

**Aim and outline of this thesis**

When I started my PhD-trajectory in 2010 most researchers and clinicians acknowledged that childhood trauma was associated with the development of psychosis. However, there were still important questions to be answered. For example, the specificity of type of abuse and neglect in relation to different symptom domains (positive or negative symptoms) of psychosis was still unknown. Moreover, although it was already recognized that childhood trauma was related to increased symptoms levels and poorer functioning, the effects on course of the disorder were not clear. It was also unknown whether certain personality characteristics, which reflect an individual’s stress sensitivity, coping and resilience, could mediate the impact of childhood traumatic experiences.

In summary, the studies presented in this thesis aim to enhance our knowledge with regard to specific associations between types of trauma and the course of symptomatology and psychosocial functioning and to examine possible underlying mechanisms, by which childhood trauma influences the development of psychosis.

**Chapter 2** addresses whether being bullied in childhood is related to the development of psychotic symptoms in non-clinical and clinical samples.

In **chapter 3** the specificity of type of abuse and neglect in relation to different symptom domains of psychosis is discussed.

**Chapter 3 and 4** explore whether abuse and neglect uniquely heighten the chance of developing psychotic symptomatology in persons who are genetically vulnerable to developing psychotic symptoms. The association between abuse and neglect and course of symptoms over time of psychotic symptoms was evaluated, both in patients and in individuals with psychotic symptoms. **Chapter 4** also addresses the question whether childhood abuse and neglect are predictive for transition to psychosis.

**Chapter 5.1 and 5.2** address the association between childhood trauma and cognitive functioning in psychosis.

**Chapter 6** examines whether childhood trauma - considering both type I and type II childhood trauma and childhood bullying - is associated with smaller hippocampal and amygdala volume in patients with psychosis.

In **chapter 7** the hypothesis that adult attachment is a mediating mechanism between childhood trauma and the development of psychosis is tested.

**Chapter 8** addresses the question whether personality characteristics are related to psychosocial functioning in patients with psychosis and a history of childhood trauma.

In **chapter 9** a summary of the previous chapters is presented, along with a general discussion of the implications, limitations and suggestions for future research. This thesis concludes with a Dutch summary and other additions.