There is reasonably consistent evidence that childhood maltreatment is associated with psychosis in adulthood. The focus of research has now shifted to the potential mechanisms that underlie this association. In a direct pathway, abusive experiences quickly result in psychotic or subclinical symptoms that persist into adulthood where they are diagnosed as a full-blown psychotic disorder. Alternatively, childhood maltreatment could affect an individual’s biology, psychology and/or behaviour and subsequently lead to the development of psychosis several years later. Once these pathways have been elucidated, can clinicians provide timely interventions to prevent the emergence of psychotic disorders amongst maltreated children?

A national survey conducted by the NSPCC, children’s charity in 2009 reported that one in four children in the UK were maltreated by their parents before the age of 17, mainly through neglect, and nearly two thirds were victimised by their peers (Radford et al., 2013). These shocking figures indicate that a substantial proportion of children in the UK are still exposed to abusive and neglectful experiences, and the consequences of these warrant investigation. Although many individuals exposed to childhood maltreatment (emotional, physical or sexual abuse or neglect) do not develop any major difficulties, they are at higher risk of developing a range of adverse outcomes, including substance misuse, depression, antisocial behaviour, post-traumatic stress disorder, and personality disorders, along with physical health problems. Therefore, it is not surprising that researchers and clinicians have begun to explore links with psychosis as well.

Psychosis is a broad concept characterised by symptoms such as hearing or seeing things that other people do not, being extremely paranoid, believing other people can read your thoughts, and disorganised thinking. It encompasses several diagnoses, including schizophrenia and depression or mania with psychotic features. The lifetime prevalence of all psychotic disorders is around 3 per cent affecting approximately one in a hundred people. This prevalence may be low but it still amounts to over 8000 new cases of psychosis in the UK every year. This has devastating effects on the individuals themselves, as well as their families who have to deal with the fall-out. Crucially, psychosis often strikes in late adolescence when someone is just starting their first proper job or studying at university. Although some affected individuals will recover fully, many will continue to be scarred psychologically and socially for the rest of their lives. Therefore, it is imperative that the causes of psychosis be ascertained so that clinicians can intervene early enough to prevent more lives from being tragically cut short.

Is there good evidence that children who are maltreated are at greater risk of developing a psychotic disorder? And given that psychotic disorders tend to emerge in early adulthood, what might be happening following exposure to childhood maltreatment that leads individuals to develop psychosis so many years later?

Link between maltreatment and psychosis

Data from several longitudinal cohorts have shown that early adversity is associated with early psychotic experiences which are thought to be on a continuum with psychotic disorders (van Os et al., 2009). For instance, the Environmental Risk Twin Study found that children who had experienced physical maltreatment by a parent were at higher risk of having psychotic symptoms at age 12 than children not exposed to this form of adversity (Arseneault et al., 2011). The effect was even greater if the child had also been bullied by peers, and the association was only present for intentional acts of harm. Other general population studies have found associations over time between documented records of maltreatment and clinically relevant psychosis in adults (e.g. Cutajar et al., 2010). Childhood maltreatment has also been demonstrated to be more prevalent amongst patients presenting to services for the first time with psychotic disorders than among

Coughard, A., Marcelis, M., Myin-Germeys, I. et al. [2007]. Does normal developmental expression of psychosis combine with environmental risk to cause persistence of psychosis? Psychological Medicine, 37, 513-527.
Cutajar, M.C., Mullen, P.E., Ogloff, J.R. et
geographically matched unaffected controls (Fisher et al., 2010).

This research has culminated in a meta-analysis of all the different studies exploring the maltreatment–psychosis association (Varese et al., 2012), which found that the relationship was statistically significant regardless of the type of study design employed. Although a causal relationship has not yet been established, the evidence now overwhelmingly points to childhood maltreatment being a risk factor for the development of psychosis in adulthood.

**Alternative explanations**

One possibility given the well-replicated association between childhood maltreatment and depression (e.g. Bifulco et al., 1991) is that cases of depressive psychosis are driving the association with psychotic disorder. However, a meta-analysis from Matheson et al. (2013) has demonstrated that this is unlikely to be the case as they found no significant difference in the rates of maltreatment between schizophrenia and depressive psychosis patients.

Another possibility is that the association demonstrated between childhood maltreatment and adult psychosis is merely an artefact produced by a third factor that is independently associated with both maltreatment and psychosis. For example, having a parent with psychosis provides a child with both the genetic susceptibility to develop psychosis (Asarnow et al., 2001) and also increases their likelihood of being maltreated (Walsh et al., 2002). Indeed, Wigman et al. (2012) found that individuals in the general population who had a parent with psychosis were more likely to have a history of childhood trauma (including maltreatment) and report psychotic experiences themselves.

Therefore, genetic factors could be confounding the association between maltreatment and psychosis. However, when parental history of psychosis was controlled for in the analysis the trauma–psychosis association held, suggesting that other factors must be accounting for this relationship.

Additionally, the use of retrospective reports of maltreatment by individuals with psychosis may call into question the accuracy of the associations found. Remembering events, often from very early childhood, is problematic in itself, but is further confounded by the nature of psychosis, which, by definition, involves imagining things and losing touch with reality, as well as comorbid depression and cognitive impairment, all of which could result in exaggerated or false reports of maltreatment. However, it has been found that patients with psychosis were reasonably consistent in their reports of abuse over a seven-year period, tended to report the same events when assessed with different measures, and were not more likely to report maltreatment when they were acutely psychotic or depressed at the time of the interview (Fisher et al., 2011). Therefore, these findings provide some reassurance that reporting bias is not substantially affecting associations found between childhood maltreatment and psychosis.

**Direct effects?**

The immediate biological consequences of childhood maltreatment provide one possible direct pathway to psychosis. For instance, head injuries sustained from childhood physical abuse can cause brain damage, and when this is sufficiently severe individuals are highly likely to experience psychotic symptoms (Kim, 2008). However, the evidence to support this supposition is inconsistent and requires further investigation.

It is also possible that some children who are maltreated have an almost immediate psychotic reaction to this adverse experience, suggestive of a direct link between the adverse exposure and outcome. Certainly, longitudinal cohort studies have demonstrated that children as young as 12 can report psychotic symptoms and these are more common amongst those who have experienced...
malnutrition and other forms of victimisation in the preceding months or years (Arseneault et al., 2011; Fisher, Schreier et al., 2013). If these early symptoms persist for several years, then the likelihood of a psychotic disorder developing is greatly increased (Dominguez et al., 2011). However, for most children, early psychotic symptoms appear to be transitory (Cougnard et al., 2007), and it is debatable as to whether they index risk only for psychotic disorders (Fisher, Caspi et al., 2013), suggesting that they may not be a good proxy for adult psychosis. Therefore, more evidence is required to elucidate a direct effect of childhood maltreatment on psychosis.

Indirect pathways

For the majority of individuals maltreatment occurs many years before the appearance of psychosis, indicating that something must be happening in this intervening period to lead to the emergence of this disorder. One possibility is that as maltreatment in childhood increases the likelihood of being victimised in adulthood (Korkeila et al., 2010), and this in turn is associated with psychosis (Beards et al., 2013), then this re-victimisation might mediate the association between childhood maltreatment and psychosis. Exploration of this possibility is required in relation to psychosis, though reports on depression suggest that stressful events in adulthood only partially account for the impact of childhood adversity on this disorder (Korkeila et al., 2010).

Psychological mechanisms

Garety et al. (2007) proposed a range of psychological mechanisms, including the development of depression and anxiety following exposure to childhood trauma, that have also been found to increase the risk of later psychosis. Indeed, several general population studies have demonstrated that maltreatment is indirectly associated with psychotic symptoms via several of these cognitive psychological mechanisms (e.g. Fisher, Schreier et al., 2013).

Additionally, abused children may adapt to such a threatening environment by developing hostile attributions of others’ intentions or being hypervigilant for potentially threatening behaviour (Dodge et al., 1990). Although adaptive in the short term, prolonged difficulties in trusting close others and forming secure attachments are often considered to be a major risk factor for psychopathology. Indeed, insecure attachment styles are prevalent amongst individuals who have experienced childhood abuse (Alexander et al., 1998) and patients with psychotic disorders, especially those with a history of abuse (Tait et al., 2004). These continued difficulties may mean that abused individuals become overly suspicious of others’ intentions and behaviour, leaving them predisposed to psychotic symptoms such as paranoid delusional beliefs and ideas of reference. Indeed Gracie et al. (2007) demonstrated that negative perceptions of others partially mediated associations between lifetime trauma and subclinical psychotic symptoms. Moreover, social isolation resulting from a lack of close relationships may also reduce the likelihood that individuals are exposed to alternative and normalising explanations for anomalous psychotic experiences.

Biological mechanisms

One potential indirect biological pathway from child abuse to psychosis is through such early stress having a detrimental impact on brain development. Maltreated...
individuals have been shown to have stunted development of several brain regions, but the findings are inconsistent (McCory et al., 2010). Nevertheless, abnormalities in the same regions have also been found in patients with psychosis (Shenton et al., 2001), tentatively indicating a potential mechanistic pathway.

Moreover, De Bellis et al. (1994) postulated that repeated exposure to childhood abuse may also cause neurochemical changes in the brain. They found that the hypothalamic-pituitary-adrenal (HPA) axis, which plays a central role in hormonal responses to stress, was dysregulated in girls exposed to sexual abuse, and similar abnormalities have been reported in individuals experiencing psychosis (Borges et al., 2013). Consequently, children exposed to maltreatment may have an exaggerated stress response to subsequent traumatic events, which becomes progressively amplified through repeated adverse exposures and eventually might result in psychotic symptoms.

Through interaction with genetic factors, maltreatment could also be indirectly linked with the development of psychosis in adulthood. Pre-existing genetic propensities (family history of disorder or specific genetic variants) could make individuals exposed to childhood maltreatment more likely to develop psychosis than those without such a genetic vulnerability. For instance, Collip et al. (2013) reported that individuals in their sample were more likely to have psychotic symptoms if they had been exposed to childhood maltreatment and were a carrier of the A allele of the FKBP5 gene, than maltreated individuals without this genetic vulnerability. However, a more broadly defined gene–trauma interaction for psychosis was not found by Wigman et al. (2012), indicating that further research on this potential mechanism is required.

Conversely, environmental factors have also been postulated to influence how genes are expressed and the subsequent development of psychiatric disorders. For instance, child maltreatment has been linked to epigenetic modifications to gene activity (McGowan et al., 2009), and such alterations in genetic expression may impact on dopamine regulation and in turn lead to the individual experiencing psychotic symptoms. Indeed, evidence is emerging that epigenetic changes precede the development of psychosis (Pidsley & Mill, 2011), though research is still required to link maltreatment and psychosis via epigenetic mechanisms in the same sample.

**Behavioural mechanisms**

Substance misuse is another possible factor that may indirectly connect child maltreatment with adult psychosis. Persistent and dangerous use of drugs has been demonstrated to occur more commonly in those who have a history of maltreatment (Lo & Cheng, 2007) and is considered a major risk factor for psychosis, particularly chronic use of high-potency cannabis (Di Forti et al., 2009). It seems plausible, therefore, that the higher rates of substance misuse amongst adult survivors of childhood abuse could in turn lead to the development of psychosis. Indeed, Whitfield et al. (2009) demonstrated in a general population sample that substance abuse partially mediated the association between child abuse and hallucinations.

**Conclusion**

Childhood maltreatment is one of many risk factors for psychosis. However, this should be qualified by stating that most individuals with psychosis have not been maltreated and most maltreated children do not develop psychosis. This is important to emphasize to avoid a return to the unhelpful period in the 1950s and 1960s in the UK and US when theories seemed to blame mothers for every case of schizophrenia that emerged. Mothers and other family members are usually crucial partners in the treatment of young people with psychosis, and it is extremely detrimental to alienate them from the therapeutic process.

A range of mechanisms are likely to be involved in the maltreatment–psychosis association. These mechanisms are not mutually exclusive and may simply represent different levels of the same phenomena, be sequentially involved in a causal chain or interact with each other to increase vulnerability. Identification of the various pathways that lead from childhood maltreatment to the experience of psychosis would open up opportunities for clinicians to intervene in adolescence and hopefully divert young people from following this devastating trajectory. This would have enormous benefits for the individuals and their families as well as reducing the burden on already stretched healthcare systems.

However, progressing this area of research is challenging. It will require collaborations across multiple disciplines, given that a range of mechanisms situated at different levels of analysis seem likely to be involved. In order to get a handle on the temporality of the effects, longitudinal assessments starting in early childhood and repeated through adolescence and into adulthood will be necessary, ideally on representative population-based samples. However, as the prevalence of psychiatric disorders is very low, tens if not hundreds of thousands of individuals will need to be studied to ensure sufficient statistical power to robustly detect the mechanistic pathways. Psychologists and other researchers should not be disheartened by this challenge and instead take inspiration from geneticists who have successfully formed huge international consortia to tackle questions about the molecular basis of disease.

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