ENCYCLOPEDIA
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[Archived] Obstetric Complications and Aggression

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Introduction

Obstetric complications refer to disruptions and disorders of pregnancy, labour and delivery, and the early neonatal period. Examples of such complications include prenatal drug exposure, poor maternal nutrition, minor physical anomalies (or MPAs: indicators of fetal neural maldevelopment, occurring near the end of the first trimester), and birth complications. Obstetric complications can have long-term effects on a child, including an increase in problematic behaviour. Research has identified links between obstetric complications and subsequent human aggression, and suggests that obstetric complications may elicit aggression by affecting brain development.

Recent Research Findings

Prenatal Substance Exposure

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It is well documented that prenatal exposure to alcohol and other drugs has long-term effects on children. In addition to cognitive deficits,[1] fetal alcohol exposure is associated with social deficits such as disrupted attachment and emotion dysregulation in infancy;[1] increased anger, aggression, and distractibility in early childhood;[2] and inappropriate sexual behaviour, legal problems, depression, suicide, and poor caretaking of subsequent children in adulthood.[1] Similar deficits have been observed in children exposed to methadone[3] and cocaine.[4] Although it was initially unclear whether these effects occurred independent of prenatal alcohol exposure and other risk factors,[4] preliminary findings from a well-designed study indicate that prenatal cocaine exposure independently relates to greater externalizing behaviour problems (relative to internalizing problems) in 6-year-old children.[5] Children prenatally exposed to cigarette smoke are also at increased risk for conduct problems and criminal behaviour,[6-9] and some research suggests that this risk is specific to aggression.[10-12]

Animal experiments indicate that prenatal substance exposure relates to aggression by interfering with the development of neurons (ie, cell bodies) and/or the functioning of different neurotransmitters (ie, chemical messengers in the brain that regulate behavioural, cognitive, and physiological functions). However, because prenatal drug exposure results in many cognitive and behavioural deficits, whether increased aggression is specifically observed in exposed children likely depends on the presence of other social and biological risk factors. Such factors include delivery complications,[10] adolescent motherhood, a single-parent family environment, unwanted pregnancy, and/or developmental motor lags.[11]

Maternal Nutrition Deficiencies

Although cross-sectional research has been inconsistent, a unique and important study illustrates the potential causal role of malnutrition during pregnancy as a risk factor for antisocial behaviour. Near the end of World War II, Germany imposed a food blockade on Holland. The male offspring of women who *had* and *had not* been exposed to severe malnutrition while pregnant were assessed for antisocial personality disorder in adulthood. The adult offspring born to women who *had* suffered significant nutritional deficits during the first and/or second trimesters had 2.5 times the rates of antisocial personality disorder compared to the controls (who *had not* suffered any nutritional deficits).[13]

Maternal zinc deficiency, in particular, has also been linked to impaired DNA, RNA, and protein synthesis in fetal brain development, and to congenital brain abnormalities.[14,15] Although the

exact mechanisms through which zinc deficiency may relate to aggressive human behaviour is unknown, extensive animal research has shown that rats fed a diet marginal in zinc (or protein) during their pregnancy and lactation give birth to offspring with impaired brain development.[16,17] Interestingly, the amygdala — which regulates certain human emotion processes and which functions abnormally in violent offenders[18,19] — is densely innervated by zinc-containing neurons.[20]

Minor Physical Anomalies

MPAs such as low-seated ears, adherent ear lobes, or a furrowed tongue are associated with heightened antisocial and aggressive behaviour in preschool and elementary school boys[21-23] and 17-year-old males.[24] MPAs appear most likely to elicit antisocial behaviour when another negative psychosocial factor is present (eg, family adversity, unstable home[25,26]). However, there is some suggestion that MPAs are a general risk factor for disruptive behaviour rather than a factor specific to antisocial, aggressive behaviour.[27]

Birth Complications

Several studies have shown that a combination of birth complications and psychosocial deficits, such as early maternal rejection,[28] a disadvantaged family environment,[29] or poor parenting[30] significantly increases the risk for serious criminal or violent behaviour in adulthood. Although a connection between birth complications and brain abnormalities has not been directly tested in aggressive individuals, fetal hypoxia (ie, a lack of oxygen) is associated with decreased cortical grey matter in schizophrenia patients.[31] Thus, birth complications such as anoxia/hypoxia, pre-eclampsia (hypertension leading to anoxia), and forceps delivery may be one source of brain dysfunction observed in antisocial groups as well. When combined with a risk-filled environment that fails to foster socialization of the child through appropriate parenting practices, a child's predisposition to engaging in aggression may be substantially increased.

Conclusions

Overall, research supports the notion that obstetric complications such as prenatal alcohol, drug, and cigarette exposure, poor maternal nutrition, birth complications, and MPAs contribute to the development of aggression at different points in a lifespan. Thus, improved pre- and perinatal health care that reduces such complications may also help to reduce the development of aggressive behaviour problems. For children who nevertheless experience such complications,

the amelioration of co-existing psychosocial stressors may reduce the risk of aggression, as it appears that obstetric complications increase the risk for later violence only when stressors such as maternal rejection, poor parenting practices, and a disadvantaged family environment are also present.

One should also note that the impact of these different obstetric complications on later behaviour is variable. Findings for prenatal alcohol exposure are far more extensive to date than those for maternal nutrition, for example. In addition, many obstetric complications (eg, fetal alcohol syndrome, prenatal cocaine exposure, and MPAs) are associated with other cognitive and behavioural problems such as mental retardation, significant attention deficits and schizophrenia. Thus, these risk factors should not be considered specific to aggression.

Future Research

Despite general research observations that obstetric complications relate to later aggression in affected children, many questions remain unanswered. First, animal experiments suggest that prenatal substance exposure, maternal malnutrition, and birth complications affect brain development, and that this brain dysfunction, in turn, results in aggressive behaviour. Therefore, promising directions for future research with humans include determining,

1. whether obstetric complications do result in identifiable brain abnormalities
2. whether brain abnormalities resulting from obstetric complications underlie persistent or severe forms of subsequent aggressive behaviour;
3. whether obstetric complications that are associated with aggressive and non-aggressive behaviour problems are each associated with different patterns of brain abnormalities.

In addition, research in all the different areas of obstetric complications has found that an obstetric complication (eg, prenatal cigarette exposure and MPAs) frequently requires an additional stressor to be present before an increase in aggression is observed. Thus, future studies may wish to seek a more complete understanding of how obstetric complications and the quality of the rearing environment interact to bring about an increased risk for aggression. Greater specificity in understanding these biological and social processes may serve to better inform policymaking and medical care standards in a way that ultimately helps reduce aggressive behaviour.

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