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Links between early child maltreatment, mental disorders, and cortisol secretion anomalies

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ABSTRACT

Early child maltreatment has been widely associated with the development of mental disorders in both childhood and adulthood. However, such association cannot be systematically established, as only few factors are observed regularly, such as high prevalence of comorbidities and externalized disorders. Similarly, the association between early abuse and cortisol secretion anomalies has been well-documented. Whereas early hypercortisolism followed by hypocortisolism was often described, the results proved inconsistent and at times contradictory. The physiopathological mechanisms are quite complex and varied, including mixed neurotoxicity and stress response anomalies, linked to circadian rhythm disturbances. One of the difficulties inherent to research on this topic is to better define maltreatment in childhood. Studying children's groups at risk of maltreatment, such as children followed by juvenile justice or in child welfare systems, could be a very good tool, provided that social, judiciary, and mental health professionals are able to work together and implement common research objectives.

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1. Introduction: Overview and multitude of mechanisms at play

Early child maltreatment is readily acknowledged to be a significant risk factor that may lead to the development of numerous mental disorders during childhood, adolescence (Puetz et al., 2016), and adulthood (Dovran et al., 2015). Furthermore, it constitutes a factor associated with aggressive behaviors (Hoeve et al., 2015) and juvenile delinquency (King et al., 2011). Explanatory models in the medical and psychological field are plentiful, but they lack systemization. Among these models, the oldest are psychopathological and characterized for example by a lack of internalization, defensive counter-attitudes (Roussillon, 2005; Berger et al., 2010), or even identification with parents who exhibit violent behavior or mental disorders. Insecure attachment developed in a chaotic affective environment (Bowlby, 1988) is associated with the development of anxious and depressive disorders

(Dadds and Barrett, 1996), externalized behavioral disorders (Lyons-Ruth and Jacobvitz, 2008; and van Ijzendoorn et al., 1999), as well as cognitive disorders (Navalta et al., 2006; Bremner and Vermetten, 2001). This model is currently supplemented through epigenetic theories on gene-environment interaction (Gervai, 2009). Moreover, there exist risk factors for lesions, for instance through subarachnoid microhemorrhages associated with shaken baby syndrome (Adamsbaum et al., 2008).

Direct or indirect mechanisms of prenatal and/or early neurodevelopmental disruption further reinforce the risk of an association between maltreatment and mental disorders. For instance, maltreated children are more likely to have been exposed to toxic events or substances as a fetus, particularly those toxic for the brain. Whilst studying children in care, who represent a specific population that has suffered maltreatment in almost all cases (Oswald et al., 2010), the Child Welfare League of America (2001) revealed that 75% of their mothers in the United States had an addictive issue, with a significant association with nutritional deficiencies or chronic physical diseases (Wieviorka, 2007). In a large study of very young children in care, McGuinness and Schneider (2007) showed that 50% of the mothers took cocaine, cannabis and alcohol.

Prematurity, and the neurodevelopmental (Dehan et al., 1998), relational (Forcada-Guex et al., 2011) and psycho-emotional disor-

Abbreviations: ADHD, Attention Deficit Hyperactivity Disorder; ChA, Child Abuse; ELS, Early Life Stress; HPA, Hypothalamic-Pituitary-Adrenal axis; PTSD, Post-Traumatic Syndrome Disorder; RAD, Reactive Attachment Disorder.

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ders with which it is associated, also significantly correlates with maltreatment in childhood (Hurme et al., 2008). Kalland et al. (2006) revealed that children in care were more often premature, as well as having a lower birth weight and even a lower Apgar score.

More recently, neurobiological models involving cortisol, both its level and cycle, have been described, and suggest a direct neurotoxicity of cortisol (Berger et al., 2010) and/or stress response anomalies (Fairchild et al., 2008).

The scientific approach to the subject of early child maltreatment is a significant overall difficulty, first of all due to the imprecision, scope, and subjectivity of the term “maltreatment”. This umbrella term traditionally spans the notions of abuse and neglect, including not only direct violence and ill-treatment (beating of children), but also neglect, “moral abandonment”, lack of care, and, more recently, exposure to conjugal violence, as well as the severe and long-term context of a dysfunctional family.

Attempts to track this phenomenon within society, even in retrospect, are inconsistent and of mediocre effectiveness (Tursz et al., 2010), because besides being ill-defined, child abuse is associated with taboos, shame, and guilt among perpetrators and victims, who at times find themselves in a hybrid situation, both as victims and perpetrators—whether real or imagined. This therefore represents a difficulty in piecing together large-scale and homogeneous study cohorts.

Moreover, child abuse is a subject of scrutiny not only in medicine, but also in the fields of social protection and justice. Meetings with affected children or parents take place on a voluntary basis in the social and justice systems' professional setting, where medical research methods are difficult to apply (Bronsard et al., 2016) and where there are more explanatory models in educational and social sciences.

We shall first present significant findings regarding mental health problems occurring in maltreated children, then findings in terms of cortisol level profiles and associated circadian rhythm recorded, in order to highlight links between early maltreatment, mental disorders, and cortisol secretion anomalies.

2. Early maltreatment and psychological disorders

In medical research, particularly in psychiatric epidemiology, several terms related to the early maltreatment phenomenon are employed, especially “early life stress” (ELS) and “childhood adversity” (ChA). Such phenomena are always associated with significant psychopathological vulnerability (Dillon et al., 2009; Mueller et al., 2010).

Research on links between childhood trauma and psychopathology covers indeed a problematic domain with a long history, and represents one of the primary hypotheses proposed by psychoanalysis in the early 20th century. At a later time, the attachment theory became a major subject of study in the 1950s (Bowlby, 1988). A query on the topic via Pubmed search engine yielded over 1500 articles when combining the terms “Maltreat*/Early Life Stress/Childhood Adversity” and “mental health”.

ELS is associated with an increased risk of developing numerous mental disorders like anxiety, depression, post-traumatic stress disorder (PTSD), substance abuse, and psychosis (Bremner et al., 1993; Carrion et al., 2008a, 2008b; Fisher et al., 2009; Kilpatrick et al., 2003; Ritchie et al., 2009; Schenkel et al., 2005; Stein et al., 1996). Similarly, we have found several research projects associating ChA with vulnerability towards a broad range of mental and psychopathological disorders. In line with this, Keller et al. (2010) reported an increased risk of emotional, cognitive, developmental, and behavioral disorders. More precisely, ChA was associated with an increased prevalence of suicide attempts (Perez et al.,

2016; Dube et al., 2003), substance abuse (Dube et al., 2003), depressive disorders (Widom, 1999), behavioral and personality disorders (Perez et al., 2016), as well as psychosis (Morgan and Gayer-Anderson, 2016). Neurocognitive disorders have also been reported to be associated with either ELS or ChA, in particular memory disorders (Eisen et al., 2007), learning abilities (Navalta et al., 2006), reward system dysfunction (Guyer et al., 2006), and executive processing (Carrion et al., 2008a, 2008b).

Whilst prevalence studies related to specific mental disorders in children subjected to abuse, ELS, or ChA, are said to have improved systemization, we have not been able to corroborate this claim. Disorders and psychopathological anomalies associated with ELS or ChA are thus common and span a very broad and varied spectrum that cannot be systematized. One of the main problems is that ELS or ChA definitions are just as broad and imprecise as that of “maltreatment” and possibly encompass abuse, direct or indirect violence, negligence, etc. Even broader definitions are at times put forward: “Childhood adversity is a broad term that denotes exposure to a range of difficult or unpleasant situations or experiences, usually before the age of 16” (Morgan and Gayer-Anderson, 2016). These circumstances render the accessibility to maltreated children for study purposes difficult.

One manner to assess cohorts of maltreated children is to identify in advance similar groups that are exposed to a high risk of maltreatment. Children placed in the child welfare system represent a composed and identifiable group. They are placed in the care of child welfare when danger to their development is identified. The situation therefore is brought before the court, and it may be decided to either maintain them in their family whilst receiving support from professionals, or to place them out-of-home, such as in a foster care family or a residential group home. These orientation choices are in fact quite circumstantial, subjective, and variable between countries and cultures. It is, however, acknowledged that children placed in group homes comprise a rather homogeneous group across countries (Thoburn, 2007).

Oswald et al. (2010) demonstrated that the vast majority of children in the child welfare system had been subjected to abuse.

Due to the fact that this group of children has been identified and circumscribed, prevalence studies have been carried out. In a previous study (Bronsard et al., 2016), we undertook a meta-analysis covering studies on mental disorders' prevalence among children placed in homes. About a dozen studies were published on this issue. Although detailed results vary from one study to another, several constants were pinpointed, namely high overall prevalence of mental disorders (around 50%), increased comorbidity rates, and increased rates of sustained externalized disorders. In the group of children placed in child welfare foster homes, a very high prevalence of both abuse and mental disorders was observed. These disorders are manifold and often concomitant, whilst a large proportion of which is accounted for by externalized disorders. Maltreatment is a broad concept lacking in specificity, and exhibiting an association with a higher prevalence of manifold, comorbid disorders in children placed in child welfare.

In addition, there is another group of children that constitutes a worthwhile subject of study in order to understand the links between abuse and mental disorders, namely adolescents involved in the juvenile justice system and, in particular, detained youths. As it is the case for children in child welfare system, this group was identified in advance, thus granting better accessibility to them, whilst ensuring some sort of homogeneity. The majority of detained youths have been exposed to abuse likewise, at a rate of about 75% according to certain studies (King et al., 2011). They are furthermore affected by very high rates of mental disorders (Fazel et al., 2008; Colins et al., 2011), ranging up to 90%, with externalized disorders being predominant (Vreugdenhil et al., 2004). Links between abuse and mental disorders have been con-

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