

IS AGGRESSION NORMAL IN HUMANS?

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ABSTRACT

From schoolyard fights to international conflicts, aggression is an enigmatic force that has shaped human behaviour and social dynamics throughout human history. It is a phenomenon as old as humanity itself, but its complexity continues to confuse and fascinate us alike.

Whether it is the tension that boils in a heated argument or the explosive violence of warfare, aggression permeates our lives in subtle and overt ways.

This paper analyses forms of aggression, some theories that explain aggression in humans, especially in youth, but the most emphasis is placed on neurobiological changes in brain structures associated with aggressiveness.

Special attention has been paid to parenting as a factor in the occurrence/overcoming of aggression in children.

Finally, some therapeutic guidelines for overcoming this negative phenomenon are enumerated.

Keywords: aggression, neurophysiological findings, parenting, overcoming

INTRODUCTION

Every day we are informed about shootings, knife attacks or other types of attacks in classrooms, schoolyards or streets, including violence between peers. This article is inspired by current information about some aggressive events throughout the world, especially among the youth population. Aggressive events were especially present in our neighbourhood through the end of 2024.

Violent behaviour in children and adolescents can include a wide range of behaviours: explosive temper tantrums, physical aggression, fighting, threats or attempts to hurt others (including thoughts of wanting to kill others), use of weapons, cruelty toward animals, fire setting, intentional destruction of property and vandalism.

With recent concerns about mass shootings and gun violence throughout the world, one of the questions that intrigues many is whether mass media purposely promote violent or aggressive behaviour. This is something that is especially important for parents, because violent content is common on television and in movies, on the internet, and in some of the most popular children's video games. Is it allowed to permit children to be involved in such experiences?

From schoolyard scuffles to international conflicts, aggression represents an enigmatic force shaping human behaviour and social dynamics throughout all human history. It is a phenomenon that's as old as humanity itself, but its complexi-

ties continue to confuse and fascinate us in equal measure. Whether it is the simmering tension in a heated argument or the explosive violence of warfare, aggression permeates our lives in ways both subtle and overt.

The importance of understanding aggression cannot be overemphasized. It is not just an academic exercise; it is a crucial step towards creating a safer, more harmonious society.

Why has aggression appeared in human behaviour? Is it an innate stimulus for defending self as it is in animal world or something else?

Early theories in psychology often explained aggression as an innate, animalistic drive that needed to be tamed or channelled. Sigmund Freud viewed aggression as a fundamental human instinct, similar to hunger or thirst. But, as our understanding of human behaviour evolved, our perspectives on aggression evolved, too.

When we think of aggression, we are overwhelmed by images of physical violence – fistfights, brawls, or even warfare. Especially during the period of celebration of New Year and Christmas, we witness many aggressive behaviours worldwide: killing people in streets, cafés, bars, in one's own home, without any reasonable explanation. Even children become very aggressive unexpectedly. Or do they only imitate adults in general world situation?

By definition, psychological aggression comprises any behaviour intended to harm another individual who does not wish to be harmed. Additionally, aggression is not limited only to physical pain but includes emotional and psychological damage,

as well. Still, in psychology, aggression encompasses a much broader spectrum of behaviours [1].

AGGRESSION HAS MANY FACES

Some of the main types of aggression are identified as:

1. Physical Aggression is the most overt and easily recognizable form of aggression. It involves using physical force to harm others – punching, kicking, pushing, or using weapons.

2. Verbal Aggression includes yelling, insulting, threatening, or using derogatory language. It is aimed at causing emotional pain rather than physical harm.

3. Relational Aggression is a form of aggression aims to harm someone's relationships or social status. It might involve spreading rumours, excluding someone from a group, or manipulating friendships. It is particularly common among adolescents and can have long-lasting psychological effects.

4. Passive-Aggressive Behaviour is a form of aggression which involves indirect expressions of hostility. It is a way of expressing anger or resentment without direct confrontation.

Aggressive behaviours are often complex and heterogeneous, and there may be varying degrees of overlap between subtypes, complicating an already intricate landscape. Figure 1 shows overlapping of different types of aggression.

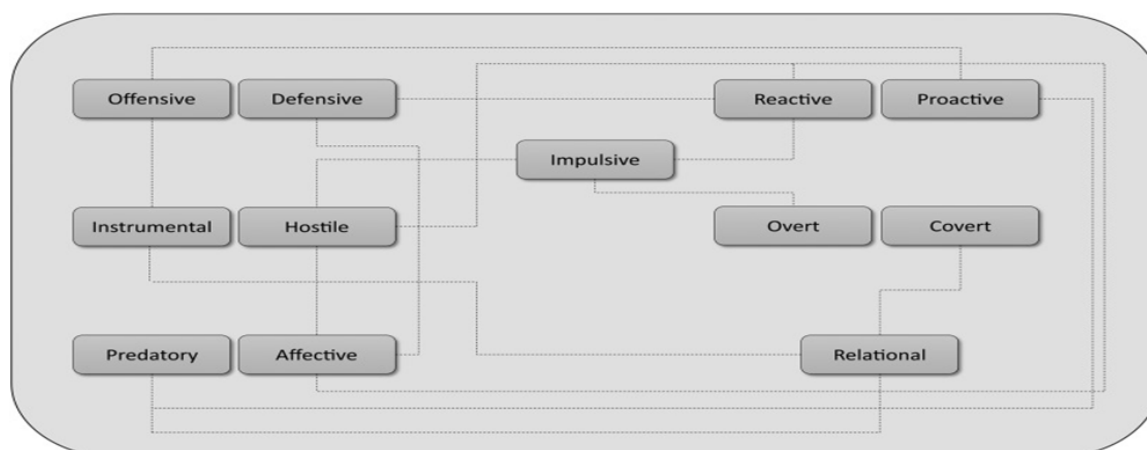


Figure 1. Overlapping characteristics among aggression subtypes (Connor DF. et al, 2019) [2]

THEORIES OF AGGRESSION

In psychology, various theories try to explain why humans manifest aggressive behaviour. The most important theoretical approaches for aggressive behaviour are included in

- Instinct Theory of Aggression
- Frustration-Aggression Theory
- Social Learning Theory

Instinct theory suggests that aggression is hardwired into our biology, a remnant of our evolutionary past. This approach is described in Freud's Thanatos instinct. It is very well known that, in animals, aggressive behaviour is related to self-defence or defence of one's own siblings. However, this instinct view still influences our thinking about the biological roots of aggression.

Albert Bandura [3] in social learning theory proposes that aggression is learned through observation and imitation. In this context, the domestic environment is most influential in the aggressive behaviour of children.

Frustration-Aggression Hypothesis suggests that aggression is a natural response to frustration. It is similar to a tantrum in young children, sometimes provoked when a desirable toy is denied.

The newest cognitive neo-association model focuses on how our thoughts and memories influence aggressive behaviour. It suggests that negative experiences create a network of aggressive thoughts, feelings, and behavioural tendencies in our minds [4].

However, it is reasonable to explain aggression as the result of a complex interplay between biological predispositions, learned behaviours, and situational factors. In other words, it can be suggested that aggression is produced by an interplay of biological factors (our genes, hormones, and brain structure), environmental influences, as well as psychological factors (mental health conditions, personality traits, and cognitive processes). Additionally, frustration, provocation, pain, or even environmental factors like heat can trigger aggression.

It is well known that aggression is a normal part of development displayed by most children [5]. It typically occurs at a higher frequency in boys than in girls. The overt aggressive behaviour is most frequent between the ages of 3 and 4 years

[6], but decreases around 5 or 6 years of age, where development of verbal and interpersonal skills helps to moderate aggressive impulses and facilitate more socially acceptable activities (e.g., sports competition and academic achievement). In the period of increased cognitive development in children, more socially related aggression appeared (verbal aggression, relational and indirect form of aggression such as excluding peers or gossip, lying or cheating) [7, 8, 9].

The more complex issue is a measuring aggression in practice. In this context there are different approaches:

1. Self-Report Measures uses questionnaires or surveys where individuals report on their own aggressive thoughts, feelings, and behaviours.
2. Observational Techniques are related to observation of individuals in controlled settings or natural environments, looking for signs of aggressive behaviour.
3. Physiological Assessments involve measuring physical indicators of aggression, such as heart rate, skin conductance, or hormone levels.
4. Experimental Methods, where researchers might create situations in a laboratory setting that could potentially elicit aggressive responses, then measure how participants react.

One particularly interesting area of research involves instrumental aggression in psychology. Many psychologists believe that instrumental aggression can be understood through Skinner's theory of operant conditioning [10]. Instrumental aggression is a complex psychological phenomenon with far-reaching consequences for individuals and society. This form of aggression, often misunderstood and oversimplified, represents a dark facet of human behaviour that is not driven by anger or a desire to harm, but rather as a means to achieve a specific goal. In essence, instrumental aggression refers to aggressive behaviour that is purposeful and goal-directed, rather than driven by anger or emotional arousal. It is the type of aggression where the aggressor's primary aim is to achieve a specific outcome, such as gaining resources, power, or status, rather than causing harm for its own sake [11].

However, it must be said that aggression is not only negative behaviour, it is important to recognize that aggressive tendencies can sometimes serve adaptive purposes. In certain situations, aggressive behaviour might be necessary for self-defence or in protecting others. More-

over, some forms of competitive behaviour that we value in sports or business could be seen as channelled aggression.

However, if we put the name aggression in databases, we can find thousands of papers published on this topic such as: Childhood aggression, Sexual aggression, Pathological Internet Use, Aggression and Cyberbullying, Effects of Parenting Environment on Child and Adolescent, Family violence, Strategies for overcoming aggressive behaviour etc.

Related to genetic influence on aggressive behaviour, PubMed, PsycINFO, and MEDLINE databases showed involved genes and the specific age group. Generally, findings show that (a) investigation of candidate genes, especially MAOA, DRD4 and COMT, continue to dominate the field, although studies using other research designs and methods, including genome-wide association and epigenetic studies are increasing, (b) the published articles tend to be moderate in sizes, with variable methods of assessing aggressive behaviour and inconsistent categorizations of tandem repeat variants, resulting in inconclusive

findings of genetic main effects, gene-gene, and gene-environment interactions, (c) the majority of studies are conducted on European, male-only or male-female mixed, participants [12, 13].

NEUROBIOLOGICAL BASIS OF AGGRESSION

Neurobiological factors that are crucial in aggression include the actions of the prefrontal cortex (PFC) and its reciprocal connections with mid-brain structures involved in the acute threat response system, such as the amygdala, hypothalamus, and periaqueductal grey (PAG) [14, 15]. In turn, these regulate the hypothalamic-pituitary-adrenal (HPA) stress response system [16]. The neural circuits that appear to control aggressive responding are not specialized for this purpose alone but support more generalized cognitive functioning such as emotional reactivity, emotional regulation, and cognitive control [17].

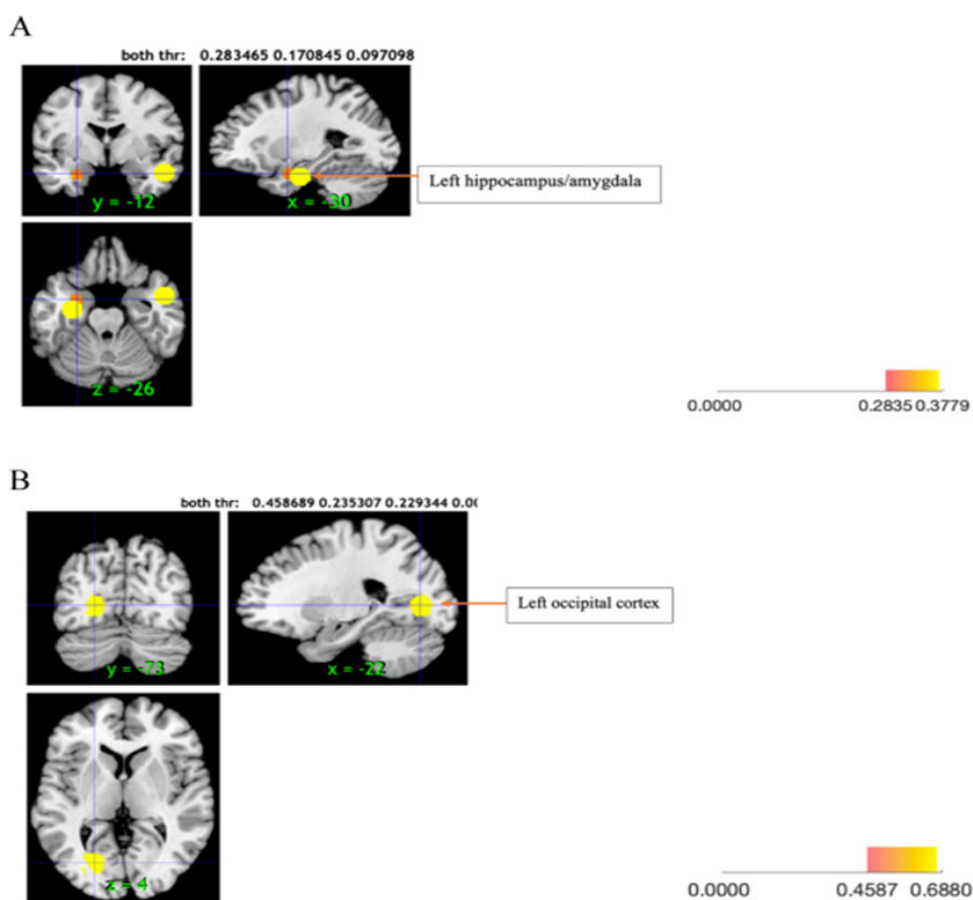


Figure 2. Proportion of activated significant regions in the aggression vs. control group (3A) and in the control vs. aggression group (3B)

In the newest paper by Nikolic M. et al., 2022 [18] fMRI findings in aggressive individuals are evaluated. In this context, fMRI related to aggression are shown left hippocampus/amygdala and left occipital region in the brain are more important. (Figure 2)

Very interesting is the phenomena of reactive aggression, where aggression is provoked by some events of the environment. In Krämer UM et al. (2011) [19] the role of serotonin in reactive aggression is evaluated. More precisely, the fMRI study investigated the role of serotonin in reactive aggression by means of an acute tryptophan depletion (ATD). In this study, the effects of tryptophan depletion on reactive aggression and its neural correlates detected only subtle behavioural and

neural effects of lowered serotonin. Importantly, behavioural effects suggested a moderating influence of participants' trait aggressiveness. In addition, a network of prefrontal and subcortical (caudate) brain regions, are shown to be correlated with the participants' aggressive response during the experiment. This was independent of the tryptophan depletion, however.

Behavioural data showed an aggression diminishing effect of ATD in low trait-aggressive participants, whereas no ATD effect was detected in high trait-aggressive participants. ATD also led to reduced insula activity during the decision phase, independent of the level of provocation. Figures 3 and 4 show brain regions activated by low and high provocation.

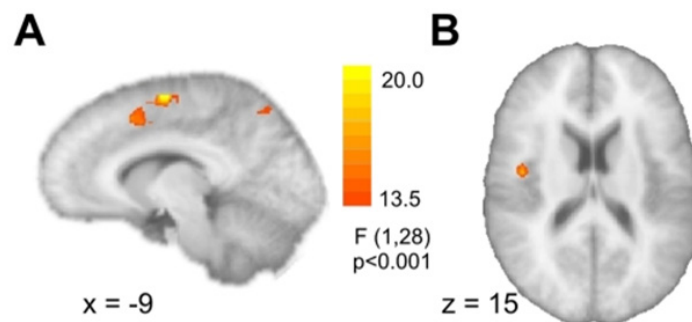


Figure 3. *Provocation trials for the decision phase yielded activation in dorsal ACC, praecuneus as well as premotor and motor cortex [19]*

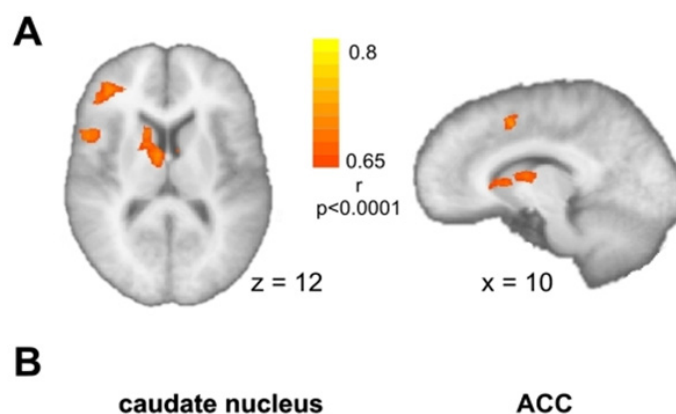


Figure 4. *Outcome phase in participants with a higher behavioural provocation effect showed an increased neural effect in the caudate nucleus, dorsal ACC, insula and right inferior frontal gyrus [19]*

In this study the previous reports of an inverse relationship between serotonin level and aggressive behaviour are not confirmed, but only an aggression that a diminishing effect of ATD in low trait-aggressive participants is detected. Still, it remains an open question about how activity in this network is modulated by serotonin or other neurotransmitters such as dopamine. The cited study found only a general modulation of anterior insula activity but no provocation specific effect. Future studies should examine whether these effects depend on pre-existing interindividual differences in the serotonergic system or whether other neuromodulators such as dopamine or vasopressin play a more significant role for activity in this network.

PARENTING FOR SOCIAL-EMOTIONAL DEVELOPMENT OF CHILDREN

In my previous articles, I accentuated the importance of attachment in further development of children. Additionally, for educative purposes, it is very important to point out that the caregiving environment of children and adolescents is critically important for their social-emotional development. It is well known that the parenting style may affect child social-emotional outcomes through its effects in shaping the child's developing brain. In this context, some studies with fMRI showed associations between parenting behaviour and child and adolescent functional activation of neural networks involved in emotional arousal, emotion regulation, reward processing, cognitive control, and social-emotional information processing.

It was also confirmed that higher negative parenting and lower positive parenting are generally associated with heightened activation in emotional arousal networks in response to negative emotional stimuli in youth. Lower positive parenting is associated with higher response in reward processing networks to monetary reward in youth. Finally, findings show that lower positive parenting predicts lower activation in cognitive control networks during cognitive control tasks and less adaptive neural responses to parent-specific stimuli. Additionally, studies found these associations to be moderated by a child's sex or psychopathology risk status.

Indeed, across theories of parenting, positive parenting, characterized by high levels of parent warmth, involvement, and sensitivity, may act as protective factors and may promote adaptive child social, emotional, and cognitive development. In contrast, negative parenting, characterized by high levels of harsh or inconsistent discipline, may be considered as a social stressor to children and may lead to problems in a child's social-emotional development and in their cognitive and physical development. However, the mechanisms by which parenting affects child outcomes are not yet fully understood. Parenting may exert its influence by genetic transmission of psychological and other functioning, through modelling behaviours for the child that they imitate, or, as has recently gained attention, by environmental shaping of the child's brain. Figure 5 shows the complex interrelation between parenting style and neuronal responses in youth [20].

In sum, the findings suggest that the quality of parenting is associated with the neural activation in emotional arousal, emotional response, reward processing, social-emotional, and cognitive control networks in children. These findings help us better understand the roots of typical child social-emotional development and can inform our knowledge of how parenting affects the development of psychopathology and especially the aggression.

Finally, it must not be underestimated that aggression can be a symptom of many different underlying problems. It is a very polymorphic thing, a commonality for any number of different psychiatric conditions, medical problems, and life circumstances. Mood disorders, psychosis, conduct disorders, ADHD, different traumatic experiences but also frustrations, impulsivity or poor self-regulation can be related to aggression.

PREVENTION AND MANAGEMENT

The prevalence of conduct disorder including aggressive behaviour varies from 2% to 10% in community studies [21]. Among the male population, aggressive behaviour is much more present.

In order to prevent and manage, understanding aggression as a problem is just the first

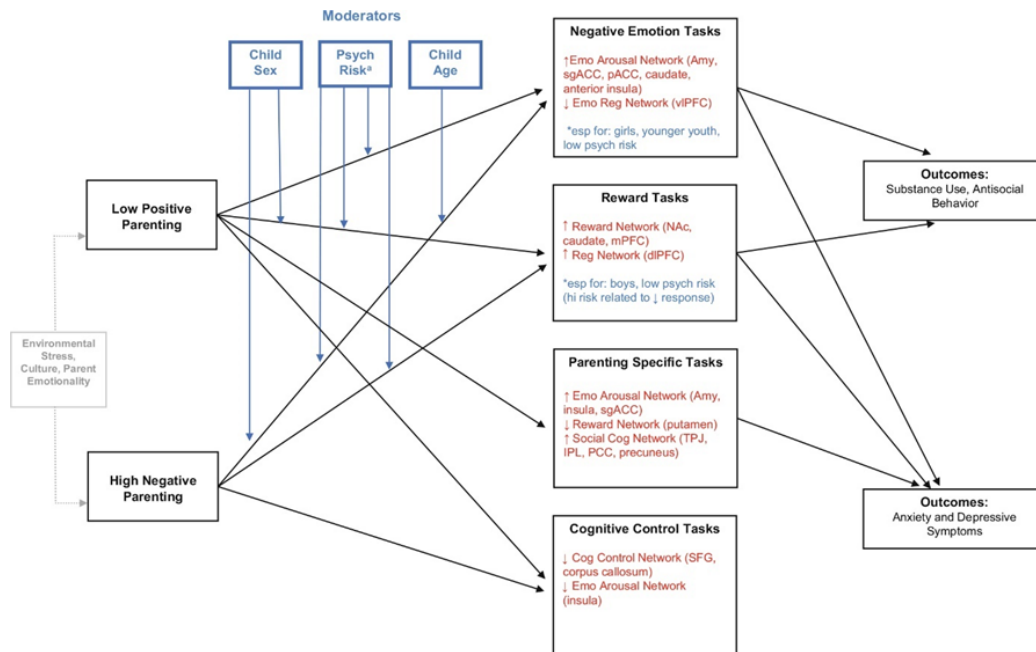


Figure 5. Summary of findings on parenting and youth neural responses

[Psych Risk indicates presence of risk for psychological symptoms, including parenting psychopathology or temperament. Emo Emotion, Amy Amygdala, sgACC subgenual Anterior Cingulate Cortex, pACC perigenual Anterior Cingulate cortex, Reg Regulation, vlPFC ventrolateral Prefrontal Cortex, esp especially, NAc Nucleus Accumbens, mPFC medial Prefrontal Cortex, dlPFC dorsolateral Prefrontal Cortex, hi high, TPJ Temporoparietal Junction, IPL Inferior Parietal Lobule, PCC Posterior Cingulate Cortex, SFG Superior Frontal Gyrus] [20]

step. The real challenge lies in managing and preventing aggressive behaviour. This is a task that spans from the individual level to global politics [22, 23, 24].

Learning to manage one's own aggressive impulses is a crucial life skill. This might involve developing better emotional regulation techniques, learning healthier ways to express anger, or seeking professional help if aggressive tendencies are causing problems in one's life.

For parents and educators, understanding aggressive toddler behaviour psychology can be crucial. Early intervention and teaching children how to manage their emotions can set the stage for healthier behaviour patterns later in life.

On a broader scale, addressing societal factors that contribute to aggression – such as poverty, inequality, and exposure to violence – is crucial for creating a less aggressive society. This involves not just psychology, but also fields like sociology, economics, and public policy.

Regarding the complexity of the aggressive behaviour, it is very difficult and multidimensional to deal with it. It is especially important in childhood, because it is practically impossible to intervene in the formed neuronal network in adults and the structured personality.

There are several steps as preventative measures:

Firstly, we must have positive reinforcement and a reward system during childhood. Teaching emotional regulation and coping skills are other crucial strategies. Implementing consistent discipline techniques is also important. Successful parenting does not mean super protection and not imposing discipline measures. Finally, creating a supportive and structured environment is the final piece of this puzzle.

Disruptive behaviour disorders frequently precede antisocial personality disorder, substance abuse, and delinquency. It is proven that aggression and severe behavioural problems are related to difficulties in social, family, and academic performance and in personal development.

Behavioural strategies for aggression often focus on emotional regulation techniques as key components of managing aggressive behaviour. Therefore, increasing awareness about family violence consequences and promoting parenting programs centred around mental health are imperative.

Early treatment of the aggression component in conduct disorders may lead to a better prognosis.

Individual factors, such as domestic violence, and contextual factors in early parenting may place children at increased risk for the development of aggression.

Cognitive-behavioural therapy (CBT) is one of the most widely used and effective treatments for aggressive behaviour in children. It helps children identify negative thought patterns and behaviours and replace them with more positive ones.

Parent-child interaction therapy (PCIT) is another powerful tool in the professional arsenal. This approach involves coaching parents on how to interact with their child in ways that promote positive behaviour.

In some cases, medication may be necessary, particularly if the aggressive behaviour is related to an underlying condition like ADHD or anxiety. However, this is typically considered only after other interventions have been tried and should always be done under the close supervision of a healthcare professional.

Clozapine and risperidone are effective for short-term treatment of aggression in children and adolescents with conduct disorder. Clozapine was more effective than risperidone in conduct externalization factors, delinquency trait, and global functioning in children and adolescents [25, 26]. Stronger efficacy of clozapine should be investigated in larger sample sizes using pharmacogenomic studies.

Addressing aggressive behaviour takes time, patience, and consistency. But the payoff is worth it. The long-term benefits of addressing aggressive behaviour in children cannot be overstated. It is not just about making life easier in the short term (though that is certainly a nice bonus). It is about setting the stage for better social relationships, improved academic performance, and healthier emotional regulation skills that will serve children well into adulthood.

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Резиме

ДАЛИ Е АГРЕСИЈАТА НОРМАЛНА КАЈ ЛУЃЕТО?

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Од тепачки во училишниот двор до меѓународни конфликти, агresiјата е загадочна сила што го обликува однесувањето на човекот и социјалната динамика низ целата човекова историја. Тоа е феномен стар колку и самото човештво, но неговата комплексност продолжува да нè збунува и да нè фасцинира подеднакво.

Без разлика дали се работи за тензијата што врие во жестоката расправија или експлозивното насилство на војувањето, агresiјата проникнува во нашите животи на суптилни и отворени начини.

Во трудот се анализирани формите на агresiја, некои теории што ја објаснуваат агresiјата кај луѓето, особено кај младите, но најмногу е даден акцент на невробилошките промени во мозочните структури поврзани со агресивноста.

Посебно внимание е дадено на родителството, како фактор за појава/надминување на агresiјата кај децата.

На крајот се наброени некои терапевтски насоки за надминување на оваа негативна појава.

Клучни зборови: агresiја, невробилошки наоди, родителство, надминување