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# Developmental Trajectories of Aggression and Other Problematic Behaviors Associated With IED<sup>☆</sup>

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## Historical Perspective

In their invitation to write the present chapter, the volume editors wrote: “We very much want to have a chapter in our book on Intermittent Explosive Disorder (IED) covering the topic of ‘Developmental Trajectories of Aggression’ because we believe that many of the children you and your colleagues study grow up to have IED.”

In making this request the volume editors were following in the steps of Aristotle who wrote, some 2600 years ago, that: *He who considers things in their first growth and origin, ... will obtain the clearest view of them.* (Politics, Book 1 chap 2). Similarly, 19th century investigators of animal and human behavior explicitly stated that understanding a given behavior required the description

<sup>☆</sup> Adapted from the following: Tremblay (2000), Tremblay (2010), and Tremblay (2018).

of that behavior's development from conception onwards (Cairns, 1983). But not all scientists agreed! One of the fiercest debates concerning the origins of species in the 1820s, described at the time by Goethe as a volcano eruption, was sparked by the decision of a French naturalist, Etienne Geoffroy Saint-Hilaire, to compare the development of fetuses rather than continue comparing only the anatomy of adult animals (Appel, 1987). Some 30 years later, Charles Darwin cited this early work on the differences in the development of fetuses as one of the best support for his theory (Darwin, 1859, p. 409). In his history of developmental psychology, Robert Cairns (1983) reminded his readers that the father of experimental psychology in the 19th century, Wilhelm Wundt, rejected the developmental perspective arguing that the adult mind could be understood independently from the mind of the child.

This refusal to take a developmental perspective has largely prevailed in the study of aggressive behavior over the 20th century. Aggressive behavior problems during adulthood, as well as during adolescence, were generally studied without reference to childhood aggressive behavior problems.

One debate on the developmental origins of aggression among humans reached its peak in the late 1960s and early 1970s. It centered on the nature vs nurture origin of aggression. Konrad Lorenz's book 'On Aggression' (Lorenz, 1966) was based on Lorenz's observations of animal behavior and concluded that humans, like all other animals, inherit an 'aggressive instinct' which could lead to the destruction of humanity. The nurture side of the debate was highlighted by the social psychologist Albert Bandura in his book 'Aggression: A social learning perspective' published 7 years later (Bandura, 1973). Bandura's book was based on studies of children in a laboratory situation where they were shown to spontaneously imitate an adult hitting a Bobo doll. Bandura concluded from these observations: "People are not born with preformed repertoires of aggressive behaviors; they must learn them in one way or another" (Bandura, 1973, p. 61). His work led to numerous studies that were partly driven by the hypothesis that children were becoming more aggressive because of violence on television (e.g., Eron, Walder, Toigo, & Lefkowitz, 1963; Huesmann, Lagerspetz, & Eron, 1984).

The social learning hypothesis of aggression essentially dominated the fields of criminology, education, child psychiatry, psychology, public health, and sociology. For example, in 1993 the US National Academy of Science Panel 'On understanding and control of violent behavior' concluded: "Modern Psychological perspectives emphasize that aggressive and violent

behaviors are learned responses to frustration, that they can also be learned as instruments for achieving goals, and that the learning occurs by observing models of such behavior. Such models may be observed in the family, among peers, elsewhere in the neighborhood, through the mass media ..." (Reiss & Roth, 1993, p. 7). As recently as 2002, the World Health Organization's 'World Report on Violence and Health' concluded: "The majority of young people who become violent are adolescent-limited offenders who, in fact, show little or no evidence of high levels of aggression or other problem behaviors during their childhood" (World Health Organization, 2002, p. 31). They attributed this conclusion to the following source: 'Youth violence: a report of the Surgeon General. Washington, DC United States Department of Health and Human Services' (US Surgeon General, 2001).



### Developmental Trajectories of Physical Aggression From Early Childhood to Old Age

In the last half of the 20th century, there was a strong interest in the stability of aggressive behavior. In one of the most often cited reviews, Olweus (1979) concluded that aggressive behavior was as stable as intelligence because of a high correlation between assessments at two points in time in 16 samples of males. Two studies starting toward the end of infancy also indicated that stability of physical aggression was high during the preschool years (Cummings, Iannotti, & Zahn-Waxler, 1989; Keenan & Shaw, 1994). However, it is important to remember that a high correlation between two assessments only indicates that individuals retain a relatively consistent placement within the group at two points in time. Correlational analyses of aggressive behavior with longitudinal data do not provide information on intraindividual change in aggressive behavior over time.

In 1984 we initiated the first large prospective longitudinal study of boys' physical aggressions from kindergarten onwards. The study made annual assessments of a sample of 1031 boys from 53 schools of low socioeconomic neighborhoods in Montreal (Canada). Results surprisingly showed that the mean frequency of physical aggressions decreased from early childhood to adolescence. To rule out the hypothesis that a subgroup of children were increasing their frequency of physical aggressions with age, while most others decreased their frequency of aggressions, we used semiparametric trajectory analyses. Results showed (see Fig. 1 from Nagin & Tremblay, 1999) that no significant group of children went from low frequency of physical

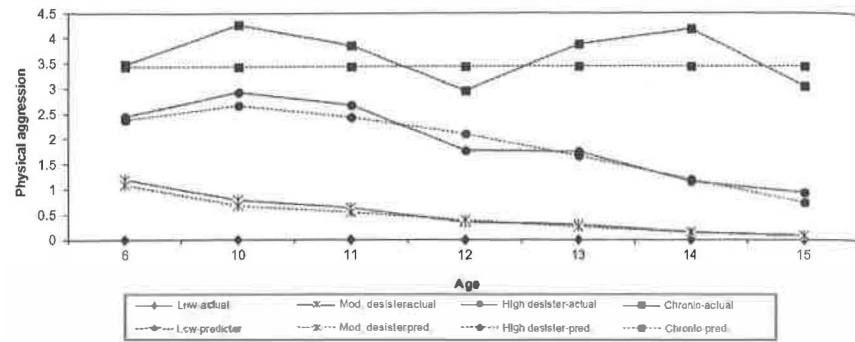


Fig. 1 Trajectories of physical aggression between 6 and 15 years of age. (From Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development*, 70(5), 1181–1196.)

aggressions during childhood to high frequency during adolescence. Those who frequently aggressed in adolescence were those who frequently aggressed during childhood. These results were replicated with longitudinal studies in Italy, New Zealand, and the United States (Broidy et al., 2003; Di Giunta et al., 2010).

The results of these longitudinal studies in many countries suggested that if children learn to aggress from their environment, this must happen before school entry. With the first data collection of a nation-wide accelerated longitudinal study in Canada, we showed that, for boys and girls, the frequency of hitting, kicking, and biting substantially decreased from 2 to 11 years of age (see Fig. 2 from Tremblay et al., 1999).

We then traced the developmental trajectories of physical aggressions from 17 to 60 months with a prospective longitudinal study of a representative sample of births in the Canadian province of Quebec (Fig. 3 from Côté et al., 2007). Results indicated that there were three developmental trajectories that had the same shape, but with significant differences in the frequencies of physical aggressions. The three groups increased their frequency of physical aggressions from 17 to 42 months followed by a decrease in the frequency from 42 to 60 months. However, a third of the sample had low frequencies of physical aggressions, 50% had a medium frequency of physical aggressions, while 17% had the highest frequency of physical aggressions at all assessment points. This high physical aggression group was different from the rest of the sample on numerous characteristics: there were more boys; the families had low income and was described by the mother as dysfunctional; the mothers

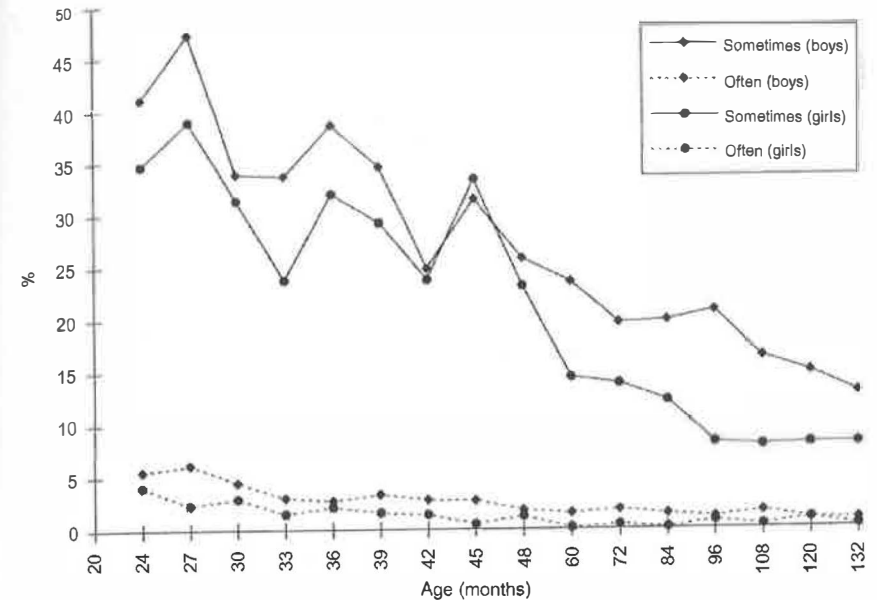


Fig. 2 Hitting, biting, and kicking (boys and girls aged 2–11 years). (From Tremblay, R. E., Japel, C., Pêrusse, D., McDuff, P., Boivin, M., Zoccolillo, M., & Montplaisir, J. (1999). The search for the age of "onset" of physical aggression: Rousseau and Bandura revisited. *Criminal Behavior and Mental Health*, 9(1), 8–23.)

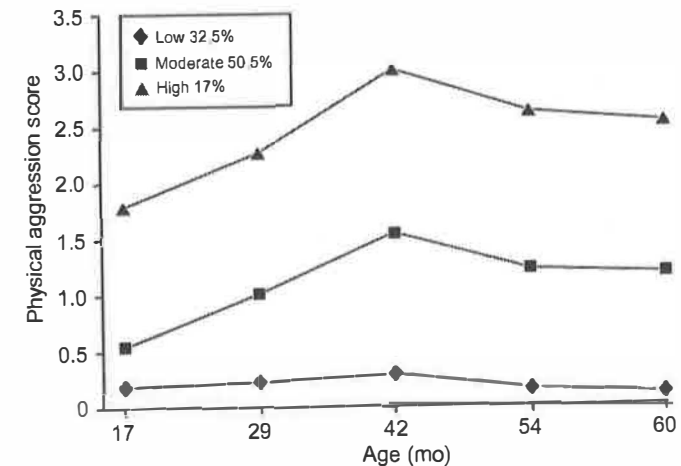
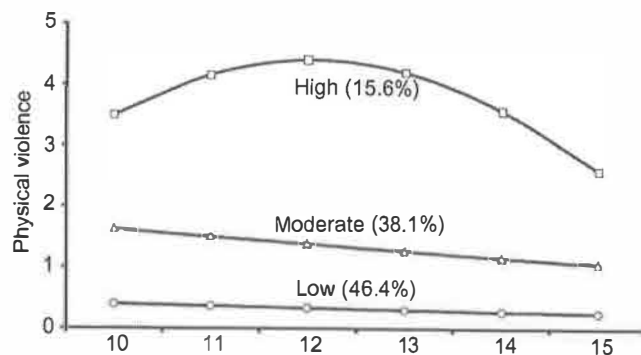


Fig. 3 Trajectories of physical aggression between 1.5 and 5 years of age ( $n = 1758$ ). (From Côté, S. M., Boivin, M., Nagin, D. S., Japel, C., Xu, Q., Zoccolillo, M., & Tremblay, R. E. (2007). The role of maternal education and non-maternal care services in the prevention of children's physical aggression. *Archives of General Psychiatry*, 64(11), 1305–1312.)

had a history of depression, of conduct problems during adolescence, and of alcohol consumption (see also Tremblay et al., 2004). More recent studies in Great Britain and Norway have confirmed the early onset of physical aggression and the decreasing developmental trajectories as children learn to control their behavior (e.g., Hay et al., 2014; Naerde, Ogden, Janson, & Zachrisson, 2014; Tremblay et al., 1999) (Campbell, Spieker, Burchinal, Poe, & NICHD Early Child Care Research Network, 2006; Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Dearing, Zachrisson, & Naerde, 2015; Naerde et al., 2014).

The longitudinal studies of physical aggression which have continued to follow children during adolescence and early adulthood showed that the frequency of physical aggression continues to decline with age for the majority (Tremblay & Côté, 2009). However, among the most physically aggressive individuals, there is often a slight increase of physical aggression during mid-adolescence followed by a decline (see Fig. 4) (Lacourse et al., 2002; van Lier, Vitaro, Barker, Koot, & Tremblay, 2009, see Fig. 3).

Few studies have monitored the development of physical aggression from adolescence throughout adulthood with longitudinal studies. The best data comes from court records of a sample of male juvenile delinquents living in Boston in the 1940s (Sampson & Laub, 2003). The results showed a clear decline in arrests for violent crimes from early adulthood to old age. Similar results were obtained for physical aggressions among couples from cross-sectional and short-term longitudinal studies (Bookwala, Sobin, & Zdaniuk, 2005; O'Leary & Woodin, 2005; Sutor, Pillemer, & Straus, 1990; Vickerman & Margolin, 2008).



**Fig. 4** Developmental trajectories of physical violence. (From van Lier, P. A. C., Vitaro, F., Barker, E. D., Koot, H. M., & Tremblay, R. E. (2009). *Developmental links between trajectories of physical violence, vandalism, theft, and alcohol-drug use from childhood to adolescence*. *Journal of Abnormal Child Psychology*, 37(4), 481–492. doi:10.1007/s10802-008-9289-6.)

Thus research on the development of physical aggression from infancy to old age indicates that (a) humans start to physically aggress before the end of their first year after birth; (b) the frequency of physical aggression reaches a peak during the first 3 to 4 years after birth; and (c) from that infancy peak, the frequency of physical aggressions then decreases until old age. A small group of individuals, mainly males, tend to use physical aggression more frequently than others throughout life and they are more likely to increase the frequency of their physical aggressions during mid-adolescence.



## The Development of Other Forms of Aggression

Up to now, the focus of this chapter has been on physical aggressions. That choice was made because physical aggression is the more lethal form of aggression and the easiest to observe, partly because of its obvious negative consequences. However, in the context of the present book's focus on IED, it is important to understand that the history of research on human aggression has clearly shown that the major problem with the field has long been with the definition of aggression (see, e.g., Berkowitz, 1962; Burt, 1925; Buss, 1961).

The definition of aggression problem can be clearly seen when the content of the « aggression » scales for children is examined. We see a mix of behaviors that range from physical aggressions to attention seeking and disobedience. For example, the frequently used Child Behavior Checklist « Aggression » scale contains « argues, brags, demands attention, disobeys, poor peer relations, jealous, lies, shows off, stubborn, moody, sulks, loud » (Achenbach & Edelbrock, 1983). The common denominator of these items appears to be that they can be annoying. The total score for this « aggression » scale is clearly mixing children who are annoying and disruptive with those who physically attack. In fact, only 2 of the 23 items refer clearly to physical aggressions, and two others which could be interpreted as physical aggression. These items are regularly used to identify either « aggressive », « externalizing », « conduct problem », or « antisocial » individuals in clinical practice. They are also used to identify genetic influences on phenotypes which are alternatively referred to as « aggressive », « externalizing », « conduct disordered », or « antisocial » (e.g., Eley, Lichenstein, & Stevenson, 1999; O'Connor, McGuire, Reiss, Hetherington, & Plomin, 1998; Slutske et al., 1997; van Beijsterveldt, Bartels, Hudziak, & Boomsma, 2003).

The definition of IED clearly includes both physical and verbal aggression, while the 3rd criterion (behavior is not premeditated) clearly excludes proactive aggression and possibly indirect aggression (relational aggression),

a form of aggression which involves a delayed response to frustration (Côté et al., 2007; Crick, 1995). From this perspective, research on the developmental origins of IED needs to distinguish proactive from reactive aggression.

Much work has been done on differentiating proactive and reactive aggression with children and adolescents. For example, Vitaro, Brendgen, and Tremblay (2002) used longitudinal data from a large population sample of children between 6 and 13 years of age to differentiate the reactively and proactively aggressive children between 10 and 12 years of age and identify their antecedent and subsequent characteristics. The study showed that the children who were rated by their teachers as the most reactively aggressive between 10 and 12 years of age had been rated the most reactive by their mothers on a reactive temperament scale (Lerner, Palermo, Spiro, & Nesselroade, 1982) at 6 years of age. With reference to IED, it is important to note that this reactivity scale includes items concerning reactivity to physical phenomena such as light and pain. At age 6, the physically reactive children were also rated by their mothers as more inattentive, hyperactive-impulsive, withdrawn, and physically aggressive. At age 13 the reactively aggressive children were less likely to report delinquent behavior than the proactively aggressive, but more likely to report depressive feelings.

These results suggest that reactively aggressive preadolescents have had problems with reactive aggression at least since kindergarten, but they also have a more general reactivity profile that includes reactivity to physical stimuli such as light and pain, as well as social withdrawal problems, impulsivity, hyperactivity, and inattention.

### The Early Development of Hyperactivity-Impulsivity

It would be a major surprise if IED was not in some way related to the early development of the well-studied hyperactivity-impulsivity disorder. Its development from 18 months to 8 years was described (Galéra et al., 2011) with maternal ratings of 2057 children from the Quebec Longitudinal Study of Child Development (QLSCD) at the following ages: 1 ½, 2 ½, 3 ½, 4 ½, 5, 6, and 8 years. Five items were used to assess hyperactivity-impulsivity: "can't sit still, is restless or hyperactive," "fidgets," "is impulsive, acts without thinking," "has difficulty waiting for his/her turn in games," "cannot settle down to do anything for more than a few moments." The three hyperactivity-impulsivity trajectories were high (16.1%), moderate (52.7%),

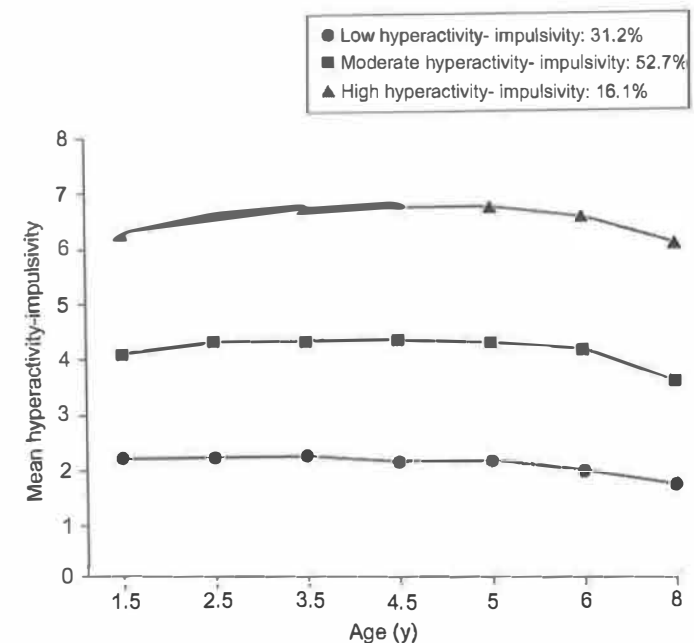


Fig. 5 Developmental trajectories of hyperactivity-impulsivity. (From Galéra, C., Côté, S. M., Bouvard, M. P., Pingault, J. B., Melchior, M., Michel, G., ... Tremblay, R. E. (2011). Early risk factors for hyperactivity-impulsivity and inattention trajectories from age 17 months to 8 years. *Archives of General Psychiatry*, 68(12), 1267–1275. doi:10.1001/archgenpsychiatry.2011.138.)

and low (31.2%). Fig. 5 clearly shows that the level of hyperactivity-impulsivity was stable for the three groups from early childhood to mid childhood. In a longitudinal study from 6 to 12 years of age, with a representative sample ( $N=2000$ ) of Canadian children, the results showed that those on high as well as low trajectories of hyperactivity-impulsivity did not substantially increase nor decrease their level of hyperactivity-impulsivity between 6 and 12 years of ages, while those in the middle showed a little bit more variability (Pingault et al., 2011). Thus levels of hyperactivity-impulsivity remain fairly stable from early childhood to adolescence and they are good predictors of numerous mental health, educational and social problems (Pingault, Côté, Galéra, et al., 2013; Pingault, Côté, Lacourse, et al., 2013; Pingault et al., 2011). It is easy to imagine that such an accumulation of problems, from early childhood to adulthood, could be involved in IED development.

## The Early Development of Irritability and its Link to Suicidality

A recent study on the development of irritability during elementary school, as a predictor of suicidal ideations and suicidal attempts during adolescence, may also be an important contribution to understanding IED development. Orri et al. (2018) used the Quebec Longitudinal Study of Child Development, first to describe the developmental trajectories of irritability between 6 and 12 years of age, based on teacher ratings; second to investigate their associations to suicidal thoughts and attempts. Three of the four items that were used in the study related to reactive aggression: reacted in an aggressive manner when teased, reacted in an aggressive manner when contradicted, reacted in an aggressive manner when something was taken away from him/her. The fourth item was had temper tantrums or hot temper. Children with high irritability and anxious mood between 6 and 12 years of age compared to those with low symptom levels had higher rates of suicidal ideation and attempts.

## Conclusions

Longitudinal studies of behavior development which start during infancy systematically show that the behavior problems we observe during adolescence and adulthood were present in early childhood. In fact, the frequency of physical aggressions, loss of control, and hyperactive and impulsive behaviors are at their highest during early childhood. Learning to gain control over one's behavior is probably the main task of childhood and this has been clear for centuries to the wisest observers of human behavior. For example, some 2400 years ago Aristotle wrote in his book on politics that "anger and will and desire are implanted in a child from their very birth, but reason and understanding develop as they grow older." More recently, Thomas Hobbes, in his book *On the Citizen* (Hobbes, 1641), was more explicit when he wrote: "Unless you give infants everything they want, they cry and get angry, they even beat their own parents ... Thus, an evil man is rather like a sturdy boy, or a man of childish mind, and evil is simply want of reason at an age when it normally accrues to men by nature governed by discipline and experience of harm."

By referring to nature and discipline and experience, as the causal factors of behavior problems during adulthood, Hobbes appears to have been more insightful than many "modern" investigators of mental health who tend to

attribute behavior problems to either genes or environment or experience. We suggest that the next step in understanding the developmental origins of IED, would involve using longitudinal studies that have assessed large cohorts of children throughout their development, to assess their IED during adulthood. These studies would help trace the pathway from pregnancy to IED in adulthood, and thus identify preventive interventions that can be implemented from pregnancy onwards.

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