J Abnorm Child Psychol (2006) 34:481–487
DOI 10.1007/s10802-006-9038-7

ORIGINAL PAPER

Prevention of Youth Violence: Why not Start at the Beginning?

Richard E. Tremblay

Published online: 25 July 2006

> "He who considers things in their first growth and origin . . . will obtain the clearest view of them."
>
> (Aristotle, Politics, Book 1 chap 2)

The product of an applied science is as good as the knowledge that gets into the hands of those who do not produce the science. From this perspective, I applaud the National Institutes of Health's initiative to ask eminent scientists at the periphery of violence research to report on the state of knowledge for violence prevention. The NIH (2004) report provides to "prevention of violence" scientists a description of how the science is perceived by scientists not directly involved. Two other panels would have been most useful, one made up of practitioners in the field of violence prevention, and another from the general public. The advantage of the scientific panel is that they can criticize the type of science we have been doing. Their criticism should be taken seriously. I certainly share many: the lack of a common language, the lack of genetic and brain research to understand youth violence, and the lack of integration of developmental knowledge in prevention experiments are among those with which I most strongly agree.

However, it was unfortunate, though not easily preventable, that the mandate of the panel suffered from some of the main weaknesses of youth violence research. These are clear in the title of the report: "Preventing violence and related health-risking social behaviours in adolescents." My comments focus on the evidence which makes me conclude that asking the panel to concentrate its attention on preventing "violence" and "related health-risking behaviours" *in adolescents* was misguided. I attempt to demonstrate why an alternative perspective is needed.

R. E. Tremblay (✉)
University of Montreal,
Montreal, Canada
e-mail: tremblar@grip.umontreal.ca

Towards a common language

The report insists on the importance of a common language for violence scientists. The term "violence" was chosen as the central concept for the panel. The panel recognized that the "term adolescent violence is used to encompass a broad spectrum of behaviours ranging from bullying at school to murder." (p. 4). It stated that "While the greatest concern is about violent behaviour like aggravated assault, armed robbery, rape, and homicide, many studies focus on more serious violence precursors, such as delinquency, physical aggression, or antisocial behaviour." (p. 4).

I have been working in this field for close to four decades and I still fail to understand how we can say "delinquency, physical aggression, and antisocial behaviour" in one breath, as if we were referring to three different types of fruits. A physical aggression is a delinquent act and an antisocial act? Why include a subcategory (physical aggression) in a list of more general categories (delinquent and antisocial). Furthermore, what is the difference between delinquent and antisocial? And, if bullying at school is part of the "violence" definition, why is physical aggression considered a "precursor" of the "more serious" violence of bullying at school? How do we draw the line between a violent physical aggression and a non violent physical aggression? To make things more complicated, the term "other health-risk social behaviour" was added to the mandate. In essence, this meant that any research concerning social behaviour of adolescents could be considered.

The only defence I can offer for the committee is that they reflected the confusions in violence research. However, I cannot understand why the committee did not refer to the American Psychiatric Association (1994) DSM-IV classification of Conduct Disorder (CD). The aim may have been to reduce the confusion, but it is hard to understand how a National Institutes of Health report on youth violence can exclude the main psychiatric diagnosis referring to youth violence. The DMS-IV made a valiant attempt to include a developmental perspective in the CD diagnosis. Unfortunately, it continues to confound physical aggression with behaviours such as truanting from school, staying out late at night and running away from home.

There are many reasons for the confusing language we use, but one of the main reasons is that the language was created without an adequate description of the development of the phenomena we want to explain. For the purpose of the present discussion I define a violent human as an individual who, over an extended period of time, uses physical aggression more frequently than the majority of his age-peers. Within this category some are more frequently violent than others, but use of physical aggression more often than the majority of one's peers over an extended period of time is disruptive for the social group and is a good predictor of important "related health-risking social behaviours" (e.g. Broidy et al., 2003; Nagin & Tremblay, 1999; NICHD-ECCSG, 2004).

The age-crime curve

Let's assume that the committee was right when it stated that "the greatest concern is about violent behaviour like aggravated assault, armed robbery, rape, and homicide" (p. 4). What do we know about these behaviours and their development? First, I expect we will all agree that they can be classified under both of two labels used by the committee: "delinquent" and "antisocial." Second, I believe all will agree that they can be placed in the subcategory of "physical aggression" and threats of "physical aggression." Third, there should be a relatively wide consensus that the best predictor of a physical aggression is a previous physical aggression.

If we agree on these three statements, we are bound to agree that we need to understand the development of physical aggression if we are to prevent these types of serious antisocial behaviours. Other forms of delinquent or antisocial behaviour, such as stealing, running away from home or taking drugs may be of interest, but we should not be distracted from understanding the development of physical aggression if we want to prevent the adolescent behaviours that the committee, the press, the general public, and consequently politicians perceive as of "greatest concern."

I have not done a systematic review of all the research papers published on the development of delinquency, antisocial behaviour and conduct disorder, but I will venture to guess that less than 10% are specifically focused on the origins and development of *physical aggression* during childhood and adolescence. Furthermore, I am quite certain that the bulk of our knowledge on physical aggression is from arrests or convictions of individuals who are of a legal age to be arrested or convicted, and hence are adolescents and adults.

Since Quetelet (1833) published the first age-crime curves based on court statistics from early 19th century France, the dominant paradigm has been that physical aggression increases dramatically in frequency during adolescence to reach a peak during early adulthood; this peak is followed by a systematic decrease up to old age. The longitudinal data (criminal records) published recently by Sampson and Laub (2003) on a sample of juvenile delinquents followed for more than 50 years essentially replicate Quetelet's 1833 age-crime curves. The World Health Organization (2002), and the Surgeon General (2001), based their prevention of violence report on the same conclusion: "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 behaviours during their childhood."(WHO, p. 31).

The key semantic problem with that phrase is the expression "become violent." The rest of the phrase is clearly meant to underscore the fact that the "majority" of adolescents who "become violent" were, as children, no different than the majority of children concerning physical aggression or related behaviour problems. As I argue below, this statement is false, but only if we agree on the operational definition of "violent" during adolescence, which is not made explicit in the phrase. One interpretation of the phrase is that you are considered to have "become violent" during adolescence if you physically aggress someone at least once. At the other extreme the phrase could mean that you are using physical aggression frequently throughout adolescence.

Note that I refer here to the frequency of physical aggression rather than to the consequences of physical aggression. I have discussed the reason for this choice elsewhere (Tremblay, 2000). It is obvious that physical aggression during adolescence are more likely to lead to worse consequences for the victims than physical aggression before adolescence. Physical growth during adolescence increases muscle power and brain power. The most forceful punch by a 17 year old will most likely do more damage than the most forceful punch by the same individual 11 years earlier. Would we conclude that the 17 year old Max "*became* violent" during adolescence if he physically aggressed only once? What about if that single aggression killed his victim?

From the evidence we have it is very rare that an individual who uses physical aggression at the same frequency as the majority of other adolescents of his age will end up killing someone. The Pittsburgh Youth Study is one of the

rare longitudinal studies that prospectively followed youth that would eventually commit homicides. Loeber, Lacourse and Homish (2005) reported that males from the Pittsburgh Youth Study with court-reported homicide and violent index offences (forcible rape, robbery, or aggravated assault) were more likely to have a history of reported serious delinquent or violent activities during their adolescent years.

If there are *adolescent-limited violent* individuals, the term should refer to adolescents who use physical aggression more frequently than the majority of adolescents; and, logically, there could be two types: a) those who never used physical aggression before adolescence, i.e. they *become* violent during adolescence, b) those who used physical aggression before adolescence, but at the same frequency as the majority of children, i.e. they *increased their relative frequency* of violence during adolescence. If these two categories of adolescent-limited violent individuals exist, it is important to distinguish them, especially for preventive purposes. There should be important differences in the causes of frequent physical aggression between those who *become* physically aggressive during adolescence (adolescent onset physical aggression), and those who *increased their relative frequency* of physical aggression during adolescence (physical aggression onset before adolescence).

Although the Surgeon General and the World Health Organization appear to conclude that there are very few violent adolescents who were physically aggressive more frequently than the majority of children before adolescence, I describe below evidence that the large majority of violent adolescents were *violent during childhood and adolescence*. The Pittsburgh Youth Study is a good place to start for that evidence. One of the important results from that study can be observed in Fig. 1. First, observe that 38% of this sample of adolescent males living in Pittsburgh during the 1990s drug war essentially never reported any violent behaviour. Second, 48% were on an accentuated declining trend of violent behaviour from 13 to 25 years of age; this means that they were at their peak in frequency of violent behaviour at 13 years of age, thus no increase during adolescence. Third, the 14% who increased their frequency of violence during adolescence were already those who were using violent behaviour most frequently at the beginning of adolescence (age 13). Hence, although some individuals increase the frequency of violent behaviour during adolescence, it is wrong to say that humans "become violent" during adolescence, if it implies that they were not using violent behaviour at the beginning of adolescence. In fact, research does show that they were using physical aggression before the start of adolescence.

The development of physical aggression before adolescence

Interestingly, the traditional age-crime curve gives the impression that physical aggression appears with the legal age for criminal responsibility as if lawmakers had chosen the age for criminal responsibility after detailed studies of child development. Those who decided to study elementary school children to understand the precursors of adolescent delinquency discovered that elementary school children use physical aggression long before they reach adolescence.

One of the rare longitudinal studies of physical aggression which started before adolescence is the Carolina Longitudinal Study. A total of 220 boys and girls from North Carolina were followed from 4th to 12th grade. Cairns and Cairns (1994) obtained assessments of physical aggression from the students and their teachers. Analyses of these data painted an unexpected picture. The information from teachers as well as from students showed a clear mean

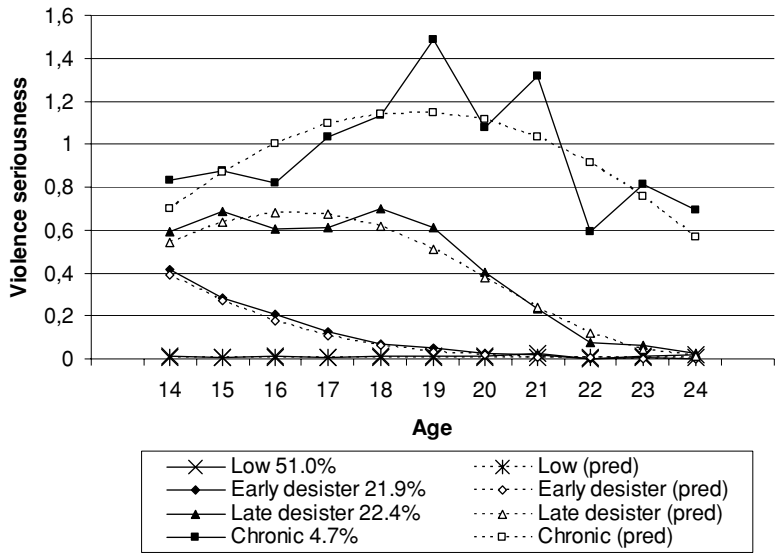

Fig. 1 Trajectories of violence between ages 14 and 24 (Loeber, Lacourse, & Homish, 2005)

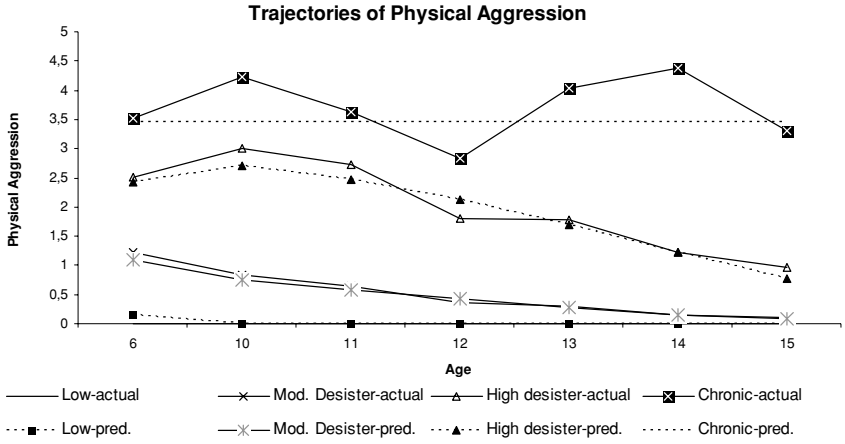

Fig. 2 Trajectories of physical aggression (Nagin & Tremblay, 1999)

decrease in the frequency of physical aggression from 10 to 18 years of age; this was true for males as well as for females (Cairns, Cairns, Neckerman, Ferguson, & Gariépy, 1989).

This finding was replicated with large samples from Canada (Broidy et al., 2003; Nagin & Tremblay, 1999), New-Zealand (Broidy et al., 2003), and the United States (Broidy et al., 2003; Loeber & Stouthamer-Loeber, 1998). Figure 2 (Nagin & Tremblay, 1999) shows that the large majority of a sample ($N = 1037$) of boys from the poorest inner city areas of Canada were substantially reducing the frequency of their physical aggression from 6 to 15 years of age. Only a very small group of boys (4%) did not show the declining trend; these were the boys who had the highest level of physical aggression in kindergarten and remained at the highest level until adolescence. When interviewed at age 15 and 17, they were the boys who reported the highest frequency of serious physical aggression; they were also the ones most frequently found guilty of infractions before 18 years of age. Thus, the age-crime curve increase in physical aggression during adolescence is produced by the fact that, during this period, the police and judicial system start arresting and convicting individuals who were using physical aggression against others at least since kindergarten.

Figure 2 clearly shows that all the boys tended to be at their peak level in frequency of physical aggression at 6 years of age, when they were at the end of their kindergarten year. If this is the case, when do they start to use physical aggression? To answer this question we need longitudinal data of children's physical aggression before they enter school. Recent data from large birth cohorts show that most children substantially increase the frequency of physical aggression from 9 to 48 months (Tremblay, 2004; Tremblay et al., 2004), and then substantially decrease frequency of use until adolescence (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; NICHD Network ECCR, 2004). Figure 3 shows the different developmental trajectories of physical aggression from 2 to 9 years of age for a sample of 1,195 children drawn from 10 locations in the United States (Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC;

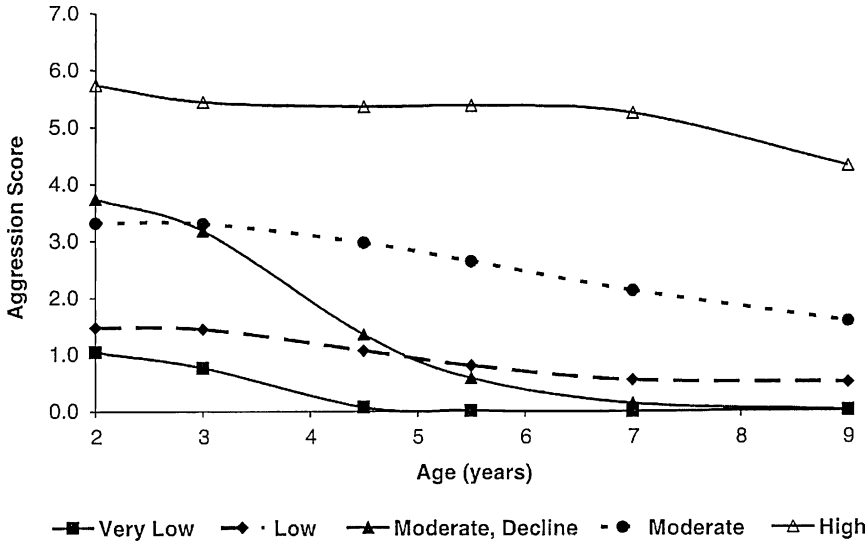

Fig. 3 Observed trajectories of mother-rated aggression(NICHD, & Network, E. C. C. R. 2004)

Seattle, WA; Madisson, WI). We clearly see that the frequency of physical aggression among children decreases substantially from the preschool years to pre-adolescence. An observational study of filmed social interactions among children in day care gives a good idea of the frequency of physical aggression among young children (Restoin et al., 1985): one in four social interactions among 24 month old was a physical aggression.

I believe we can draw at least eight strong conclusions from the available longitudinal data on the development of physical aggression from birth to adulthood:

1. Most humans have used physical aggression.
2. The onset of physical aggression use generally occurs before 24 months of age.
3. There is a steady decline in the frequency of physical aggression use from the preschool years to old age.
4. If humans learn to use physical aggression, the learning generally occurs during the first 24 months after birth.
5. Most humans learn alternatives to physical aggression before school entry.
6. A small proportion (approximately 3 to 5%) of humans maintain high levels of physical aggression use from the preschool years to adolescence.
7. The adolescents who most often use physical aggression tend to be among those who used physical aggression most often before adolescence.
8. Successful prevention of physical aggression by adolescents may be most cost-effective when targeting high risk preschool children.

Prevention of youth violence

In this last section I elaborate on my 8th conclusion. The NIH (2004) report deplored that prevention programs did not integrate the available developmental knowledge. The best proof is that in most industrialized countries the majority of violence prevention efforts are most likely targeting adolescents and pre-adolescents. The idea, which is still omnipresent in the NIH (2004) report, the Surgeon General (2001) report, the WHO (2002) report, and other official publications (e.g. Anderson et al., 2003; US Human Capital Initiative, 1997), is that if we catch adolescents before they "become violent" during adolescence we will be successful in preventing them from becoming violent.

In its chapter on effective interventions the NIH (2004) report cites two programs that met all the effectiveness criteria of the Blueprints for Violence Prevention prepared by the Center for the Study and Prevention of Violence (Mihalic, Irwin, Elliott, Fagan, & Hansen, 2001.) at the University of Colorado. The two programs are clearly meant for adolescents with severe behaviour problems, hence not for prevention of "becoming violent." The report also cites six Blueprints programs considered "effective with reservations." Only one of the six programs targets preschool children (Olds et al., 1998). Of the other five, one targets adolescents with severe behaviour problems, one is a universal drug use prevention program for adolescents, two target school children of all ages who have a large variety of minor problems, while the last program is a universal intervention for elementary school children. The committee did not have much choice because most prevention experiments target school children, most do not measure outcomes for more than one year after treatment, most do not report physical aggression as a specific outcome, and those who used long term trajectories of physical aggression as an outcome can be counted on a few fingers (see Farrington & Welsh, 2003; Löesel & Beelmann, 2003; Lipsey & Derzon, 2003; Woolfenden, Williams, & Peat, 2002).

Based on the developmental data summarized above it seems reasonable to conclude that prevention programs for aggressive elementary or high school children are, in fact, corrective interventions. Since children were using physical aggression during the preschool years, it does not make sense for interventions with school-age children to aim at "preventing" children "from learning to use physical aggression." At best, the interventions are attempts to help learn alternatives to physical aggression for children who did not learn when they should have, i.e. during the preschool years.

An analogy may be helpful here. Let's imagine kindergarten children who come to school walking on all fours because they did not learn to walk up right. An intervention to help them learn to walk up right would not be considered a preventive intervention. We would consider this a corrective (remedial) educational intervention. The analogy applies to children who have speech or learning problems. These children all have developmental problems. The term "prevention" in such cases makes sense only with reference to the consequences of their deficits. But this is true of heart surgery or hip replacement. Why not invest in preventing these problems rather than trying to correct them once they become dangerous for the community (Carneiro & Heckman, 2003; Lynch, 2004; Tremblay, 2003)?

Indeed, if we want to be semantically correct, we should not use the term prevention even for "onset" of physical aggression. I can see no reason to preventing young children from using physical aggression. Use of physical aggression appears to be a developmentally appropriate behaviour during early childhood. What children need to learn is to regulate that behaviour and use alternatives when appropriate. There is increasing evidence that play-fighting is important for normal development (Peterson & Flanders, 2005). Learning to re-conciliate after aggressive interactions may also be important for the development of social skills (de Waal, 2000).

To my knowledge, there is as yet no research on the effects of preschool education programs that would help children at risk of chronic physical aggression to learn alternatives to physical aggression. The early childhood prevention programs tend to focus on cognitive development or on general social-emotional development. Some have shown long term impact on antisocial behaviour, but most, if not all of these experiments, have not assessed or reported on the development of physical aggression. Also, to my knowledge, none have shown a reduction of physical violence during adolescence. This may be because of very small sample sizes, but it is also due to the fact that physical aggression was not an important developmental issue during early childhood, hence it was generally not assessed.

Finally, research on regulation of physical aggression and fostering socially acceptable alternatives during early childhood needs to include genetic and brain research. Recent work indicates important genetic contributions to individual differences in frequency of physical aggression as early as 18 months of age (Dionne, Tremblay, Boivin, Laplante, & Pérusse, 2003), as well as gene-environment interactions leading to violent behaviour during adolescence and adulthood (Caspi et al., 2002). Epigenetic studies with animals are showing that the quality of the prenatal and postnatal environments have strong influences on gene expression leading to brain development (ex. Weaver et al., 2004). We probably pay a tremendously expensive price for not fostering the quality of early brain development in high risk children, knowing: a) that quality of this crucial organ's development insures the quality of behaviour regulation and, b) that chronically violent youth and adults show important cognitive dysfunctions (ex. Paus, 2005; Raine et al., 2005; Raine et al., 2004; Séguin, Nagin, Assaad, & Tremblay, 2004).

Conclusion

We need to take a second look at how we traditionally think about the development of youth violence and, consequently, how we attempt to prevent children and adolescents from "becoming" violent. This reframing needs to be made with reference to the natural development of physical aggression. If physical aggression is part of normal early childhood development, it would probably be wrong to prevent its "onset." All children may need to realize that physical aggression is part of their behavioural repertoire. Playful fighting with caring adults and peers, fiction which includes violent behaviour, and adult's clear rule setting appear to be the traditional means by which most children learn to regulate physical aggression. Simultaneously, children need to learn that, in our cultures, there are more socially effective ways of solving problems than physical aggression. Thus, we probably need to experiment with at least four types of programs for children and adolescents:

i. Universal and selective interventions during pregnancy and early childhood which attempt to foster the normal development of aggressive behaviours.
ii. Indicated programs for infants and toddlers who appear to be on a chronic trajectory of physical aggression. These children need intensive interventions to help them learn alternatives to physical aggression at a time when it is developmentally appropriate.
iii. Indicated programs for elementary and high school children. These probably need to be conceived as remedial programs for children with developmental delays. The older the youth, the worst will be the developmental delays.
iv. Finally, we need to take into account that all humans have used physical aggression and will do so again if they perceived no better alternatives. From this perspective we need to experiment with situational prevention programs that reduce the probability that any member of a social group will resort to physical aggression. These programs should be experimented in all environments: the family, the day care, the classroom, the school, the neighbourhood, the work place, and international relations.

Because intellectual and economic resources are limited, we know that we will not be able to invest equally into these four types of programs. We also know that public and political pressure will try to force us to invest more into those who, at this moment, are most likely to seriously hurt the man or woman on the street. But, we also know that this is the strategy we have always used, and that we are very far from having solved the problem. So why not stop beating around the bush, and take Aristotle seriously?

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