

## Impact and clinical significance of a preventive intervention for disruptive boys

15-year follow-up

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**Background** Many intervention programmes have attempted to reduce disruptive behaviour problems during early childhood to prevent maladjustment during adolescence and adulthood.

**Aims** To assess the long-term impact and clinical significance of a 2-year multicomponent preventive intervention on criminal behaviour and academic achievement, using intention-to-treat analyses.

**Method** Targeted disruptive–aggressive boys considered to be at risk of later criminality and low school achievement ( $n=250$ ), identified from a community sample ( $n=895$ ), were randomly allocated to an intervention or a control group. The rest of the sample ( $n=645$ ) served as the low-risk group. The intervention was multimodal and aimed at boys, parents and teachers. Official data measured both outcomes.

**Results** Significantly more boys in the intervention group (13%;  $P < 0.05$ ) completed high-school graduation and generally fewer (11%;  $P=0.06$ ) had a criminal record compared with those allocated to the control group.

**Conclusions** The results suggest that early preventive intervention for those at high risk of antisocial behaviour is likely to benefit both the individuals concerned and society.

**Declaration of interest** None.

Disruptive behaviour problems (aggressive, hyperactive and oppositional behaviours) during early childhood predict maladjustment (e.g. violence, criminality and school drop-out) during adolescence and adulthood (Farrington, 1992; Tremblay *et al*, 1992a; Moffitt, 1993; Patterson, 1996; Fergusson *et al*, 2002; Loeber *et al*, 2002; Vitaro *et al*, 2005). Intervention programmes have attempted to reduce disruptive behaviours to prevent such negative outcomes (e.g. Durlak & Wells, 1997; Farrington & Welsh, 2003). However, their long-term effects are rarely evaluated. Moreover, a significant long-term effect is not sufficient for claiming the efficacy of an intervention; its clinical significance has to be assessed by comparing its effects with a normative or low-risk group.

This study's main objective was to evaluate whether participation in a preventive intervention targeting early disruptiveness predicted a higher rate of high-school graduation and a lower rate of crime involvement compared with the control group, by age 24 years. The second objective was to verify whether the boys who received the intervention would resemble the boys in the low-risk group with regard to the outcomes, whereas the boys in the control group would not.

### METHOD

The global objective of the Montreal Longitudinal Experimental Study (Tremblay *et al*, 1992b) was to examine prospectively the development of a large sample of boys attending inner-city kindergartens who had backgrounds of low socio-economic status, with a particular focus on antisocial behaviour and school adjustment. Behaviour ratings of male pupils, mean age 6.1 years (s.d.=0.32), were obtained from 87% of the kindergarten teachers in 53 schools in areas of low socio-economic status in Montreal, Canada, at the end of the 1984

school year. A total of 1161 boys were rated. After exclusion of pupils who did not meet additional selection criteria – i.e. ethnicity (only boys with Canadian-born parents whose first language was French were included) and education (only boys whose parents had 14 years or less of schooling were included) – that number was reduced to 895. The purpose of these additional selection criteria was to create a homogeneous sample (through methodological control).

Boys were assessed by their kindergarten teacher by means of the Social Behavior Questionnaire (SBQ; Tremblay *et al*, 1991). This contains 38 items grouped into four components: disruptive (13 items), anxious (5 items), inattentive (4 items) and prosocial (10 items). The disruptiveness scale ( $\alpha=0.93$ ) includes three categories of behaviour (Loeber *et al*, 1989): aggression (3 items), oppositional behaviour (5 items) and hyperactivity (2 items), and was used to identify at-risk children. From the total sample, boys with a score above the 70th percentile ( $n=250$ ) on the disruptiveness scale were considered to be at risk of later antisocial behaviour and dropping out of school (White *et al*, 1990; Tremblay *et al*, 1992a). Although this cut-off point is somewhat arbitrary, it has been used successfully to predict serious maladjustment in this sample (Tremblay *et al*, 1994). These 250 boys were randomly assigned to one of three groups (prevention,  $n=69$ ; attention–control,  $n=123$ ; control,  $n=58$ ) by drawing the names from a box until the necessary numbers were obtained. Given that no difference was found between the two control groups on any outcome during adolescence or early adulthood (see below), they were combined into a single control group for later analyses (Fig. 1). The attention–control group was equivalent to a no-treatment sensitisation or contact control group; the control group was a no-treatment, no-contact control group.

Among these, 172 families (69%) agreed to participate in the intervention programme, but all the at-risk boys ( $n=250$ ) were kept in the longitudinal study and their data were included in the intention-to-treat analyses. Both the boys and their families participated in the intervention programme. The rest of the larger sample, representing participants who obtained scores below the 70th percentile ( $n=645$ ), were considered to be at lower risk and were kept in the study to test the clinical significance of the prevention programme.

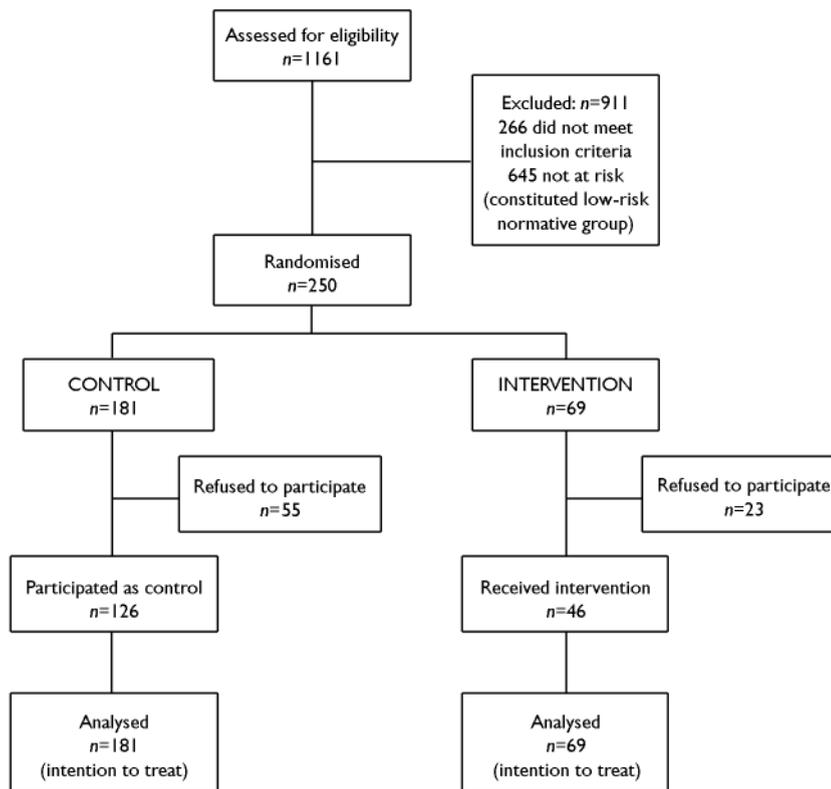


Fig. 1 Study profile.

### Preventive intervention programme

Three foci of the applied preventive intervention programme were based on a literature review addressing early intervention with aggressive children before 1984. The first theme identified was social skills training for the disruptive boys (Cartledge & Milburn, 1980; Kettlewell & Kausch, 1983; Michelson *et al*, 1983; Schneider & Bryne, 1987). Social skills training aimed at promoting changes in behaviour towards peers, yielding more social acceptance and less inclination towards antisocial peers. Training was offered at school in small groups of four to seven children, with a ratio of three prosocial children from the school to one disruptive child in each group. The second focus was that of parent training in effective child-rearing, based on the Oregon Social Learning Center Model (Patterson *et al*, 1975). The third domain was the provision of information and support for teachers concerning at-risk boys, which served as a complement to the parent training.

The intervention programme lasted 2 school years, from September 1985 to June 1987. Boys were 7 years old when the intervention started and 9 years old when it

ended. A detailed description of the treatment is presented elsewhere (Tremblay *et al*, 1992b).

### Implementation assessment

In order to evaluate programme exposure, the therapist responsible for each child-family-teacher unit indicated at the end of each planned training session whether or not the session had taken place and the percentage of content that had been delivered in the session with regard to the pre-planned, standardised content. Over 85% of the children who participated in the intervention attended at least two-thirds of the social skills training sessions. The maximum number of sessions given to the parents was 46, with the mean number of sessions for the duration of the programme being 17.4, including parents who discontinued their participation in the programme. Parents were given as many sessions as needed to master the skills, following the adaptive preventive intervention approach proposed by Collins *et al* (2004). However, 75% of the parents covered at least two-thirds of the content and objectives of the planned training programme. Teachers demonstrated low interest and

limited availability; they were generally not able to spend much time discussing teaching strategies for one child. Therefore, meetings with teachers were fewer than planned (about 50% of teachers participated in at least one meeting). Work with the parents and teachers was carried out by full-time trained therapists: two university-trained childcare workers, one psychologist and one social worker. Social skills training sessions were taped and used for weekly feedback and to maintain the integrity of the programme across therapists.

### Control and outcome measures

#### Control variables assessed in kindergarten

Although no significant difference was found between the intervention group and the control group after random assignment, two control variables – parental occupational prestige and children's disruptiveness – were included in the analyses to completely level initial differences and reduce bias in estimating the impact of the intervention programme. Parental prestige was established using fathers' and mothers' occupational status at pre-test and used as an indicator of family background. It was calculated using the Canadian socio-economic status index of Blishen *et al* (1987). This variable is known to be linked to behaviour problems and delinquency and to high-school graduation (Huesmann *et al*, 1984). The children's disruptiveness variable used for selection and pre-test was also used as a control variable.

#### Outcome measures collected at age 24 years

A high-school diploma was selected as the measure of scholarly achievement. This variable was used instead of school dropout or non-age-appropriate regular classroom placement, previously used to assess school performance (Vitaro *et al*, 2001), because it represents a more definite measure; some boys who dropped out of high school returned to complete their education and received a diploma. The Ministry of Education of Quebec confirmed the award of a high-school diploma as of year 2003 for 879 persons in the original sample, including 242 of the original 250 participants in the prevention or control groups. This categorical variable provided information on whether or not the participants had obtained a high-school diploma by age 24 years. Overall, 427 of the 879 participants (48.6%) had done so.

Possession of a criminal record was selected as the measure of crime involvement. Criminal records were obtained from official files as of year 2003 for all of the 895 persons in the original sample, including the 250 participants in the prevention or control groups. This categorical variable provided information on whether or not the participant had a criminal record by age 24 years. Of the 895 participants, 178 (19.9%) had acquired a criminal record by age 24 years. Criminal offences were divided into five categories, as defined by the Ministry of Public Security of the Province of Quebec (prevalence for each category is shown in parentheses): crimes against persons, e.g. homicide (17.9%); property crimes, e.g. arson (31.2%); other Criminal Code offences, e.g. prostitution (25.5%); motor vehicle-related offences, e.g. impaired driving (8.8%); and drugs and narcotics-related offences, e.g. possession (16.4%).

## Analyses

Two sets of analyses were performed, after verifying that the data did not violate any of the assumptions of logistic regression. For the first set of logistic regressions, achieving a high-school diploma and presence of a criminal record were separately regressed on the experimental conditions (i.e. intervention *v.* control) while controlling for parental occupational status and disruptiveness. For the second set of logistic regressions, the same outcomes were regressed on group membership (i.e. intervention and control groups, plus the low-risk group) while controlling for parental occupational status. In order to test the effectiveness of the programme, all participants in the intervention sample were included in the intention-to-treat analytic strategy, whether they received the intervention or not.

## RESULTS

### Differences between control and intervention groups

Frequencies of high-school graduation and criminal records are presented in Table 1.

#### High-school graduation

After controlling for parental occupational status and initial level of children's disruptiveness, we found that being in the intervention group was associated with a higher rate of high-school graduation than being in the control group ( $\beta=0.78$ ,  $OR=2.19$ ,  $Wald \chi^2=6.06$ ;  $P<0.05$ ).

**Table 1** Frequencies of official record measures at age 24 years for the three study groups

|                                     | Control group<br>n (%) | Intervention group<br>n (%) | Normative group<br>n (%) |
|-------------------------------------|------------------------|-----------------------------|--------------------------|
| High-school graduation <sup>1</sup> | 56 (32.2)              | 31 (45.6)                   | 340 (53.4)               |
| Criminal record <sup>2</sup>        | 59 (32.6)              | 15 (21.7)                   | 104 (16.1)               |

1. Includes all available data for the original sample ( $n=879$ ).  
2. Includes all available data for the original sample ( $n=895$ ).

#### Criminal record

Being in the intervention group was marginally associated with a lower rate of criminal record than being in the control group ( $\beta=-0.65$ ,  $OR=0.52$ ,  $Wald \chi^2=3.68$ ;  $P=0.06$ ).

### Differences between experimental groups and the low-risk group

#### High-school graduation

After controlling for parental occupational status, being in the intervention group compared with being in the low-risk group predicted a similar rate of high-school graduation ( $\beta=-0.19$ ,  $OR=0.83$ ,  $Wald \chi^2=0.52$ ; NS), but being in the control group compared with being in the low-risk group predicted a lower rate of high-school graduation ( $\beta=-0.84$ ,  $OR=0.43$ ,  $Wald \chi^2=20.77$ ;  $P<0.0001$ ).

#### Criminal record

Being in the intervention group compared with being in the low-risk group predicted a similar rate of criminal record ( $\beta=0.30$ ;  $OR=1.35$ ,  $Wald \chi^2=0.92$ ; NS), whereas being in the control group compared with being in the low-risk group predicted a higher rate of criminal record ( $\beta=0.89$ ,  $OR=2.45$ ,  $Wald \chi^2=21.69$ ;  $P<0.0001$ ).

## DISCUSSION

The first goal of our study was to use intention-to-treat analyses to assess the long-term impact of a multicomponent preventive intervention programme targeting disruptive boys from homes with low socio-economic status; these boys were considered at high risk of low academic achievement and chronic antisocial behaviour. The impact of the programme was evaluated by contrasting disruptive boys who participated in the preventive programme and their counterparts in a control group on two outcomes: high-school graduation by age 24 years and official criminal records. The second goal was to

compare the intervention group and the control group with the rest of the boys in the low socio-economic status group who initially scored below the 70th percentile on disruptiveness (i.e. the low-risk group).

### Impact and social significance of the programme

As predicted, a positive effect of the intervention programme was found for high-school graduation. The likelihood of having a high-school diploma was more than twice as high for the intervention group as for the control group. These results support earlier findings during adolescence on school drop-out (Vitaro *et al.*, 1999). Although marginal, a positive effect of the intervention was also found for possession of a criminal record: the likelihood of having a criminal record was almost twice as high for the control group as for the intervention group.

Comparing the experimental groups with a low-risk group on high-school graduation allows evaluation of the clinical significance of the intervention. In addition to the significant effect of the intervention on high-school graduation when compared with the control group, being in the intervention group predicted a rate of high-school graduation similar to that of the low-risk group. In the same way, the intervention group obtained a similar rate of criminal record as the low-risk group, whereas the risk of having a criminal record in the control group was more than double that for the low-risk group. These results confirm the relevance of reducing early disruptiveness to prevent later adjustment problems, and highlights the predictive power of early disruptiveness in an experimental clinical context.

Considering that, in adolescence, a significantly greater percentage of boys in the prevention group remained in an age-appropriate regular classroom compared with controls (Vitaro *et al.*, 1999), and that the level of delinquency was higher for the control group compared with the intervention

group (Lacourse *et al*, 2002), these results are not surprising. However, although encouraging, these findings should be considered in light of the fact that the rate of high-school graduation for the intervention group was only 46%, and the rate of having a criminal record was as high as 22%. In comparison, the rate of high-school graduation in the low-risk group was also low (68%) and the rate for criminal record was also high (16%), bringing the rates for the whole sample to 49% for high-school graduation and 19% for possessing a criminal record. In consequence, although boys in the intervention group became similar to their low-risk peers with respect to high-school graduation and criminal activities, the burden of other risk factors (i.e. low socio-economic status, inner-city residence) took its toll on the whole sample. It is thus important to acknowledge that a preventive intervention programme, albeit intensive, multimodal and long-term, has only a limited protective effect under the conditions of chronic socio-familial adversity and environmental risk.

### Limitations

A number of limitations have to be considered. First, this study used only one measure of antisocial behaviour. Official records used in this study can be considered as a good indicator of antisocial behaviour, but their interpretation is limited since they provide no direct information on observable behaviours. On the other hand, the use of this measure resulted in low attrition. It is also convenient for cost-effectiveness and clinical significance analyses. Second, the sample was restricted to French-speaking male participants of low socio-economic status. Generalisability is therefore limited. A similar intervention with a mixed sample from a middle-class environment could generate different results and yield different conclusions. Finally, potential moderators and mediators still have to be explored.

### Implications of the study

Despite these limitations, our study contributes to the critical need for long-term follow-up investigations by giving a valuable and rare picture of the long-term effects of an early preventive programme. This research also allowed the clinical significance of the programme to be tested by comparing the intervention and the control groups with a group of peers from

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the same high-risk environment. Given the cost to society of criminality and failure to graduate from high school (Kerckhoff & Bell, 1998), this study also stresses the cost-effectiveness of preventive intervention even if no formal examination of cost-effectiveness was performed.

Taking into account these results, some considerations can be put forward. As suggested by Tremblay *et al* (1996), a longer intervention or a booster programme covering the transition to high school and into adulthood might have resulted in more robust effects during adulthood. In other words, the duration of the intervention (2 years) may not be sufficient or optimal, particularly when the external conditions are unfavourable. Several authors (Reid, 1993; Lochman & Wells, 1996) have suggested that an intervention should last for at least the whole elementary schooling period. As for the number of components, most experts agree on the importance of targeting different systems in children's life, such as parents, teachers and the children themselves, as in the present study. However, additional systems such as peer groups should be targeted in future studies, in order to modify the additional important sources of influence that affect the development of antisocial behaviour (Coie & Jacobs, 1993; Greenberg *et al*, 2001; Boivin *et al*, 2005). Improving external conditions would also represent a good course of action for improving the impact of a child, family and school-centred preventive intervention.

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