

Persistence of conduct disorders and their relation to early initiation of smoking and alcohol drinking in a prospective ELSPAC Study

Research Article

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Abstract: The important risk factors of early initiation of smoking and alcohol drinking are: prosmoking family and peers, conduct disorders and delinquency, poor academic performance. The data obtained by physicians, teachers and children were collected at the age of 11 years. Children were divided into group A (without symptoms), Group B (with one or more symptoms). For statistic analysis, the programme EPI INFO was used. During the period between 7 and 11 years, new children with problematic behaviour (178=3.9%) were diagnosed in Group A, while substantial decreasing of children previously included in Group B was seen (by 59.1%). Together 7.05% of 11 years old children visited specialists (psychologists) due to their conduct disorders: 6.8% from Group A and 12.3% from Group B. Children more often than their teachers reported the frequent occurrence of conduct disorder. About 20% of children smoked, and more than 40% had tasted alcohol. However, the differences between Groups A and B were not significant. Our prospective study has demonstrated the possibility of misinterpretation of behavioural outputs. Children with previous behavioural problems had not a higher risk for early smoking and alcohol use.

Keywords: Younger school age • Behavioural problems • Changes in prevalence • Early smoking and alcohol drinking initiation

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The work described has not been published before, and the publication has been approved by all co-workers.

1. Introduction

Many studies have tried to identify the risk factors of children's and adolescents' smoking habits. According to three theoretical hypotheses (social learning theory, problem behaviour theory, social bonding theory), three important risk factors might play a role in the development of smoking behaviour: pro-smoking family and peers, conduct disorders and delinquent behaviour, and poor academic performance [1].

Some longitudinal studies focused on children with conduct problems, delinquency, and/or attention- deficit/ hyperactivity disorder (ADHD) have consistently described the correlations between behavioural problems and early substance (tobacco, alcohol, marijuana) use in childhood and adolescence [2-9]. Early use of legal drugs increases the risk both of developing addiction [10] and of abuse of illicit substances [11]. In terms of relationship between ADHD and drug use, some research studies suggested that the risk may be mediated by conduct disorders and by the influence of deviant peer groups rather than by ADHD [12]. Nevertheless, the newest meta-analysis of 13 studies has confirmed the significant correlations between childhood ADHD and

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alcohol use (OR 1.35; 95% CI 1.11-1.64), and smoking habits (OR 2.36; 95% CI 1.71-3.27), even when controlling for other confounding factors [13]. Another new study suggested that genotypes associated with monoamine neurotransmission interact with ADHD symptoms and influence the initial (pleasant / unpleasant) reactions to cigarette smoking [14].

Studies were specifically focused on the relationship between aggression and cigarette smoking. Two subtypes of aggression are differentiated: proactive and reactive. Whole proactively aggressive are typically accepted by peers, and such behaviour is associated with delinquency and psychopathy in adulthood, reactively aggressive children are rejected by all peers and thus perceived as a protection against delinquency [15]. It has been repeatedly demonstrated that aggression is also highly associated with adolescent cigarette smoking and/or other substance use [8,16,17]. Both of those two subtypes influence smoking through different mechanisms [15]. Aggression was also correlated with increased risk of earlier initiation of substance use; however relations between proactive and reactive aggression and initiation were different for alcohol, marijuana and tobacco [15].

This paper describes the trends of conduct disorder occurrence and other manifestations of behavioural divergence found during the investigations of children followed in the prospective European Longitudinal Study of Pregnancy and Childhood (ELSPAC). The cohorts of children and their parents from the city of Brno and Znojmo District are studied within a period from the children's 18th week of prenatal life to 18 years of age.

2. Methods

The data obtained by participating physicians-pediatricians, teachers and children – was collected when children reached the age of 11 years. The data was analysed for two groups of children, divided according to the previous physicians' diagnosis of conduct disorders at the age of 7 years. Group A comprised of children without serious symptoms of conduct disorders. In Group B there were children with one or more symptoms of conduct disorders, such as stubborn, negativistic behaviour, inability to pay attention, aggressiveness, and inadequacy of reactions.

Three sets of hypotheses were tested: (1) whether the conduct disorders are stable or mutable over the time; (2) whether there are similar evaluations of behavioural problems made by teachers and by children's self-estimation; (3) whether the behavioural problems

will be associated with the early initiation of smoking, alcohol drinking and other substance use.

For statistical evaluation of differences, the programme EPI INFO, version 6.4a (Mantel Haenszel, Yates corrected and Fischer tests) was used.

3. Results

At age of 7 years, 6100 children in total were assessed by physicians using recommended unified methods included in a specific questionnaire. Among them, 275 children (4.5%) were diagnosed with one or more symptoms of conduct disorders, while 5825 children (95.5%) had no such problems.

At age of 11 years, 4777 children from the cohort were assessed by physicians (78.3% of those from the previous observation), and analysed for the first hypothesis. The numbers of missing children were similar both in the group without conduct problems (Group A, 4574 = 78.5%) and in the group with behavioral problems (Group B, 203 = 73.8%); the differences in the rate of persons in Groups A/B were not significant.

During the period between 7 and 11 years of age, using the same diagnostic criteria, physicians found differences in the prevalence of symptoms signaling behavioural problems. There were new children diagnosed with problematic behaviour (178 = 3.9%) in Group A (children who had no problems at age 7 years), namely the lack of attention. This was also the most prevalent symptom in Group B. Although the number of children with the diagnosis of the problematic behaviour according to the four criteria has substantially decreased in Group B (by 59.1%, from 203 to 83), the prevalence of persons in the whole sample (A+B) has slightly increased (from 4.2 % to 5.5%) (Table 1).

Table 1. The trends in the prevalence of symptoms of behavioural problems diagnosed by physicians among 11 year-old children (% in group A of children without diagnosed symptoms and in group B of children with diagnosed symptoms in previous examination at age 7)

Symptoms	Group A	Group B	Total
No. of children observed at both ages 7 and 11	4574	203	4777
No. of children with problems at age 7 years	0	203	203=4.2%
No. of children with problems at age 11 years	178=3.9 %	83=40.9 %	261=5.5%
stubborn, negativistic behaviour	0.4	7.2	
inability to pay attention	20.2	29.0	
aggressivity	0.7	5.4	
inadequacy of reactions	1.0	14.1	

In the whole sample, 337 of 11-year-old children (7.05%), more than assessed by physicians, visited specialists (psychologists, psychiatrists) because of their conduct disorders: 6.8% from Group A and 12.3% from Group B. The symptoms of hyperactivity and attention deficit disorder were significantly more often diagnosed in Group B. Also other behavioral symptoms occurred more often among the children who had problems at 7 years of age, but differences in comparison with Group A were not significant, as well as the frequency of those who were in permanent treatment by psychologists (Table 2).

Questions concerning particular behavioral problems were described using the same questionnaire for teachers and children. In all cases, children more often than their teachers reported frequent occurrence of symptoms with one exception (fighting with others). The differences between teachers' assessment of children's behaviour and children's self-assessment were significant especially for Group A (Table 3).

The self-reported data pertaining to smoking, alcohol drinking and using other drugs were collected in the sample of those 11-year-old children from Brno

and Znojmo who filled out the questionnaire and were observed by physicians repeatedly both at age 7 and 11 years (No 2323, representing 48.6% of the whole sample observed by physicians). The prevalence of children with symptoms in the group with available data about their experiences with drugs was slightly less than in the whole sample observed by physicians (3.2% and 5.5% resp.), the differences were not significant.

More than 20% of children reported smoking (more than 4% had smoked repeatedly), and more than 40% of them had tasted alcohol (almost 20% repeatedly). About 1% of children had experimented with other psychoactive substances (marijuana, psychoactive fungi, inhaling volatile compounds). Although more children in the group with conduct disorder (B) reported experimentation with legal and other drugs, the differences were not significant in comparison with the group of children without conduct disorder (A) (Table 4)

4. Discussion

A critical view about the subjective nature of the diagnosis of conduct disorders and /or ADHD was published by B.Kean [18](2005). He specifically pointed out that the diagnosis of ADHD was almost unique to the United States at the end of the last century, while in the rest of the world hyperactivity was perceived as a rare condition often associated with some level of intellectual disability and/or conduct disorders. Absence of credible markers of brain malfunction, biochemical imbalance or neurological disturbance increased the chance that any child in conflicts with parents or school can be diagnosed within a few minutes with ADHD by medical practitioners listening to parental grievances. Under such conditions, the diagnosis of ADHD had moved rapidly towards global acceptance during the last decade of the 20th century.

During several decades of research, three changes in formal diagnostic criteria of ADHD with an aim to

Table 2. Children who were treated in special clinics for conduct disorders (% from the whole groups)

	Whole sample	Group A	Group B	p<
No of children	4777	4574	203	
No. treated	337 = 7.05%	312 = 6.8%	25 = 12.3%	
Hyperactivity	53 = 1.1%	0.9	5.9	.001
Attention deficit	100 = 2.1%	1.9	6.4	.01
Behavioral problems	20 = 0.4%	0.4	1.5	ns
Other conduct disorders	72 = 1.5%	1.4	4.4	ns (0.06)
Cure in psychological office	266 = 5.6%	5.4	9.9	ns

Table 3. Similarities and differences between frequencies of behavioural problems reported by teachers (T) and children (Ch) (%)

Symptoms	whole sample			Group A			Group B		
	T	Ch	p<	T	Ch	p<	T	Ch	p<
No. of data obtained from teachers(T) and children (Ch)	4757	4770		4560	4569		197	201	
Poor concentration	33.7	41.2	.001	32.8	40.7	.001	57.9	55.9	ns
Restlessness	23.6	41.9	.001	23.2	41.3	.001	37.9	60.0	.01
Fights with others	12.9	10.6	.05	12.6	10.5	.05	22.8	12.3	ns
Angry outbursts	9.2	26.3	.001	9.0	26.2	.001	13.8	29.3	.05
Telling lies	6.6	10.5	.001	6.5	10.5	.001	11.1	12.3	ns
Pilferages	2.4	3.6	.05	2.3	3.6	.05	1.6	5.5	ns

Table 4. Self-reported smoking, alcohol drinking and other psychoactive substances using (% of children from Brno and Znojmo repeatedly observed by physicians both at age 7 and 11)

Group	A	B	Total
Total sample	4574	203	4777
Missing data	2325	129	2454
No of children:	2249 = 96.8 %	74 = 3.2 %	2323
Smoked repeatedly	4.3	6.8	4.4
Smoked once	16.1	16.2	16.1
Did not smoke	79.7	77.0	79.6
Alcohol repeatedly	18.9	20.3	18.9
Alcohol once	21.4	29.7	21.7
Did not drink alcohol	59.7	50.0	59.4
Substance used repeatedly	0.4	1.4	0.4
Substance once	0.5	1.4	0.6
No substance used	99.1	97.2	99.0

Notice: "Missing data": children who filled the questionnaire, but did not answer the questions about smoking, alcohol a drugs use: 50.8 % from group A, 57.4 % from group B

improve the objective markers of the disorder were made [13]. In the ELSPAC study starting at 1991, the diagnostic criteria included characteristic symptoms, but neither the period of manifestation, nor similar occurrences in two different environments. The traditional approach based solely on the subjective reports of mothers was used.

Our study has confirmed the possibility of misinterpretation of behavioural outputs for some children. The higher number of children with problematic behaviour diagnosed at age 7 years occurred at the same time as when their school duties started. Adjustment to a new environment may have provoked maladaptation, unhappiness, dissatisfaction, and frustration with their parents. Almost 60% of the children with behavioural problems at a younger age have lost their stigmatizing label during the following 4 years (from 7 to 11). In the rest of the sample with a persistent diagnosis of conduct disorders (83 children), only one third (30.1%) needed the treatment in special clinics. On the other hand, in Group A, children with no behavioural problems at the age of 7, new cases signaling the behavioral problems were observed during their younger school age; some of them also required special treatment. The number of children visiting specialists was higher than the number of those who were diagnosed as problematic by their physicians (337 vs. 261). The need for special psychological treatment could have been initiated by teachers

and/or by parents, without previous consultations with physicians. We can only speculate about these discrepancies: the school environment can start children's non-adequate behavior obstructing others' attention and performance, and can help with the discovery of their poor socialization. This may be why teachers and or/parents have a reason to request treatment of the child in psychological clinics.

The comparison of data concerning behavioural problems obtained from the questions answered independently by teachers and children showed, that children were able to assess their behaviour with an almost "objective, bird's-eye view". With only one exception, children were more critical in their self-assessment than teachers, namely in Group A. It may be that during the limited time – less than one third of a day – which children and teachers spend together, many children are able to cope with their abnormal reactions, while their problem activity increases outside of the school environment. Maybe a majority of children from Group A could obey the school rules more often than children from Group B, where the correspondence between teachers' and children's answers was higher. A critical view about the subjective nature of the diagnosis of conduct disorders and/or ADHD was published at 2005 by B.Kean.

Children with conduct disorders and other behavioural abnormalities represent serious social and health problems. Many publications are concerned with studying the causal factors of conduct disorders. The results of available empirical research show that different types of conduct disorders are strongly determined by genetic factors, which attribute at least to 50 percent of the variance [19]. It is obvious that there is a great interest to identify especially environmental risk factors that can be preventable, such as parental behaviour, antisocial peer groups, and differential stochastic experiences [20]. Another research examined the associations between prenatal and postnatal exposure to smoking and behavioural problems in childhood, delinquency in adolescence, crime in adulthood [17,21-27]. In terms of impacts of smoking, namely of nicotine, on the changes in fetal and infant brain and neurotransmitter systems, the potential biological mechanisms have been described [27]. Smokers, more than other people, are also exposed to polycyclic aromatic hydrocarbons, found to be among the risk factors negatively affecting prenatally-exposed children's behaviour at the age of 5 and 7 years [28]. However, some other scientists proposed the hypothesis that these associations are not causal, as both maternal smoking and the characteristics given by genetic propensity for antisocial phenotypes are correlated [29].

The ELSPAC study did not have the methodological possibilities of studying the genetic – environmental interactions. Nevertheless, it contributes to the evidence supporting the idea that some factors can negatively affect the fetal development. Firstly, the presence of an unfavourable family environment occurred significantly more often in the group of children with conduct disorders diagnosed at their age 7: higher frequency of less educated mothers, parents with psychological problems in childhood and adulthood, and more fathers having conflicts with law. In this group, more mothers smoked during the whole pregnancy, and the average birth weight and head circumference of children with behavioural problems were significantly lower compared to newborns who had not such problems at age 7 [31].

The associations between behavioural problems and psychoactive substance use were mentioned in the introduction. Some studies, which used the community samples, showed that conduct disorders were significant mediators both between ADHD, oppositional defiance disorders, and substance use [7,9,16,30,32]. Some authors described that delinquency is a stronger predictor of experimentation with smoking for boys [33], while others found no gender differences [34]. It seems that co-occurrence of delinquency and drug use decreases over time [35]. We can speculate that young people may grow out of their behavioural problems and then grow out of smoking because behaviours become more differentiated over time [1].

In terms of smoking prevention, there is a critical importance of delaying the onset of smoking. Once children start smoking, they are at increased risk of future problems such as poor health, but also vulnerability to alcohol abuse and/or illicit drug use, school difficulties and socially-based inequalities of life. According to another viewpoint, children who are identified with different behavioural problems and even with ADHD can be seen as at risk in terms of drug abuse, poor school performance and /or malignant personality disorder and delinquency in adulthood. Young children especially have less potential to express their reasons for their behavioural problems [18].

In our cohort, almost 20% of the children reported smoking: majority of them had the single smoking attempt, more than 4% smoked repeatedly; more than 40% of them tried drinking alcohol (almost 20% repeatedly). About 1% of the children reported experimenting with other drugs (marijuana, psychoactive fungi, inhaling volatile compounds). The number of legal drug users was much higher in comparison with Fite's et al. study [15], where the associations between different subtypes

of aggression and smoking initiation were examined among children at similar age (mean 10.4 years). Authors found <10% alcohol and cigarette lifetime users, and < 2% marijuana users.

Although we observed that the frequency of self-reported experimentation with legal and illegal drugs was higher in the group of eleven-year old children with previously diagnosed behavioural problems, the differences in comparison with the non-problematic group were not significant. We believe it was due to the surprisingly high number of self-reported experimentation. It could be assumed that some children did not admit their contact with drugs, as questionnaire was filled at home and sent by mail together with those filled by parents. As the society in the Czech Republic adopted very tolerable attitudes to smoking and alcohol, even to children's consumption of these legal drugs, we presume that such data were not underestimated. Finally, it must be mentioned that more than 50% of children did not answer these questions.

In the available references, the participants of A Four-Wave Longitudinal Study from California were examined at ages 13, 16, 18, and 23 years. The behavioural problems were not significantly associated with future smoking behaviour, but, on the contrary, smokers at the ages of 13 and 16 showed increase in the symptoms of conduct disorders, especially delinquent behaviour [1].

Our study did not fully confirm, in accordance with the literature, that children with behavioural problems are at higher risk of early smoking and alcohol use, and consequently more vulnerable to development of addictions and higher morbidity. We will analyse this relationship in further follow-up stages. Nevertheless, it is required to accept additional alternatives that could influence such children through parental, school-based and social-based interventions [36].

5. Conclusion

Our prospective study has confirmed the possibility of misinterpretation of behavioural outputs for some children: almost 60 % of children with behavioural problems at younger age have lost their stigmatizing label within four years (from 7 to 11). On the other hand, new cases of children with behavioural problems were diagnosed during the same period. We did not find that children at age 11 years with previous and current behavioural problems are at higher risk of early smoking, alcohol or illicit drugs use.

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The authors declare that they have no conflict of interest.

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