

# Children Born to Heroin-Addicted Mothers: What's the Outcome 25 Years Later?

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## Abstract

**Objective:** The aim of this descriptive cross-sectional study is to show the long term evolution of children born to heroin-addicted mothers, focusing on social development, psychiatric disorders and substance abuse disorders.

**Methods:** 30 subjects born to heroin-addicted mothers between 1985 and 1990 were cited to complete an interview with 101 questions about their socioeconomic environment and social development, mental health and drug consumption. It was performed a descriptive analysis of the sample and the variables were compared using contingency tables and the Fisher's exact test.

**Results:** We noted a high percentage of parental abandonment (56.2% of subjects lost one or both parents, 44.4% of subjects lived in extended care and 23.3% who were adopted or lived in shelter centers), and a high rate (26%) of emotional or physical abuse in childhood. Regarding socioeconomic development, most subjects were classified as having a medium or high socioeconomic level (80%), however social problems, which were measured as arrestments or imprisonment, were frequent. One third of the subjects had been diagnosed with some psychiatric disorder in childhood, most of them presented attention deficit disorder and hyperactivity and major depression, and we also found a 66.7% of subjects susceptible to have personality disorders. Drug consumption was very high across the sample; 70% of subjects had consumed cannabis in the previous year, 30% of people consumed cocaine in the last 12 months, 20% amphetamine, 13.3% of them had consumed ecstasy, 13.3% used hallucinogens and 2 people referred consumption of heroine. The use of alcohol also seemed to be high, as 5 people were classified as hazardous drinkers.

**Conclusion:** Subjects born to heroin-addicted mothers may be at risk of having social problems, psychiatric problems and illicit substance use disorders, therefore they could therefore benefit from close monitoring after birth to minimize and control the risks.

**Keywords:** Opioid-related disorders; Heroin; Prenatal exposure; Young adult; Mental disorders; Drug users; Social problems

## Introduction

Opiate use during 1980s and 1990s was a major health and social problem that carried serious consequences and that led to widespread social alarm [1]. In the case of pregnant women, opiate consumption was usually associated with a gestational background which was unfavorable for the fetus. The pregnancies were usually not controlled and were generally associated with the use of other drugs [2] and with a high prevalence of diseases susceptible to maternal-fetal transmission [2,3]. After delivery, many of these mothers were deemed unfit to take care of their children, therefore extended family or foster care was common [3,4]. Patients who were discharged at home with their biological parents were raised, in most cases, in environments surrounded by drug and with a poor socioeconomic status.

The development of children exposed to opiates in utero has been well characterized, but there is a lack of information about what happens after childhood [5]. Prenatal exposure to heroin has been associated with behavioral disorders, attention problems, hyperactivity, aggressiveness and lack of social inhibition [6-9] in children, assuming an increased risk of Attention Deficit and Hyperactivity Disorder (ADHD). The limited literature regarding adolescents suggests that the effects observed on children neurodevelopment possibly persist during the adolescence [5].

The mental health of children and adolescent born to drug addicted parents has been also a topic of interest in recent years. Most of the published studies about mental disorders in these children have documented an increased risk of axis I psychiatric disorders [10-12]

and a recent study that evaluated the offspring of parents consumers of heroin and alcohol, concluded that the children of heroin addicted parents had 8 times more risk of suffering depressive disorder, 3 times more risk of ADHD and 16 times more risk of Substance Use Disorders (SUD) than controls [13].

The literature data suggest there are developmental problems in children and adolescent born to heroin-addicted mothers, as well as an increased risk of psychiatric problems and SUD, but there are few data about what happens beyond adolescence. The aim of this study is to analyze the long-term evolution of children born to heroin-addicted mothers. We attempted to locate all the people born in the "Hospital del Mar" in Barcelona (Spain) in the 1980s to heroin-addicted mothers to assess their socioeconomic development, social problems, and the presence of psychiatric disorders and SUD. Considering that the reference population of our hospital covered an area directly affected by the impact of heroin in that time, we expected to find a group with

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poor socioeconomic conditions and a high prevalence of psychiatric and substance abuse disorders.

## Patients and Methods

We collected all the medical records classified with the diagnosis of “drug withdrawal syndrome in the newborn” or “narcotics affecting fetus/newborn through the placenta/breast milk” according to the “International Classification of Diseases-9” (ICD-9), from 1985 to 1990. The subjects were contacted by telephone or conventional mail. We also investigated other databases, such as the Human Immunodeficiency Virus (HIV) register of the “Municipal Institute of Public Health in Barcelona”, the “Registry of Tuberculosis Cases of the Control Program of Barcelona” and the “Death Registry of Catalonia”, none of which provided useful information.

All the participants were asked to complete a self-administered interview and monetary compensation was offered to all of them. The project was approved by the “Clinical Research Ethics Committee of the Hospital del Mar” and subjects provided informed consent before the interview.

The interview consisted in 101 items divided into 6 sections. The “Family History” section consisted of questions about birth parents (ethnicity, status, age, employment status and education). In the “Childhood” section the subjects were asked if they were adopted or had been in foster centers and were questioned about having undergone physical, sexual or emotional abuse during childhood. Thereafter, the third section related to “Personal History” included questions about their current social and economic status (age, marital status, employment status, education, professional standing, socioeconomic status, arrests and imprisonment). The socioeconomic assessment was performed using the “Family Affluence Scale” (FAS) [14] developed by the World Health Organization (WHO) Health Behavior to establish

the family socioeconomic status in children and adolescents through four questions. The sum of the scores for each response provides a number that allows to classification of the subject into a high (score from 6 to 9), medium (score from 3 to 5) or low (score less than 3) socioeconomic status. The “Health” section involved questions about diseases and the health status of the subjects, and the “Welfare” section consisted of questions regarding mental health. The participants were asked about psychiatric assessment or treatments received and psychiatric disorders diagnosed. We used the “Standardized Assessment of Personality-Abbreviated Scale” (SAPAS) as the screening method to identify personality disorders. This test consists of 8 questions with a score “0/1”. A total of 3 points in the interview correctly identifies (sensitivity 94% and specificity 85%) the presence of personality disorders according to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) [15]. For the assessment of ADHD we used the “Adult ADHD Self-Report Scale (ASRS-v1-1) symptom checklist”, a WHO self-administered scale that assesses the frequency of the 18 ADHD symptoms described by the DSM-IV [16]. In the last section, relating to drug use, the participants were asked about the use of cannabis, cocaine, heroin, benzodiazepine, liquid ecstasy, ecstasy, amphetamine, and hallucinogens. The Fast Alcohol Screening Test (FAST) was used to screen use/abuse of alcohol. This test consists of 4 questions, resulting in a score between 0 and 16. If the total score is 3 or more, the patient is considered a hazardous drinker with a sensitivity of 93% and a specificity of 88% [17].

Maternal and perinatal data were collected from medical records, and the collected variables were: gestational age, birth weight, size, head circumference, Apgar in minute 5, maternal infections, maternal drug consumption, neonatal abstinence syndrome (NAS), and neurological symptoms at 3 months of age and destination at discharge. The diagnosis of NAS was made using the standardized scoring system developed by Finnegan in 1975 [18]. Obtaining 3 scores greater than 8 in the Finnegan Test was considered diagnosis of NAS.

We performed a descriptive analysis of the sample. Quantitative variables were expressed as mean and standard deviation and categorical variables were represented with frequencies and percentages. We then compared groups of variables. We analyzed social problems (arrests and imprisonment) in relation to psychiatric disorders, having been discharged with biological parents and substance use. We studied possible risk factors predisposing substance abuse or psychiatric disorders analyzing the relationship with the educational level and employment of the subjects studied and the personal history of NAS or neurological deficit, low FAS level, having been adopted in childhood or discharged with biological parents and child abuse. Finally we studied the relationship between psychiatric diseases and substance use. These comparisons were performed with contingency tables, using the Fisher’s exact test, considering a p less than 0.05 as statistically significant. The relative risks (RR) were calculated in each case, indicating the confidence interval (CI) 95%. Analyses were performed using SPSS 18.0 (IBM Corp.).

## Results

We collected 150 patient medical records and attempted to contact these subjects by phone or conventional mail. Five had died, 94 were not located (probably because the address and/or telephone were not updated), 15 refused to participate in the study, and 36 were interviewed. On review of the medical records we found that 6 of the 36 mothers had not been heroin consumers but had consumed other drugs, thereby constituting a final sample of 30 individuals. Data related to the neonatal period were not available in 3 of these subjects.

<b>Sex (n/%)</b>		<b>Education (n/%)<sup>1</sup></b>	
<b>Male</b>	12 (40)	<b>Less than elementary studies</b>	1 (3.3)
<b>Female</b>	18 (60)	<b>Compulsory studies</b>	14 (46.7)
<b>Age (mean, years)</b>	22.23 (SD:1.5)	<b>Secondary studies</b>	14 (46.7)
<b>Marital status (n/%)</b>		<b>Superior studies</b>	1 (3.3)
<b>Single</b>	25 (83.3)	<b>Professional standing (n/%)<sup>2</sup></b>	
<b>Married</b>	1 (3.3)	<b>None</b>	7 (23.3)
<b>Common-law couple</b>	4 (13.3)	<b>Unskilled laborer</b>	9 (30)
<b>Widow/widower</b>	0 (0)	<b>Workmen</b>	8 (26.7)
<b>Separated/divorced</b>	0 (0)	<b>Skilled worker</b>	6 (20)
<b>Cohabitation (n/%)</b>		<b>Qualified work</b>	0 (0)
<b>Alone</b>	3 (10)	<b>Graduate</b>	0 (0)
<b>Partner</b>	8 (26.6)	<b>Other</b>	0 (0)
<b>Son/daughter</b>	0 (0)	<b>FAS (n/%)</b>	
<b>Partner and children</b>	2 (6.7)	<b>FAS low</b>	6 (20)
<b>Friends</b>	1 (3.3)	<b>FAS medium</b>	15 (50)
<b>Other family</b>	14 (46.7)	<b>FAS high</b>	9 (30)
<b>Other</b>	2 (6.7)	<b>Have you ever been arrested? (n/%)</b>	
<b>Employment status (n/%)</b>		<b>Yes</b>	9 (30)
<b>Active</b>	14 (46.7)	<b>No</b>	21 (70)
<b>Unemployed</b>	11 (36.7)	<b>Have you ever been in prison? (n/%)</b>	
<b>On sick leave</b>	0 (0)	<b>Yes</b>	2 (6.7)
<b>Housewife/husband</b>	2 (6.7)	<b>No</b>	28 (93.9)
<b>Disabled</b>	0 (0)		

Table 1: Sociodemographic characteristics of the subjects studied.xlsx.

Table 1 shows the demographic data of the 30 patients included in the sample. The mean age was 22.3 years, and included 18 female and 12 male subjects any of them were siblings.

Perinatal data were collected from medical records (Table 2). Since these data were not available in 3 patients, the sample used in this case included only 27 subjects.

The remaining information was obtained through the questionnaire completed by the 30 subjects included. Information concerning the birth parents is summarized in Table 3, showing a remarkably high mortality rate of 40% of mothers and 30% of fathers who had died in the years after the birth of their children.

Seven subjects (23.3%) reported having been adopted or admitted

<b>Gestational age</b>	
<b>Mean (weeks)</b>	38.4 (SD: 1.5)
> 36.6 w (n/%)	25 (92.5)
32-36.6 w (n/%)	2 (7.4)
28-31.6 w (n/%)	0 (0)
<27.6 w (n/%)	0 (0)
<b>Birth weigh</b>	
<b>Mean (g)</b>	2821 (SD: 496)
<b>Appropriate birth weight (n/%)</b>	18 (66.6)
<b>Low birth weight (n/%)</b>	9 (33.3)
<b>Size</b>	
<b>Mean (cm)</b>	47.3 (SD: 2.4)
<b>Head circumference</b>	
<b>Mean (cm)</b>	33.3 (SD: 1.8)
<b>Apgar 5 min (n/%)</b>	
<7	1 (3.7)
>6	23 (85.2)
Unknown	3 (11.1)
<b>Mother infections (n/%)</b>	
HIV	15 (55.6)
HBV	6 (22.2)
Other	4 (14.8)
<b>Mother consumption (n/%)</b>	
<b>Heroin</b>	27 (100)
<b>Inhaled</b>	4 (14.8)
<b>Injected</b>	11 (40.7)
<b>Both</b>	3 (11.1)
<b>Unknown</b>	9 (30)
<b>Methodone</b>	8 (29.6)
<b>Cocaine</b>	3 (11.1)
<b>Cannabis</b>	6 (22.2)
<b>Benzodiazepine</b>	1 (3.7)
<b>Alcohol</b>	1 (3.7)
<b>Neonatal abstinence syndrome</b>	
n/%	14 (51.9)
<b>Treatment (n/%)</b>	
<b>Phenobarbital</b>	11 (78.6)
<b>Opium tincture</b>	2 (14.3)
<b>Chlorpromazine</b>	1 (7.1)
<b>Persistent neurological symptoms (n/%)</b>	2 (7.4)
<b>Destination at discharge (n/%)</b>	
<b>Parents</b>	15 (55.6)
<b>Other relatives</b>	12 (44.4)
<b>Foster home</b>	0 (0)
<b>Adopted</b>	0 (0)
<b>Foster family</b>	0 (0)

Table 2: Perinatal factors (n=27).

	<b>Father</b>	<b>Mother</b>
<b>Age (mean, years)</b>	48.76 (SD: 3.6)	46.3 (SD: 4.6)
<b>Ethnicity (n/%)</b>		
<b>Native</b>	24 (80)	27 (90)
<b>Foreign</b>	4 (13.3)	1 (3.3)
<b>Gypsy</b>	0 (0)	2 (6.7)
<b>Unknown</b>	2 (6.7)	0 (0)
<b>Current situation (n/%)</b>		
<b>Died</b>	9 (30)	12 (40)
<b>Alive</b>	18 (60)	18 (60)
<b>Unknown</b>	3 (10)	0 (0)
<b>Employment status (n/%)</b>		
<b>Active</b>	5 (16.7)	8 (26.7)
<b>Unemployed</b>	5 (16.7)	3 (10)
<b>On sick leave</b>	0 (0)	0 (0)
<b>Housewife/husband</b>	0 (0)	1 (3.3)
<b>Retired</b>	0 (0)	1 (3.3)
<b>Disabled</b>	5 (16.7)	3 (10)
<b>Another</b>	3 (10)	1 (3.3)
<b>Unknown</b>	0	1 (3.3)
<b>Not applicable</b>	12 (40)	12 (40)
<b>Studies (n/%)<sup>1</sup></b>		
<b>Less than elementary studies</b>	8 (26.7)	3 (10)
<b>Compulsory studies</b>	1 (3.3)	7 (23.3)
<b>Secondary studies</b>	6 (20)	6 (20)
<b>Superior studies</b>	2 (6.7)	1 (3.3)
<b>Unknown</b>	1 (3.3)	1 (3.3)
<b>Not applicable</b>	12 (40)	12 (40)
<b>Professional standing(n/%)<sup>2</sup></b>		
<b>None</b>	8 (26.7)	8 (26.7)
<b>Unskilled laborer</b>	2 (6.7)	4 (13.3)
<b>Workmen</b>	5 (16.7)	1 (3.3)
<b>Skilled worker</b>	2 (6.7)	2 (6.7)
<b>Qualified work</b>	0 (0)	1 (3.3)
<b>Graduate</b>	1 (3.3)	0 (0)
<b>Other</b>	0 (0)	0 (0)
<b>Unknown</b>	0 (0)	1 (3.3)
<b>Not applicable</b>	12 (40)	12 (40)

Table 3: Parental sociodemographic characteristics

<sup>1</sup>Less than elementary studies: people who have completed many years of schooling but without completing mandatory schooling. Compulsory studies: Graduate School, Bachelor and elementary education certificate. Secondary studies: Bachelor, Training Cycles Middle, Technical Assistant (FP I) and equivalent qualifications. Superior studies: PhD, Graduate, Graduate College, Technician (Cycles Higher level training), Technical Specialist (FP II) and equivalent qualifications or assimilated.

<sup>2</sup>Unskilled laborer: auxiliary jobs for which no qualification is required. Workmen: performs work requiring a basic level of schooling. Skilled worker: performs work requiring secondary studies. Qualified worker: performs work for which first university degree training is required. Graduate: performs work for which secondary university degree, master or doctorate is required

to shelter centers during their childhood. Before the adoption of these 7 adopted children, two had been living with their parents and 3 had been with other relatives. The previous situation of the other two subjects was not described. Six subjects reported having had suffered emotional abuse (20%) and 2 physical abuse (6.7%).

One of the main items in our project was the development of psychiatric disorders (Table 4) and their relationship with maternal drug consumption. Depression and ADHD were the most frequent diagnoses. In the screening ASRS-V1.1, 6 people (20%) were classified as susceptible to ADHD (one of them had been diagnosed yet in childhood) and another 3 had been diagnosed with ADHD in childhood

<b>SAPAS (screening for personality disorders) (n/%)</b>	
>2 high risk	18 (66.7)
<3 low risk	12 (33.3)
<b>ASRS.V1.1 A (screening for ADHD) (n/%)</b>	
Susceptible	6 (20)
Non susceptible	24 (80)
<b>Have you ever gone to a psychiatrist? (n/%)</b>	
Yes	17 (56.7)
No	13 (43.3)
<b>Have you ever had psychiatric treatment? (n/%)</b>	
Yes	8 (26.7)
No	22 (73.3)
<b>Have you ever been diagnosed with..? (n/%)</b>	
<b>Attention-deficit/hyperactivity disorder</b>	4 (13.3)
<b>Major depressive disorder</b>	5 (16.7)
Dysthymia	2 (6.7)
Bipolar disorder	0 (0)
Panic disorder	2 (6.7)
Specific phobia	4 (13.3)
Social phobia	0 (0)
<b>Obsessive-compulsive disorder</b>	0 (0)
<b>Posttraumatic stress disorder</b>	1 (3.3)
<b>Eating disorders</b>	0 (0)
<b>Antisocial personality disorder</b>	0 (0)
<b>Borderline personality disorder</b>	0 (0)
<b>Schizophrenia</b>	0 (0)
<b>Psychotic disorder</b>	0 (0)
<b>Some psychiatric disorder</b>	10 (33.3)

Table 4: Mental health.

	CAN	COC	HER	BZ	GHB	ECS	ANPH	HAL
<b>Have you ever consumed ...? (n/%)</b>								
Yes	26 (86.7)	14 (46.7)	2 (6.7)	2 (6.7)	2 (6.7)	6 (20)	9 (30)	7 (23.3)
No	4 (13.3)	16 (53.3)	28 (93.3)	28 (93.3)	28 (93.3)	24 (80)	21 (70)	23 (76.7)
<b>How many days have you consumed in the last 12 months?</b>								
0 days	9 (30)	21 (70)	28 (93.3)	28 (93.3)	29 (96.6)	26 (86.7)	24 (80)	26 (86.7)
1-3 days	2 (6.7)	8 (26.7)	1 (3.3)	0 (0)	1 (3.3)	4 (13.3)	6 (20)	4 (13.3)
4-9 days	2 (6.7)	0 (0)	1 (3.3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
10-19 days	1 (3.3)	1 (3.3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
20-29 days	3 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
30-150 days	5 (16.7)	0 (0)	0 (0)	2 (6.7)	0 (0)	0 (0)	0 (0)	0 (0)
>150 days	8 (26.7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>Have you ever been treated for drug-related problems? (n/%)</b>								
Yes	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.3)	0 (0)	0 (0)	0 (0)
No	30 (100)	30 (100)	30 (100)	30 (100)	29 (96.6)	30 (100)	30 (100)	30 (100)

CAN: Cannabis; COC: Cocaine; HER: Heroin; BZ: Benzodiazepine; GHB: Liquid Ecstasy; ECS: Ecstasy; ANPH: Amphetamine; HAL: Hallucinogens

Table 5: Drugs consumption.

but were not classified as susceptible to ADHD in the test. We found a significant association between ADHD and destination after discharge ( $p=0.043$ ), albeit with a not significant RR. The relationship between abuse and the diagnosis of major depression was also significant, with a  $p = 0.041$  and a RR of 6 (CI: 95%; 1.27-28.26).

Finally, we collected data related to drug consumption; 76.7% of subjects were regular tobacco smokers and with regard to alcohol intake, 5 subjects were classified as hazardous drinkers in the FAST test and 1 had been treated for alcohol-related problems. Table 5 summarizes the use of the other drugs studied. On analyzing the relationship between psychiatric disorders and the risk of substance abuse we found few significant results. Subjects with ADHD (diagnosed ADHD or classified by the test) were more likely to be regular users of cocaine with  $p=0.027$

and a RR of 3.96 (CI: 95%; 1.23-12.74), and the relationship between habitual consumption of cocaine and having been to a psychiatrist was significant with  $p=0.042$ , although the RR was not significant. Low scores on the FAS test were a risk factor for heroin consumption with a  $p=0.034$  but no calculable RR.

## Discussion

The consequences of the serious health and social problems related to heroin use in the 1980s and 1990 are apparent by the large number of children born to addicted mothers during the five-year study period, and the high proportion of subjects who died. 5 of the 150 subjects studied died (3.3%), four of them died due to complications related to AIDS and the cause of death in the remaining patient was unknown.

All the mothers studied were opiate consumers during pregnancy and almost 30% consumed other drugs at the same time. On the other hand a high percentage of mothers were included in methadone detoxification programs despite the limited availability methadone maintenance treatment at that time, which was only fully developed after 1992 [19]. HIV infection was one of the most common problems associated with heroin [1] and in our sample 55.6% of the mothers had HIV infection. Fortunately none of the newborns were infected.

As expected, the social environment in which these subjects were raised during their early childhood was not ideal for proper neurologic and socioeconomic development. The data collected in the study suggest a low socioeconomic level and an environment of neglect and abuse. 55.6% were raised at home with their parents in their first years of life, with most growing up in a precarious environment surrounded by drugs and delinquency. The remaining 44.4% of the children could not be raised by their parents and were cared for by other family members. One or both parents were lost to 56.2% of the children during childhood, and although initially none of the subjects were adopted or admitted to shelter centers from the hospital, during their childhood 13% of the children living with their parents and 25% of those raised by other family members were given up for adoption. Furthermore, more than a quarter of the subjects received some kind of abuse by their caregivers, further aggravating the situation. The profile of biological parents reported by subjects was mostly native parents with a low educational level and unemployed or disabled in most, suggesting a poor socioeconomic level.

Taking into account the familiar and personal history described one could expect a low socioeconomic status, important social problems and a high prevalence of psychiatric and substance abuse disorders in these subjects. Nonetheless, in regard to socioeconomic development we found an acceptable socioeconomic level, with 80% of the study population classified as having a high or medium socioeconomic level according the FAS test and a good educational level, while on the other hand, the social problems seemed to be very high. A high percentage of subjects had completed elementary school, and 50% of the subjects had continued with further studies (the rate of subjects achieving university or postgraduate studies was not analyzed since most of the subjects had not reached the age to complete such studies). At the time of the interview, 36.7% of the subjects reported being unemployed, which is not surprising considering that in 2011 the unemployment rate among young youths from 20 to 29 years of age in Spain reached 34.7% [20] and that some of the subjects were still pursuing their studies.

One of the main points of interest was the development of psychiatric disorders and their relationship with maternal opiate consumption. According to ESEMeD-Spain (European Study of the Epidemiology of Mental Disorders) [21] study, 19.5% of Spanish people over 18 years old have a mental disorder during their lifetime. In the case of children and teenagers the global prevalence of mental disorders in Spain is estimated to be 10%-20% according to the different studies [22]. These data contrast with ours, where up to 56.7% of the subjects had gone to a psychiatrist in childhood, 26.7% of subject had received psychiatric medical treatment and a 33.3% of the patients had been diagnosed with some psychiatric disorder. The most frequent diagnoses in our sample were depression and ADHD. In Spain, it is estimated that the longest prevalence of depression represents a 2% in schoolchildren and up to 8% during the adolescence even when still being underdiagnosed [23]. In our sample we found 5 cases of depression diagnosed in childhood, constituting a 16.7%, a higher percentage of those described in the literature. Moreover, it has been found a significant relationship with the antecedent of child abuse, being a risk factor for the development of

depression. Regarding to the ADHD, 20% of subjects from our group were classified as susceptible of suffering ADHD in the test ASRS-v1-1 and a 13.3% had been diagnosed in childhood, whereas according to several studies the rate of ADHD in general adult population is of around 3-4% [24] and 3-7% in school population [25]. This condition has been associated with the consumption of opiates during pregnancy, although in our sample we also found a significant relationship with the antecedent of living with the biological parents. Finally, in the field of psychiatric disorders, one of the most remarkable findings was the high percentage of individuals with personality disorder according to screening with SAPAS, representing 66.7% of the sample. Nonetheless, in contrast to what could be expected these disorders did not represent a risk factor for substance abuse.

Overall drug use in the study sample was very high on comparison of the results in the general population according to EDADES 2009/2010 (Encuesta Domiciliaria sobre Alcohol y Drogas en España) [26], a survey on alcohol and drugs in Spain. None of the environmental factors studied led to an increased risk, except for an increase in heroin use in the low socioeconomic group and an increase in cocaine consumption in ADHD patients. Tobacco was reportedly consumed regularly by 76.6% of the study subjects while in the EDADES survey tobacco consumption was described in 28% of women and 35.9% of men [26]. The most prevalent illegal drug reportedly used was cannabis, as in the general population. In our study 86.7% of subjects stated having used cannabis at least once in their life and 70% reported use during the last year, while in the general population between 15 and 64 years of age, 32.1% had ever used cannabis and 10.6% had done so in the last year [26]. In our study occasional consumption of cocaine was of 46.7% while use during the last year was of 30%. These percentages in the general population are lower, being 10.2% for occasional use and 2.6% for consumption in the last year [26]. According to the EDADES survey, in the last year 7.1% of adults between 15 and 64 years of age had consumed hypnotosedatives, 0.8% ecstasy, 0.6% amphetamines, 0.5% hallucinogens and 0.1% heroine [26], all of them lower percentages than ours, except for hypnotosedatives which was 6.7% in our sample.

It is important to take into account the possible selection bias in some aspects in our study. We have already mentioned that none of the participating subjects had been adopted or accepted into foster care from the hospital. Nonetheless, this may be explained in that the addresses or telephone numbers of those who had been adopted or taken into foster care were not available and thus, these subjects would not be located. Other of the limitations of the present study is the socioeconomic assessment. We used a test designed to establish the socioeconomic status in children and adolescents who live with their parents, however once finalized the study we observed that about a half of the subjects lived independently of their families, so the FAS test could have estimated their socioeconomic situation incorrectly.

Previous studies have reported a significant loss of subjects in the long-term follow up [4,6,27] because of the associated social conditions. The present study included a long period after birth, which may contribute to an important loss rate and a limitation to the study. However, with the data obtained we can verify that this is a group with some peculiarities in terms of socioeconomic status, psychiatric pathology and drug use on comparison with young people with a similar age and without antecedents. It is known that addictions, as other psychiatric diseases, are diseases characterized by a complex interaction between genetic [28] and environmental factors [29]. Nonetheless, are the socioeconomic conditions in which these subjects grew up, genetic factors or heroin exposure in utero the causes of this trend to social problems, drug use and psychiatric disorders? Unfortunately the small

sample size does not allow this question to be answered, although it does show the important problems of the children born to heroin-addicted mothers.

The results obtained in this study suggest that young adults born to heroin-addicted mothers may be at an increased risk of social problems, psychiatric disorders and substance use disorders and could, therefore, benefit from monitoring and professional intervention from birth. However, more research is needed to demonstrate the relationship between the maternal use of heroin (and the related socioeconomic factors) and the long term effects in the offspring.

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