

# Self-reported health, use of alcohol and illicit drugs, and criminality among adults with foetal alcohol syndrome

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## Abstract

**Aims:** To investigate self-reported physical and psychiatric problems, use of alcohol and illicit drugs, as well as conviction, and being a victim, of crime in adults with foetal alcohol syndrome (FAS). **Methods:** Interviews with 20 adults, aged  $30 \pm 8$  years with FAS diagnosis (65% female) and an age-and-gender-matched comparison group. Measures used were the Addiction Severity Index interview, the Beck Depression Inventory Scale and the Beck Anxiety Inventory Scale. **Results and conclusions:** Adults with FAS need healthcare for depression and suicidal ideation, which occurred commonly, but problems with use of alcohol and illicit drugs were not more common in the FAS group. Although self-reported physical health problems were not more common in the FAS group, their number of days with sickness leave indicated that they are often in too poor a physical condition to work. A majority of the FAS group had been victims of crime, which makes this an important topic for further research. The groups did not differ in crime conviction rates. Everyone in the study group had been diagnosed with FAS; a diagnosis may give access to social

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welfare interventions. More individuals within the FAS disorders spectrum need to be identified to be given access to efficient interventions.

### Keywords

adulthood, foetal alcohol syndrome, psychiatric problems, substance use, victim of crime

Foetal alcohol syndrome (FAS) was first described more than 40 years ago (Jones & Smith, 1973), and since then research has demonstrated that alcohol consumption during pregnancy can have physical, behavioural and cognitive effects on the developing foetus (Murawski, Moore, Thomas, & Riley, 2015). The range of these effects is referred to as foetal alcohol spectrum disorders (FASD), of which FAS is the endpoint (Bertrand, Floyd, & Weber, 2005). Foetal alcohol syndrome is currently the only medical diagnosis within the continuum of FASD, and has the ICD-10 code Q86.0 (ICD-10; World Health Organization, 2011). An individual with FAS displays a characteristic pattern of facial anomalies including short palpebral fissures, a smooth philtrum and a thin upper vermillion border; is small for gestational age; and has central nervous system dysfunction (Riley et al., 2011). Children with FAS may have reduced cognitive function, manifested as generally reduced intellectual functioning, deficits in executive functioning, and learning and memory difficulties (Mattson et al., 2013). Today there are several reports on how prenatal alcohol exposure affects physical, behavioural and cognitive development in children and adolescents (e.g., Mattson, Crocker, & Nguyen, 2011). However, there is still a need for more knowledge about how life develops for these individuals as they become adults (Moore & Riley, 2015).

There is a lack of knowledge about physical health status among adults with FAS. However, a recent review (Moore & Riley, 2015) suggests that adult individuals with FASD may have poorer general physical health. This suggestion arises from, for example, experimental animal studies showing that prenatal alcohol exposure

can cause long-term immunity defects and an increased susceptibility to the influenza virus (McGill et al., 2009) and autoimmune diseases (Zhang et al., 2012). In addition, a recently published systematic review (Popova et al., 2016) investigated the prevalence of comorbid conditions in individuals with FAS. It was found that, for example, hearing loss, visual impairment and blindness were notably more common among individuals with FAS than among the general population in the US. However, further studies are needed to clarify the physical health status of adults with FAS, and to determine whether there is an increased prevalence of physical problems among them.

Streissguth and colleagues have reported that adults with FASD have a life span prevalence of psychiatric problems of 90% (Streissguth et al., 2004). For example, 44% have experienced depression, 40% psychoses, 20% anxiety and 20% bipolar disorder (Famy, Streissguth, & Unis, 1998). In a recent study on adults diagnosed with FAS during childhood, it was found that 33% had been treated for psychiatric disorders and 6% for suicide attempts (Rangmar, Hjern et al., 2015). Moreover, 57% had received psychotropic drug prescriptions such as sleeping medicine, anxiolytics, neuroleptics and/or antidepressants. The various types of psychiatric problems were more common among adults with FAS compared with an age-and-gender-matched control group.

Excessive consumption of alcohol and the use of illicit drugs may have a negative impact on an individual's health. In fact, studies have shown that adults with FASD may have an increased risk for developing problems with alcohol and/or illicit drugs (e.g., Streissguth

et al., 2004). For example, 60% of adults with FASD have experienced current or past substance dependence (Famy et al., 1998). Moreover, a recent study (Rangmar, Hjern et al., 2015) found that hospital care for alcohol problems and/or illicit drug use was more common among adults with FAS compared with an age-and-gender-matched control group.

Previous studies (e.g., Brown et al., 2015) have shown that individuals with FASD have impaired self-control and adaptive behaviour, as well as a reduced ability to understand when their behaviour may harm others. Individuals with FASD may also be gullible, and may have difficulty understanding consequences and abstract concepts. These characteristics may also be found in persons with criminal behaviour (Brown et al., 2015). It has previously been reported that among adults with FASD, 60% have experienced trouble with the law (Streissguth et al., 2004). Furthermore, a Canadian study reported an estimation that youths with FASD were 19 times more likely to be imprisoned compared to those without FASD, and that the number of undiagnosed persons in correctional facilities was high (Popova, Stade, Bekmuradov, Lange, & Rehm, 2011). These studies (Brown et al., 2015; Popova et al., 2011; Streissguth et al., 2004) thus show that adults with FASD may have an increased risk of criminal behaviour. However, a recent study from Sweden (Rangmar, Hjern et al., 2015) found that the crime conviction rates among adults with FAS were similar to those of the control group; 28% had a record of court conviction while 6% had been convicted of severe crimes. This suggests that crime conviction rates in individuals with FASD may differ between countries and selected populations. An explanation may be that societal interventions addressing individuals with FASD, such as assisted living and supported employment, vary internationally. These interventions may serve as protective factors and may thereby ameliorate outcomes and reduce the risk of criminal behaviour (Freunscht & Feldmann, 2011).

Another aspect of criminality is being a victim of crime, for which individuals with FAS are at an increased risk (Freunscht & Feldmann, 2011): 33% of adults with FAS had experienced victimisation, sexual assault or rape, and violence or forced prostitution. The adults with FAS had commonly been exploited by their friends and partners. The increased risk of being a victim of crime for individuals with FAS may be due to difficulties understanding the intentions of others and the consequences of their own actions (Freunscht & Feldmann, 2011).

Little is known about health consequences and behaviour in adults with FAS. There is thus a need for studies on physical and psychiatric problems in adults with FAS, and their use of alcohol and illicit drugs. We also need studies clarifying whether adult individuals with FAS have an increased risk of exhibiting criminal behaviour that could lead to being convicted, or being a victim, of crime.

The aim of this study was to investigate self-reported physical and psychiatric problems, use of alcohol and of illicit drugs, as well as conviction and being a victim of crime in adults with FAS. Based on previous research (Famy et al., 1998; McGill et al., 2009; Moore & Riley, 2015; Rangmar, Hjern et al., 2015; Streissguth et al., 2004; Zhang et al., 2012), we hypothesised that adults with FAS would report, in the past and more recently, having experienced more physical and psychiatric problems, and more use of alcohol and of illicit drugs than an age-and-gender-matched comparison group. Based on two studies (Freunscht & Feldmann, 2011; Rangmar, Hjern et al., 2015), we expected the crime conviction rates to be similar between the groups, and hypothesised that adults with FAS would have been victims of crime to a larger extent than those in the comparison group.

## Materials and methods

### *Study group with FAS*

The study group consisted of 20 individuals: 13 women (65%) and 7 men (35%), aged 18 to 41

**Table 1.** Demographics at the time of data collection for the foetal alcohol syndrome (FAS) group ( $n = 20$ ) and the comparison group ( $n = 20$ ; of whom 13 women and 7 men in both groups). Data are presented as percentages with numbers of individuals (in parentheses).

Age	FAS group		Comparison group	
	M	SD	M	SD
Diagnosis <sup>1</sup>				
FAS (Q86.0)	100%	(20)	0%	(0)
Intellectual disability (F70)	5%	(1)	0%	(0)
Living circumstances during childhood				
Biological home	0%	(0)	100%	(20)
Out-of-home care	100%	(20)	0%	(0)
Highest completed education				
Primary school, nine years (including special education)	15%	(3)	0%	(0)
Secondary education (including special education)	85%	(17)	5%	(1)
Post-secondary education	0%	(0)	95%	(19)
Income				
Employed	30%	(6)	25%	(5)
Educational allowance	0%	(0)	45%	(9)
Social welfare	0%	(0)	5%	(1)

<sup>1</sup>Also indicated as code in the International Classification of Diseases (ICD-10; World Health Organization, 2011).

years ( $30 \pm 8$ ). To be eligible for participation in this study, individuals had to be at least 18 years old and to have a medical record confirming an FAS diagnosis (Q86.0; World Health Organization, 2011).

Almost half the study group ( $n = 8$ ) had been diagnosed with FAS in childhood when they were patients at the Children's Hospital in Göteborg. At that time, the diagnostic criteria were: (1) a documented history of alcohol abuse during pregnancy, (2) a characteristic pattern of facial anomalies, (3) growth retardation and (4) neurodevelopmental abnormalities of the central nervous system (Clarren & Smith, 1978; Jones & Smith, 1973). These eight participants were recruited from, and are presented in detail in, a follow-up study on psychosocial outcomes in adults with FAS (Rangmar, Hjern et al., 2015). The remaining participants in the study group ( $n = 12$ ) had been diagnosed with FAS at different stages, and were recruited to this study through the Swedish National FAS Organisation. In some cases the participants did not bring their medical records to the data collection session. In such cases, their foster parents

were contacted and affirmed that their child had a medical record confirming the FAS diagnosis. For more information on the study group, see Table 1.

### Comparison group

Participants in the comparison group ( $n = 20$ ) were individually matched with those in the study group by age and gender. However, the groups were not similar concerning various psychological and social variables (see Table 1). The comparison group had higher intellectual and executive functioning and social cognition than the study group (Rangmar, Sandberg, Aronson, & Fahlke, 2015). A research assistant distributed information about the project in public places in order to recruit the comparison group. After reading the information, people willing to participate were asked to provide their contact details. Individuals who matched someone in the study group in terms of gender and age, and consented to participate voluntarily, were invited.

The Regional Ethical Review Board approved this study.

### *Procedure and measures*

All participants gave verbal informed consent, and were invited to the data collection. Travel expenses, accommodation costs and food were paid for by the research project, and the participants received compensation (two cinema tickets). A trained test leader conducted the interviews, which took about two hours. For further description of the procedure, see Rangmar, Sandberg et al. (2015).

We used the Addiction Severity Index interview (ASI; McLellan, Cacciola, Alterman, Rikoon, & Carise, 2006), an established self-report instrument in the field of addiction research with acceptable validity (Håkansson & Berglund, 2012). The ASI is a structured interview that assesses self-reported lifetime and recent problem severity in seven life areas: alcohol use, illicit drug use, education and employment, family and social relationships, legal problems, physical problems, and psychiatric problems.

For the purpose of this study, physical and psychiatric problems, use of alcohol and illicit drugs, and criminal behaviour were selected for further analyses. Examples of questions include: “Do you have any chronic physical problems which continue to interfere with your life?” and “Are you taking any prescribed medication on a regular basis for a physical problem?” Questions about psychiatric problems included: “Have you in the past/recently experienced serious depression/anxiety?” and “How old were you when you experienced serious depression/anxiety for the first time?” Questions about alcohol and illicit drug use included: “Have you ever drunk alcohol?” and “Do you have past/recent experiences of illicit drugs?” Questions about criminality included: “Have you ever been taken into custody or charged for criminal offences leading to fines/probation/prison?” For the purpose of this study, the following questions were added to the ASI interview concerning being a victim

of crime: “Have you been the victim of a crime? What kind of crime? (For example, violence/sexual violence, or being cheated out of money). Was it reported to the police?”

Data on psychiatric problems were elaborated on through the self-rating scales of the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) and the Beck Depression Inventory (BDI; Beck, Ward, & Mendelson, 1961). The BAI provides data on the level of symptoms of anxiety in the past week. Scores range between the minimum 0 and the maximum 63, defined as: minimal < 7, mild = 8–15, moderate = 16–25 and severe = 26–63. The BDI provides data on the level of symptoms of depression in the past two weeks. Scores range between the minimum 0 and the maximum 63, defined as: minimal < 9, mild = 10–16, moderate = 17–29 and severe = 30–63. In the FAS group, the BAI and BDI were conducted as interviews to allow the participants to ask questions if there was something they did not understand.

### *Data analyses*

SPSS 22 was used for all statistical analyses. Data were compared between the FAS group and the comparison group. The  $\chi^2$  test was used for categorical variables, and when the overall  $\chi^2$  test was significant, standardised residuals ( $R$ ) were used to determine which cells were major contributors to this. If  $R > 2.0$ , there was a contributor regarding the significant result. Data that were not normally distributed in continuous variables were tested using the non-parametric Mann–Whitney U-test. Differences between the FAS group’s and the comparison group’s median values were analysed. Tests were two tailed, a  $p < .01$  was regarded as significant, and effect size  $r$  was calculated.

## **Results**

### *Self-reported physical problems*

There were no significant differences between the groups in any of the variables on self-reported

**Table 2.** Self-reported physical health in the foetal alcohol syndrome (FAS) group and the comparison group.

Variable	FAS group (n = 20)	Comparison group (n = 20)	t-ratio or $\chi^2$	df
Number of times in hospital for physical problems	2 ± 2	1 ± 2	1.010	34
Days with physical problems last month	16 ± 15	17 ± 14	-0.230	21
Chronic physical problems which continue to interfere with life	63.2% (12)	55.0% (11)	0.268	1
Prescribed medication on a regular basis for physical problem	35.3% (6)	15.0% (3)	2.056	1
Pension for physical disability	15.0% (3)	0.0% (0)	3.243	1
Days of sickness leave latest months	14 ± 15	2 ± 8	2.625	19.18

physical health. Twelve of the adults with FAS (63%) and 11 (55%) in the comparison group reported a chronic physical problem which continued to interfere with life (ns). None of these problems were reported by more than one participant; each chronic physical problem was only reported once. Conditions included poor vision, psoriasis and joint problems. Three (15%) in the FAS group had a pension for physical disability; no one in the comparison group had such a pension (ns). The number of days with sickness leave due to poor physical health in recent months was 14 (± 15) in the FAS group, and at a  $p < .05$  level this was significantly higher than in the comparison group, where this number was 2 (± 8). For further data on physical problems, see Table 2.

### Self-reported psychiatric problems

Data from the ASI showed that the two groups differed significantly ( $p < .01$ ), with nine (64%) of the adults with FAS having experienced symptoms of depression within the past year compared to two (15%) in the comparison group. Anxiety within the past year was significantly more common in the FAS group (reported by nine members, 75%), than in the comparison group (two members, 25%;  $p < 0.01$ ).

The median scores on the BAI and BDI in the FAS group were in the range defined as mild, whereas the comparison group had scores

that can be defined as minimal (Beck et al., 1961, 1988). Concerning the BAI, the median score for the FAS group on symptoms of anxiety was 13, and for the comparison group the median score was 6. The groups did not differ significantly in this ( $U = 144$ ,  $z = -1.3$ ,  $p = .195$ ,  $r = -.207$ ) or their scores on symptoms of depression (BDI:  $U = 166$ ,  $z = -.94$ ,  $p = .348$ ,  $r = -.148$ ). The median scores were 10 for the FAS group and 4 for the comparison group.

Data from the ASI showed that it was significantly more common for the FAS group to have experienced concentration and memory disturbances in the past year. In the FAS group, ten (50%) had experienced such disturbances, while the corresponding number in the comparison group was one (5%,  $p < .01$ ). The groups differed significantly in that, among the adults with FAS, seven (35%) had experienced hallucinations, while no one in the comparison group had ( $p < .01$ ). Fourteen of the adults with FAS (70%) had experienced problems controlling violent behaviour, which was significantly more than the four (20%) in the comparison group ( $p < .01$ ). The age for suicidal ideation for the first time was significantly lower in the FAS group, at 21 ± 3, than in the comparison group, at 33 ± 1 ( $p < .001$ ). The two groups also differed significantly ( $p < .01$ ) with 11 (55%) of the adults with FAS having been prescribed some sort of psychotropic drug (sleeping medicine, antidepressant and/or anxiolytics),

**Table 3.** Self-reported psychiatric problems in the foetal alcohol syndrome (FAS) group and the comparison group.

Variable	FAS group (n = 20)	Comparison group (n = 20)	t-ratio or $\chi^2$	df
Lifetime depression	70.0% (14)	65.0% (13)	0.114	1
Age first depression	19 ± 6	21 ± 8	-0.934	25
Depression within past year	64.3% (9)*	15.4% (2)	9.000	1
Lifetime anxiety	60.0% (12)	40.0% (8)	1.600	1
Age first anxiety	19 ± 7	19 ± 10	-0.065	18
Anxiety within most recent year	75.0% (9)*	25.0% (2)	7.901	1
Lifetime concentration and memory disturbances	70.0% (14)	30.0% (6)	6.400	1
Concentration and memory disturbances most recent year	50.0% (10)*	5.0% (1)	10.157	1
Lifetime hallucinations	35.0% (7)*	0.0% (0)	8.485	1
Lifetime problems controlling violent behaviour	70.0% (14)*	20.0% (4)	10.101	1
Lifetime suicidal ideation	47.4% (9)	10.0% (2)	6.719	1
Age first suicidal ideation	21 ± 3**	33 ± 1	-9.362	8
Lifetime suicide attempt	15.8% (3)	5.0% (1)	1.232	1
Need for psychiatric care	65.0% (13)	35.0% (7)	3.600	1
Disability pension due to poor mental health	33.3% (6)	5.3% (1)	4.748	1
Psychotropic drug(s)	55.0% (11)*	15.0% (3)	7.033	1

\* $p < .01$ . \*\*  $p < .001$ .

compared to three (15%) in the comparison group. For further data on psychiatric problems, see Table 3.

### *Self-reported use of alcohol and of illicit drugs*

Data from the ASI showed that no one in the FAS group or the comparison group had experienced problems with the use of alcohol or illicit drugs. There were no significant differences between the groups in any of the variables in this area. For further data on the use of alcohol and illicit drugs, see Table 4.

### *Conviction, and being a victim, of crime*

There were no significant differences between the groups in any of the variables on conviction, and being a victim, of crime. The self-reported data from the ASI showed that two (10%) participants in the FAS group had been taken into custody or charged for criminal offences and received fines, compared with one (5%) in the

comparison group (ns). In both groups, no one had been taken into custody or charged for criminal offences resulting in probation or prison.

Fourteen (70%) in the FAS group and 13 (65%) in the comparison group had been victims of crime at some point (ns). The groups did not differ significantly. Among the 14 in the FAS group who had been victims of crime it was most common to have been the victim of violence/sexual violence, with eight (57%) having experienced this. In the comparison group it was most common to have been cheated out of money, with six (46%, ns) having experienced this. Nine (45%) in the FAS group and four (20%) in the comparison group had experienced being physically hurt by family or a close friend (ns). For further data on criminality, see Table 5.

## **Discussion**

This study showed that the adults with FAS had, both in the past and recently, experienced

**Table 4.** Self-reported use of alcohol and illicit drugs in the foetal alcohol syndrome (FAS) group and the comparison group.

Variable	FAS group (n = 20)	Comparison group (n = 20)	t-ratio or $\chi^2$	df
Ever drunk alcohol	80.0% (16)	100.0% (20)	4.444	1
Ever in lifetime got drunk on alcohol	65.0% (13)	80.0% (18)	3.584	1
Age when drunk for the first time	19 ± 6	18 ± 5	0.530	29
Drinking days past month	1 ± 2	3 ± 3	-1.539	29
Drink alcohol regularly (min. 3 times/week)	0.0% (0)	5.0% (1)	1.026	1
Drink alcohol and get drunk 3 days/week	0.0% (0)	0.0% (0)		1
Lifetime experience of illicit drugs	20.0% (4)	35.0% (7)	1.129	1

**Table 5.** Self-reported experiences of conviction, and being victim, of crime in the foetal alcohol syndrome (FAS) group and the comparison group.

Variable	FAS group (n = 20)	Comparison group (n = 20)	$\chi^2$	df
Taken into custody or charged for criminal offences resulting in fines	10.0% (2)	5.0% (1)	0.360	1
Taken into custody or charged for criminal offences resulting in probation or prison	0.0% (0)	0.0% (0)		1
Ever been a victim of crime	70.0% (14)	65.0% (13)	0.023	1
Violence/sexual violence	57.1% (8)	30.8% (4)	1.899	2
Cheated out of money	28.6% (4)	46.2% (6)	1.899	2
Other crimes	14.3% (2)	23.1% (3)	1.899	2
It was reported to the police	71.4% (10)	69.2% (9)	0.901	1
Physically hurt by family or close friend	45.0% (9)	20.0% (4)	2.849	1

more psychiatric problems than had the comparison group. The crime conviction rates were low and did not differ significantly between the groups. These results supported our hypothesis, while the study's other findings contradicted it. The results showed that adults with FAS had not, either in the past or recently, experienced more problems with physical health or the use of alcohol or illicit drugs than the comparison group. Moreover, the adults with FAS had not been the victims of crime to a larger extent than the comparison group had.

The results in this study confirmed those of previous studies (Famy et al., 1998; Rangmar, Hjern et al., 2015) reporting on psychiatric problems among individuals with FAS/D.

Data from the ASI interview showed that lifetime experiences of depression commonly occurred in both groups. Within the recent year, however, the adults with FAS had experienced more depression and anxiety than those in the comparison group. Despite this, the group scores on the self-rating BAI scale, showing the level of symptoms of anxiety in the past week, did not differ significantly. Neither did their scores on the BDI, which shows the level of symptoms of depression in the past two weeks. The median scores on the BAI and BDI in the FAS group were in the range defined as mild, whereas the comparison group had scores that could be defined as minimal (Beck et al., 1961, 1988). Despite the relatively low scores on the BAI and BDI, the statements in the ASI



interview may indicate that the adults with FAS had experienced anxiety and depression in life.

Suicidal ideation was more common, and started earlier, among the adults with FAS, having begun already when they had been in their twenties. Half the FAS group had been prescribed some sort of psychotropic drug, and receiving a disability pension due to psychiatric problems was more common in the FAS group than in the comparison group. Various types of psychiatric problems were more common among adults with FAS than in the comparison group. These results are in line with previous reports stating that psychiatric problems commonly occur in adults with FAS (Streissguth et al., 2004). On the other hand, no one in the FAS group or the comparison group had problems with excessive consumption of alcohol or the use of illicit drugs. In this area closely related to psychiatric problems, the results contradicted previous reports (Rangmar, Hjern et al., 2015) which show that alcohol problems and/or illicit drug use are more common among adults with FAS than in the general population.

Unlike awareness of psychiatric problems among individuals with FAS (e.g., Famy et al., 1998; Streissguth et al., 2004), knowledge about their physical health is more limited (Moore & Riley, 2015). The results from this study showed that chronic physical problems that continue to interfere with life were equally self-reported in the FAS group and in the comparison group. Prescriptions of medication for a physical problem were also equally common in the two groups. However, three individuals in the FAS group received a pension for physical disability, and at a  $p < .05$  level, the number of days with sickness leave due to poor physical health in recent months was significantly higher in the FAS group. These findings suggest that adults with FAS have poorer physical health, which may affect their ability to work. However, this suggestion does not exclude the possibility that the high number of days with sickness leave in the FAS group might also be due to psychiatric problems. Nevertheless, further studies are needed to clarify the physical

health status among adults with FAS and whether the prenatal alcohol exposure might have caused poor physical health, which interferes with their daily life.

Within the FASD spectrum, individuals' behavioural and cognitive developments differ from typical development in quite similar ways (Hoyme et al., 2016). As a result, individuals prenatally exposed to alcohol, even those who do not have the dysmorphology required for an FAS diagnosis, may be in similar need of efficient interventions from society. Because they do not have the FAS diagnosis, they may not have access to such support. An FAS diagnosis may thus function as a protective factor regarding long-term outcomes (Salmon, 2007; Streissguth et al., 2004). Although all individuals in this study group had an FAS diagnosis, the outcomes on self-estimated psychiatric problems showed that the psychological support and care provided to them have not been sufficient. However, the relatively positive outcomes concerning the use of alcohol and illicit drugs may be due to the interventions and support from society they have received throughout life. Children with FAS are at risk of being born into a disadvantageous environment: a family in which at least one parent abuses alcohol. Due to these circumstances, they may be placed in out-of-home care (Astley, 2010). In this study all the adults with FAS had been placed in out-of-home care, which may have been a protective factor contributing to the low rates of alcohol and illicit drug use. In addition, the outcomes concerning crime conviction rates contradicted previous studies (Brown et al., 2015; Popova et al., 2011; Streissguth et al., 2004) showing that individuals with FASD may have an increased risk of criminal behaviour. The different study populations may explain the differing crime conviction rates in individuals with FASD between countries. Throughout life, individuals with an FAS diagnosis have a need for, and access to, various social welfare interventions (Rangmar, Hjern et al., 2015). Even in this way, an FAS diagnosis may function as a protective factor and thus reduce the risk of criminal behaviour.

Previous studies (such as Brown et al., 2015) have shown that individuals with FASD have impaired self-control and may be gullible. These characteristics could also make a person a potential victim of crime. Even though a majority of the adults in this study with FAS, 14 of 20, had been victims of crime, this number was not significantly higher than in the comparison group. Among the persons with FAS it was most common to have been a victim of violence, whereas in the comparison group it was most common to have been cheated out of money. The fact that a majority in both groups had experienced being a victim of crime implies that this is an important topic about which there is little existing knowledge.

## Methods discussion and limitations

Data from the ASI showed that it was more common to have experienced depression and anxiety within the past year in the FAS group than in the comparison group. Data from the BDI and BAI on symptoms of depression and anxiety within the past two weeks showed no significant differences between the groups. This may indicate that the self-rated answers differed depending on the measure used. However, the use of different measures in this study provided data that, taken together, give a more complete picture of the participants' lifetime prevalence of experienced depression and anxiety.

Participants in the comparison group were individually matched by age and gender, but had higher intellectual and executive functioning and social cognition than the study group (Rangmar, Sandberg et al., 2015). Because of these differences between the groups, and because there are no applicable normative data for ASI, data from the comparison group might be regarded as reference values.

About half of the study group were recruited from previous research, and the other half through the Swedish National FAS Organisation.

All participants were contacted about participation in research; none of them were patients seeking treatment or care. Thus, taken together, the group studied was considered representative of adults with FAS. A limitation in this study is the relatively small sample size, but this is partly offset by the fact that all participants in the study group had an FAS diagnosis, which delimited the group from the general population. Closely related to this is the fact that studies on adults with FAS are rare. This complicates comparisons between results from this study and previous studies on individuals with FASD, rather than only FAS. However, the behavioural and cognitive developments vary within the FAS/D population in a similar way, differing from typical neuropsychological development (Hoyme et al., 2016). Individuals with FAS are thus in many ways representative of the broader spectrum of FASD, and vice versa. Comparisons and generalisations between the somewhat different populations are thus suggested to be relevant.

## Conclusions

The findings in this study showed that depression, anxiety and suicidal ideation were common among the adults with FAS; thus, efficient interventions and healthcare are essential. Moreover, the study indicated that the adults with FAS were often in too poor a condition to be able to work, and that a majority of the group had been victims of crime. The results call for further research on physical health problems in adults with FAS, and on their risk of being victims of crime. Importantly, all individuals in this study group had an FAS diagnosis. Throughout life this may have given them access to social welfare interventions and may, for example, have made their crime conviction rates low. This demonstrates the need to identify and make interventions available to more individuals with disabilities caused by prenatal alcohol exposure, all under the umbrella of FASD.

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## References

- Astley, S. J. (2010). Profile of the first 1,400 patients receiving diagnostic evaluations for fetal alcohol spectrum disorder at the Washington State Fetal Alcohol Syndrome Diagnostic & Prevention Network. *Canadian Journal of Clinical Pharmacology*, *17*(1), e132–e164.
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*(6), 893.
- Beck, A. T., Ward, C., & Mendelson, M. (1961). Beck depression inventory (BDI). *Archives of General Psychiatry*, *4*(6), 561–571.
- Bertrand, J., Floyd, L. L., & Weber, M. K. (2005). Guidelines for identifying and referring persons with fetal alcohol syndrome. *MMWR. Recommendations and Reports: Morbidity and Mortality Weekly Report. Recommendations and Reports/Centers for Disease Control*, *54*(RR-11), 1–14.
- Brown, N. N., Burd, L., Grant, T., Edwards, W., Adler, R., & Streissguth, A. (2015). Prenatal alcohol exposure: An assessment strategy for the legal context. *International Journal of Law and Psychiatry*, *42*, 144–148.
- Clarren, S. K., & Smith, D. W. (1978). The fetal alcohol syndrome. *New England Journal of Medicine*, *298*(19), 1063–1067.
- Famy, C., Streissguth, A. P., & Unis, A. S. (1998). Mental illness in adults with fetal alcohol syndrome or fetal alcohol effects. *American Journal of Psychiatry*, *155*(4), 552–554.
- Freunsch, I., & Feldmann, R. (2011). Young adults with fetal alcohol syndrome (FAS): Social, emotional and occupational development. *Klinische Pädiatrie*, *223*(1), 33.
- Håkansson, A., & Berglund, M. (2012). Risk factors for criminal recidivism: A prospective follow-up study in prisoners with substance abuse. *BMC Psychiatry*, *12*(1), 1.
- Hoyme, H. E., Kalberg, W. O., Elliott, A. J., Blankenship, J., Buckley, D., Marais, A. S., . . . Jewett, T. (2016). Updated clinical guidelines for diagnosing fetal alcohol spectrum disorders. *Pediatrics*, *138*(2), e20154256.
- Jones, K., & Smith, D. (1973). Recognition of the fetal alcohol syndrome in early infancy. *The Lancet*, *302*(7836), 999–1001.
- Mattson, S. N., Crocker, N., & Nguyen, T. T. (2011). Fetal alcohol spectrum disorders: Neuropsychological and behavioral features. *Neuropsychology Review*, *21*(2), 81–101.
- Mattson, S. N., Roesch, S. C., Glass, L., Deweese, B. N., Coles, C. D., Kable, J. A., . . . the CIFASD. (2013). Further development of a neurobehavioral profile of fetal alcohol spectrum disorders. *Alcoholism: Clinical and Experimental Research*, *37*(3), 517–528. doi:10.1111/j.1530-0277.2012.01952.x
- McGill, J., Meyerholz, D. K., Edsen-Moore, M., Young, B., Coleman, R. A., Schlueter, A. J., . . . Legge, K. L. (2009). Fetal exposure to ethanol has long-term effects on the severity of influenza virus infections. *The Journal of Immunology*, *182*(12), 7803–7808.
- McLellan, A. T., Cacciola, J. C., Alterman, A. I., Rikoon, S. H., & Carise, D. (2006). The addiction severity index at 25: Origins, contributions and transitions. *American Journal on Addictions*, *15*(2), 113–124. [Swedish version.]
- Moore, E. M., & Riley, E. P. (2015). What happens when children with fetal alcohol spectrum

- disorders become adults? *Current Developmental Disorders Reports*, 2(3), 219–227.
- Murawski, N. J., Moore, E. M., Thomas, J. D., & Riley, E. P. (2015). Advances in diagnosis and treatment of fetal alcohol spectrum disorders: From animal models to human studies. *Alcohol Research: Current Reviews*, 37(1), 97. Retrieved from <http://pubs.niaaa.nih.gov/arcr/arcr371/article07.htm>
- Popova, S., Lange, S., Shield, K., Mihic, A., Chudley, A. E., Mukherjee, R. A. S., . . . Rehm, J. (2016). Comorbidity of fetal alcohol spectrum disorder: A systematic review and meta-analysis. *The Lancet*, 387(10022), 978–987.
- Popova, S., Stade, B., Bekmuradov, D., Lange, S., & Rehm, J. (2011). What do we know about the economic impact of fetal alcohol spectrum disorder? A systematic literature review. *Alcohol and Alcoholism*, 46(4), 490–497.
- Rangmar, J., Hjern, A., Vinnerljung, B., Strömland, K., Aronson, M., & Fahlke, C. (2015). Psychosocial outcomes of fetal alcohol syndrome in adulthood. *Pediatrics*, 135(1), e52–e58.
- Rangmar, J., Sandberg, A. D., Aronson, M., & Fahlke, C. (2015). Cognitive and executive functions, social cognition and sense of coherence in adults with fetal alcohol syndrome. *Nordic Journal of Psychiatry*, 69(6), 1754–1760.
- Riley, E. P., Infante, M. A., & Warren, K. R. (2011). Fetal alcohol spectrum disorders: An overview. *Neuropsychology Review*, 21(2), 73–80. doi: <http://dx.doi.org.ezproxy.ub.gu.se/10.1007/s11065-011-9166-x>
- Salmon, J. (2007). Fetal alcohol spectrum disorder: New Zealand birth mothers' experiences. *Canadian Journal of Clinical Pharmacology = Journal Canadien de Pharmacologie Clinique*, 15(2), e191–213.
- Streissguth, A. P., Bookstein, F. L., Barr, H. M., Sampson, P. D., O'Malley, K., & Young, J. K. (2004). Risk factors for adverse life outcomes in fetal alcohol syndrome and fetal alcohol effects. *Journal of Developmental & Behavioral Pediatrics*, 25(4), 228–238.
- World Health Organization. (2011). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva, Switzerland: World Health Organization.
- Zhang, X., Lan, N., Bach, P., Nordstokke, D., Yu, W., Ellis, L., . . . Weinberg, J. (2012). Prenatal alcohol exposure alters the course and severity of adjuvant-induced arthritis in female rats. *Brain, Behavior, and Immunity*, 26(3), 439–450.