COMPARING DAILY LIVING SKILLS IN ADULTS WITH FETAL ALCOHOL SPECTRUM DISORDER (FASD) TO AN IQ MATCHED CLINICAL SAMPLE

Valerie Temple, Lauren Shewfelt, Leeping Tao, Josee Casati, Linda Klevnick
Surrey Place, Toronto, Ontario

ABSTRACT

Background
Prenatal alcohol exposure is an established risk factor for cognitive deficits. Adults with FASD also have deficits in their Adaptive Daily Living skills (ADLs) relative to age-appropriate norms, but the degree to which this can be attributed to cognitive deficits is unclear.

Objectives
To examine ADLs in adults with FASD and compare them to a group of clinic referred individuals with similar IQ scores but without FASD.

Methods
Fifteen adults with FASD and 15 IQ matched controls were included. Wechsler Intelligence tests were used to measure IQ, and the Adaptive Behavior Assessment System-II (ABAS-II) was used to measure ADLs.

Results
Compared to IQ matched controls, individuals with FASD had significantly lower overall ADLs (p=.03). Mean scores across all sub-domains on the ABAS-II were lower for the FASD group. Mean standard scores for ADLs in the FASD group were 11 points lower than mean IQ. In the control group, the difference was only 2 points.

Conclusions
Adults with FASD may have lower daily living skills than individuals with similar IQ scores. This suggests that IQ is not a good predictor of ADLs in adults with FASD.

Key Words: *Fetal Alcohol, FASD, daily living skills, adaptive behaviour, adult*

Prenatal alcohol exposure is a well established risk factor for a variety of cognitive deficits and behavioural problems in children.[1,2,3] How these deficits are manifest in adulthood and how they might influence the performance of adaptive daily living skills (ADLs) in adulthood, is less well documented.

The Canadian Guidelines for diagnosing Fetal Alcohol Spectrum Disorders (FASD) include four categories: Fetal Alcohol Syndrome (FAS), Partial Fetal Alcohol Syndrome (pFAS), Alcohol Related Birth Defects (ARBD), and Alcohol Related Neuro-developmental disorder (ARND).[4] The general parameters considered when making a diagnosis of FASD are level of exposure to alcohol, physical deficits such as growth impairment, specific facial features, and central nervous system dysfunction. Central nervous system dysfunction may be identified through either structural evaluation, using techniques such as brain imaging, or through functional evaluation which may entail psychological, speech-language, or occupational therapy assessment. Functional evaluations in adults typically find impairments in executive functioning, numeric processing, learning and memory, attention and information processing, and language.[5,6,7] Problems with mental health and ADLs are also commonly reported.[7,8]

Studies of ADLs in children have found that individuals with alcohol exposure often have

lower scores than their normally developing, age-matched peers.[9,10] Whaley et al. found that a group of children, aged 2 to 10 years, with alcohol exposure had scores 2 standard deviations below the mean for overall ADLs on the Vineland Adaptive Behavior Scale (VABS) when compared to age norms.[9] They also found that older children with alcohol exposure had greater deficits in their social skills relative to non-exposed peers, suggesting that age may exacerbate these problems. However, when they compared ADLs in the alcohol-exposed group to a clinic referred sample of children matched on age and IQ, the two did not differ. This would seem to suggest that children with alcohol exposure have lower than average ADLs when compared to normally developing individuals but not necessarily when compared to other children with mental health problems and similar IQ scores. Thomas et al. used the Social skills subscale of the VABS to compare a group of 5 to 12 year olds with FASD to non-exposed children matched for age and verbal IQ.[10] They found that, despite having similar verbal IQ scores, the FASD group had lower ADLs scores for the domain of social skills. They also noted, as Whaley et al. did, that problems with ADLs became more pronounced over time, with older children demonstrating greater deficits.

At least one study of children exposed to alcohol prenatally did not find deficits in overall ADLs. Coles et al. (1991) compared 3 groups of children between 5 and 8 years old who were either exposed to alcohol throughout the pregnancy, exposed until the second trimester only, or unexposed.[11] They found that ADLs scores for all 3 groups were in the Average range compared to age norms, with no significant differences between groups.

Studies of ADLs in older children and adults with FASD consistently find significant deficits. Streissguth and colleagues examined the ADLs of a group who ranged in age from 12 to 40 years.[7] Although some of the physical characteristics of FASD such as growth deficits and facial features faded with time, low IQ and low ADLs remained a significant problem. On the VABS, participants had an average overall age-equivalent score of 7 years despite the fact that the average chronological age of the group was 17 years. Social skills were noted to be especially low when compared to other daily living skills. Similarly, a study by Spohr and colleagues which examined individuals diagnosed with FASD over 20 years of age found that intellectual disability, limited occupational success, and dependent living were common problems for the group suggesting low ADLs compared to peers.[12] Another study by Streissguth's group looked at outcomes for 90 individuals with FASD over the age of 21 years[13] within the context of a larger cohort of both children and adults. These 90 adults were reported to have a mean overall IQ score of 80 (Fullscale IQ) but their mean overall Composite standard score on the VABS was only 61. This difference of almost 20 points between the two types of standard scores represents a significant and substantial discrepancy in ADLs relative to IQ.

Although previous studies seem to support the hypothesis that adults with FASD have deficits in their ADLs relative to age-appropriate norms, the degree to which this can be attributed to deficits in IQ is unclear. Individuals with low IQ's are well known to have deficits in their ADLs[14] so it is possible that the low ADLs scores typically seen in FASD are similar to those seen in other individuals with low IQ levels. The purpose of this study therefore was to examine ADLs in adults with FASD and compare their scores across a variety of domains to a group of clinic referred individuals with similar IQ scores but without FASD.

METHODS

Participants

All participants in this study were clients of a community-based agency serving individuals with developmental disabilities in Toronto, Ontario. Fifteen adults with a diagnosis of FASD and 15 IQ matched controls were included. The FASD group had 9 females and the control group had 5 females. In terms of residence, 9 individuals with FASD lived independently or semi-independently and 6 lived with a family member or in a foster home. In the control group, 6 lived independently or semi-independently, 8 lived with family, and 1 lived in a temporary mental health placement.

Existing psychiatric diagnoses within the control and FASD groups are shown in Table 1. A high number and wide variety of mental health problems were reported for both groups, with

many having several diagnostic labels. Most commonly found in the FASD group were: Attention Deficit Hyperactivity Disorder, Mood disorders, Substance Abuse/Dependence, and Anxiety Disorders. Mean ages and age ranges for the FASD and control groups are shown in Table 2.

TABLE 1 Previous DSM* Diagnoses in the FASD (N=15) and Matched Control Group (N=15)

	FASD	Control
DIAGNOSIS	**N**	**N**
Clinical Syndromes		
Mood Disorders	6	5
Anxiety Disorders	6	4
Psychotic Disorders	1	4
Substance Abuse/dependence	8	3
Adjustment Disorder	0	1
Developmental and Personality Disorders		
Personality Disorders	1	2
Conduct /Oppositional Defiant Disorder	3	2
Attention Deficit Hyperactivity disorder	7	3
Pervasive Developmental disorders	0	2
Attachment Disorders	4	0

*Diagnostic and Statistical Manual of Mental Disorders

TABLE 2 FASD (N=15) and Matched Control Group (N=15) Demographics and Scores on the Adaptive Behavior Assessment System-II (ABAS-II)

	FASD		Control	
Variable	**Mean**	**(Range)**	**Mean**	**(Range)**
Age	25.1	(18-46)	29.8	(20-57)
Fullscale IQ	79.9	(59-108)	79.5	(59-97)
ABAS-II				
Subscales				
Conceptual*	71.2	(55-85)	80.6	(67-103)
Practical	76.1	(59-101)	83.4	(61-109)
Social	72.7	(60-87)	77.6	(62-105)
GAC[1]**	68.1	(52-92)	77.1	(57-105)

**Significant difference, p<.05; *Significant difference, p<.016
[1]General Adaptive Composite (total score for the ABAS-II)

Procedures

All individuals in the FASD group were referrals to an FASD Adult Diagnostic Clinic at the agency. Details regarding prenatal exposure were gathered through interview with family members (e.g., birth mother or father; maternal grandparents) or review of clinical records (e.g., past medical reports). Only those for whom exposure could be confirmed were included in the FASD group. Diagnoses of FASD were made by a multi-disciplinary team using the Canadian Guidelines for Diagnosis.[4] Overall, 4 individuals were diagnosed with FAS, 2 with pFAS, and 9 with ARND.

The IQ matched control group was a clinic referred sample chosen by reviewing the files of individuals who had presented for intellectual assessment over the past 5 years. Individuals who had, in the course of their regular clinical treatment, completed an appropriate IQ test and adaptive behaviour scale (see description of instruments below) and who had an IQ score identical to one of the FASD participants were selected for inclusion. In cases where more than one match for IQ was found upon file review, a decision on which case to include was made first by attempting to match as closely as possible on age, and then on gender. All psychological assessments were performed by a licensed psychologist or a psychometrist under supervision of a licensed psychologist. Information regarding prenatal exposures, birth and developmental history was obtained for the control group through an Intake interview. Those for whom maternal alcohol use was reported were not included in the study.

Instruments

Intellectual ability was assessed using either the Wechsler Adult Intelligence Scale-III or the Wechsler Abbreviated Scale of Intelligence. These are two well know and widely used ability tests which assess verbal and nonverbal abilities to arrive at a score for overall, or Fullscale, IQ. Adaptive abilities were rated using the Adult Form of the Adaptive Behavior Assessment System-II (ABAS-II). The ABAS-II is a popular and comprehensive norm-referenced rating scale designed to evaluate if an individual displays the functional skills needed for independent daily living.[14] It includes 240 items in the following 9 skill areas: Communication, Functional Academics, Self-direction, Leisure, Social, Community Use, Home Living, Health and Safety, and Self-care. These 9 subscales are combined to create 3 Composite scores: Conceptual, Social and Practical skills. The 3 Composites are in turn combined to form the General Adaptive Composite (GAC). All Composite scores are expressed as standard scores. The ABAS-II was completed for each participant by a knowledgeable caregiver or informant.

RESULTS

Table 2 shows the mean scores and ranges for age, IQ, and ABAS-II scores. For the FASD group, mean scores across all ADLs domains were well below normal, ranging from about 1.5 to 2 standard deviations below age norms. Descriptively, these scores are in the Borderline to Extremely Low range. Scores for the control group were also depressed but less so, ranging from about 1 to 1.5 standard deviations below age norms. These would be classified overall in the Borderline to Low Average range.

Paired sample t-tests were used to establish if there were significant differences across the two groups. T-tests comparing age, IQ, and total ABAS-II scores were undertaken. Results found that age [$t(14)=1.85$, $p=.09$] and IQ [$t(14)=.57$, $p=.58$] were not significantly different for control and FASD groups. On the ABAS-II, however, the FASD group had significantly lower scores for overall Composite GAC [$t(14)=2.44$, $p=.03$] compared to the control group.

As a significant difference was found between the FASD group and controls on overall GAC scores, it was of interest to see which sub-domains were most effected. Additional t-tests were therefore undertaken to examine the 3 Composites which make up the overall ABAS-II score. In order to control for Type I error, a significance level of .016 (.05 divided by 3) was established for this analysis. Results found that only Conceptual skills [$t(14)=2.91$, $p=.011$] were significantly lower in the FASD group when compared to controls. Practical skills [$t(14)=1.93$, $p=.074$] and Social skills [$t(14)=1.41$, $p=.180$] were not significantly different, but were still lower in the FASD group.

DISCUSSION

IQ has been defined as an individual's general intellectual ability or 'general problem solving skill'. It is intended to measure a person's ability to solve a variety of different types of problems compared to their age peers. Scores for ADLs are intended to be a measure of the behavioural manifestation of an individual's ability to cope with the tasks of everyday life, or put another way, to solve problems in daily life. It would therefore be reasonable to expect that IQ scores and ADLs scores would be similar or at least closely related. For many individuals this is the case. It was not true, however, for the individuals with FASD in this study.

Results showed that compared to a group of clinic-referred, IQ matched controls, individuals with FASD had significantly lower ADLs overall. Mean scores for all 3 domains on the ABAS-II, a popular tool for rating daily living skills in adults, were lower in the FASD group compared to controls. Examination of individual domains found significantly lower scores for the FASD group in Conceptual skills.

The FASD group had about an 11 point difference between their mean GAC score (overall ADLs score) and their mean IQ score, with IQ being higher than ADLs. The control group, on the other hand, had about a 2 point difference between their mean scores. This would appear to indicate that adults with FASD have deficits in their daily living skills greater than might be expected based on IQ only. This difference might be interpreted as indicating that IQ as it is typically measured is not a good predictor of overall ability in adults with FASD. Conversely, it could indicate that adults with FASD for some reason cannot translate the problem solving skills they demonstrate during IQ testing into the "everyday world".

One area of particular difficulty for the FASD group appeared to be the domain of Conceptual skills which contains subscales for self-direction, functional academics, and communication. Some examples of the skills in the Conceptual area are the ability to manage time and money; the ability to express complex thoughts or ideas; the ability to plan for the future; and the ability to control emotions and impulses. Previous research has demonstrated significant deficits in executive functioning, mathematical skills, and receptive language for individuals with FASD.[5,15] Our data demonstrate that these deficits are also evident to others (i.e., informants in this study) in daily life.

The severity of impairment in ADLs demonstrated by this group with FASD appears to be similar to the level Streissguth reported for her sample of adults over 21 years.[13] Our results are also very close to the overall 2 standard deviations below average for ADLs that was reported by Whaley et al. in her sample of children.[9] This study differs from Whaley, however, in that their clinic referred sample also had significant deficits in ADLs similar to the FASD group, whereas our clinic sample had stronger ADLs more in line with their reported IQ levels.

There are several important limitations of this study that must be recognized. First, given the small sample size results should be regarded as tentative until examined on larger samples. As well, due to limited numbers it was not possible to control for any of the important variables that might also influence ADLs such as socio-economic status or a variety of life experiences. In this study, ADLs were established by caregiver report rather than direct observation and therefore are subject to reporter bias, lack of sufficient knowledge etc. This issue can be especially problematic for adults as they often live away from family members and do not always have someone who can reliably report on their daily activities. Future investigations might focus on controlling for variables that can influence ADLs such as family history, vocational opportunities, and level of schooling.

Corresponding Author:
Valerie.temple@surreyplace.on.ca

REFERENCES

1. Kodituwakku P. Defining the behavioral phenotype in children with fetal alcohol spectrum disorders: A review. Neuroscience and Biobehavioral Reviews 2007;31:192–201.
2. Matson S, Roesch S, Fagerlund A, Autti-Ramo I, Lyons Jones K, May P, Adnams C, Konovalova V, Riley E, & CIFASD. Towards a neuropsychological profile of Fetal Alcohol

Spectrum Disorders. Alcohol Clin Exp Res 2010;34:1640-50.
3. Greenbaum R, Nulman I, Rovet J, Koren G. The Toronto experience in diagnosing alcohol-related neurodevelopmental disorder: A unique profile of deficits and assets. Can J Clin Pharmacol 2002;9:215-25.
4. Chudley A, Conry J, Cook J, Loock C, Rosales T, LeBlanc N. Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. CMAJ 2005;172:S1-S21.
5. Kerns K, Don A, Mateer C, Streissguth A. Cognitive deficits in nonretarded adults with FAS. J of Learning Disabilities 1997;30:685-693.
6. Chudley A, Kilgour A, Cranston M, Edwards M. Challenges of diagnosis in Fetal Alcohol Syndrome and Fetal Alcohol Spectrum Disorder in the adult. Amer J of Medical Genetics 2007;145C:261-272.
7. Streissguth A, Aase J, Clarren S, Randels S, LaDue R, Smith D. Fetal alcohol syndrome in adolescents and adults. JAMA 1991;265:1961-67.
8. Barr H, Bookstein F, O'Malley K, O'Connor P, Huggins J, Streissguth A. Binge drinking during pregnancy as a predictor of psychiatric disorders on the structure clinical interview for DSM-IV in young adult offspring. Am J of Psychiatry 2006;163:1061-70.
9. Whaley S, O'Connor M, Gunderson B. Comparison of the adaptive functioning of children prenatally exposed to alcohol to a nonexposed clinical sample. Alcohol Clin Exp Res 2001;25:118-124.
10. Thomas S, Kelly S, Mattson S, Riley E. Comparison of social abilities of children with fetal alcohol syndrome to those of children with similar IQ scores and normal controls. Alcohol Clin Exp Res 1998;22:528-33.
11. Coles C, Brown R, Smith I, et al. Effects of prenatal alcohol exposure at school age. I. Physical and cognitive development. Neurotoxicology and Teratology 1991;13:357-67.
12. Spohr H, Willms J, Steinhausen H. Fetal Alcohol spectrum disorders in young adulthood. J Pediatr 2007;150:175-9.
13. Streissguth A, Bookstein R, Barr H, Sampson P, O'Malley K, Kogan Young J. Risk factors for adverse life outcomes in FAS and FAE. Developmental and Behavioral Pediatrics 2004;25:138-149.
14. Harrison P. & Oakland T. Adaptive Behavior Assessment System-II: Manual. San Antonio, Tx: Psychological Corporation 2003.
15. Rasmussen C. Executive functioning and working memory in fetal alcohol spectrum disorder. Alcohol Clin Exp Res 2005;29:1359-67.