_____ **Research Report** _____

**Fetal Alcohol Spectrum Disorder (FASD) in
a correctional population: Prevalence, screening
and characteristics**

2011 Nº R-247

Fetal Alcohol Spectrum Disorder (FASD) in a correctional population: Prevalence, screening and characteristics

Patricia H. MacPherson, M.Sc.
Addictions Research Centre

Albert E. Chudley, MD
University of Manitoba

&

Brian A. Grant, Ph.D.
Research Branch

Correctional Service of Canada

June 2011

Acknowledgements

Executive Summary

Key words: *Fetal Alcohol Spectrum Disorder, FASD, partial Fetal Alcohol Syndrome, pFAS, Alcohol Related Neurodevelopmental Disorder, ARND, corrections, adults, screening, diagnosis, psychometrics.*

Fetal Alcohol Spectrum Disorder (FASD) is a concern within the justice system generally, and specifically in adult and juvenile correctional systems. While work has been conducted with juvenile populations regarding the identification and diagnosis FASD, the adult correctional population has largely been overlooked.

The goals of the current research study were to pilot a screening tool (the FASD Brief Screen Checklist – BSC)[1], with a cohort of male offenders entering the federal correctional system, to estimate the prevalence of FASD among the general male federal offender population, and to describe the characteristics of offenders with an FASD.

The study was conducted over an 18 month period. During this time, all newly sentenced offenders at the study site[2], age 30 and under, were asked to participate in the research. Consent interviews were held with all offenders who met the inclusion criteria, and 65% agreed to participate. Participants were administered the FASD Brief Screen Checklist, (BSC), asked for names and contact information of family members and close family friends, including birth mothers, to confirm the presence or absence of prenatal alcohol exposure and to provide historical information for each participant (eg. history of adoption or foster care, early school experiences). Each participant underwent a full FASD medical assessment led by a physician experienced in FASD diagnosis which included a physical exam and extensive neuropsychological test battery. A case conference was held with the physician, a clinical neuropsychologist and a research assistant to determine if the participant met the criteria for a diagnosis in one of the FASD categories (Fetal Alcohol Syndrome, partial Fetal Alcohol Syndrome, or Alcohol Related Neurodevelopmental Disorder).

Ninety-one offenders participated in the full research protocol. The results of the screening and diagnostic process found that 10% of participants met the criteria for an FASD, 15% met some of the diagnostic criteria for an FASD[3], but were missing information critical to making or ruling out a diagnosis, 45% were found to have neuropsychological deficits unrelated to prenatal alcohol exposure, and 30% were found to have no identifiable deficits through the diagnostic protocol.

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[1] The BSC was developed by the Addictions Research Centre in collaboration with Canadian experts in the field of FASD.

[2] The study site was a medium security penitentiary for men in the Prairie Region.

[3] This group was composed of participants who were missing information required to complete a diagnosis. There were two subgroups: one group missing information on prenatal alcohol exposure and one with confirmed prenatal alcohol exposure but insufficient severity of neuropsychological deficits to meet the criteria for a diagnosis in one of the FASD categories.

The psychometric properties of the BSC were found to be very promising. Receiver operating curves (ROC) were generated for the BSC behavioural and historical subscales to assess the optimal psychometric properties and the associated cut-off scores. The final BSC was found to be predictive of FASD (Sensitivity = 78%, Specificity = 85%, negative predictive value = 97%, positive predictive value = 41%, and accuracy = 84%). Diagnosis was used as the gold standard to evaluate the predictive utility of the screening tool. The behavioural items had excellent internal consistency (Cronbach's alpha=.89). The BSC discriminated well between participants with an FASD, those with neuropsychological deficits unrelated to prenatal alcohol exposure and those that had no deficits identified.

Analysis of the characteristics of offenders with an FASD found that they had higher risk and need ratings compared to other offenders in the research. It was found that offenders with an FASD had particular difficulties with employment in the community and with a lack of family support. They had severe neuropsychological deficits in attention, executive functioning and adaptive behaviour. In addition, they were much more likely to have had multiple convictions and previous periods of incarceration as both juveniles and adults.

The research demonstrated that a screening and diagnostic protocol for FASD can be successfully implemented in a federal correctional setting. In order to validate the screening tool and to obtain an accurate estimate of FASD prevalence in the general offender population, this research will need to be replicated with another sample of offenders from a different geographic location and population demographic. It is important for correctional jurisdictions to determine the prevalence of offenders with an FASD to better assist them while incarcerated and while released to the community to prevent re-offending by this population.

Table of Contents

List of Tables

List of Figures

List of Appendices

Introduction

An increasing area of concern for criminal justice pertains to offenders with Fetal Alcohol Spectrum Disorders (FASDs), a range of conditions caused by prenatal exposure to alcohol which can result in neurophysiologic changes involving brain structure and function. These alterations are permanent and can affect an individual's ability to function within societal rules and norms which can, in turn, lead to contact with the criminal justice system (Boland et al, 1998). While there are no research studies to date that provide good estimates of the prevalence of FASD within the adult correctional system, it is suspected that the rate is higher than that in the general population (Boland, Burrill, Duwyn, & Karp, 1998; Boland, Chudley & Grant, 2002).

Identifying FASD in a correctional context

Identifying adults with an FASD is a challenge. Many adults with an FASD do not show any physical signs of their disorder, therefore intellectual and behavioural difficulties experienced are likely to have been previously misdiagnosed (Streissguth et al, 1991a). Individuals with an FASD have trouble with judgment, reasoning, and understanding the consequences of their actions. They are also more likely to be raised in unstable and unsupportive home environments, which further exacerbate their difficulties (Streissguth et al., 1991a). Further complicating the identification of adults in the criminal justice system, many of the characteristics associated with an FASD are common in the general prison population among offenders who do not have an FASD. For example, offenders in the general prison population commonly have attention deficits, learning difficulties, substance abuse problems and are impulsive (Boe, Nafekh, Vuong, Sinclair, & Cousineau, 2003). Behavioural problems that are the manifestation of brain damage due to prenatal alcohol exposure are unique, however, in range, chronicity and severity. The range of deficits exhibited by adults with an FASD can include social adaptive functioning, learning, memory, executive functioning, language comprehension, cognitive functioning, and attentional deficits. As brain damage is permanent the challenges these individuals face will remain throughout their lives. Many individuals with an FASD require lifelong support and may have trouble living independently without stable support systems. Some of the classic behavioural issues associated with an FASD can lead to

additional challenges when these individuals are incarcerated, such as easily trusting others, inability to understand consequences, trying too hard to make friends and disclosing too much personal information (Fast & Conry, 2004). When an undiagnosed individual with an FASD is incarcerated, these behaviours can cause the offender to be victimized by others and to be mistakenly identified as being a trouble-maker by correctional staff (Fast & Conry, 2004).

The number of individuals with an FASD in the Canadian correctional system is unknown, however research suggests individuals with FASD are at an increased risk of coming in contact with the justice system (Boland et al., 1998, 2002; Fast & Conry, 2004; Fast, Conry & Loock, 1999; Streissguth & Kanter, 1997; Streissguth et al., 2004). There is currently no established method of identifying individuals with an FASD in the correctional system, which suggests that individuals with an FASD who have not been identified in their youth may continue to be undetected while in custody (Boland et al., 1998). Thus, it is important to identify offenders with an FASD in order to consider supportive and effective treatment approaches and services that meet their unique needs.

Fetal Alcohol Spectrum Disorder

FASD is an umbrella term that describes a range of disorders resulting from prenatal exposure to alcohol. The degree of impairment is determined by a variety of factors such as the timing, dose, and frequency of prenatal alcohol exposure, maternal genetic factors, prenatal drug exposures and other maternal variables. Fetal Alcohol Syndrome (FAS), the most visible manifestation of FASD, is distinguished by three main diagnostic requirements: significant pre- and/or post-natal growth impairment, significant central nervous system (CNS) impairment, and presence of three distinct facial characteristics : short palpebral fissures (eye opening), smooth or flattened philtrum (groove between nose and upper lip) and a thin upper lip (Chudley et al., 2005; Chudley, Kilgour, Cranston, & Edwards, 2007). Other potential birth defects found in individuals with an FASD include heart defects, cleft palate, brain malformations, visual and auditory impairments, kidney abnormalities, seizure disorders, skeletal effects, and other physical abnormalities (Chudley et al., 2005). On the other end of the spectrum, individuals with an FASD do not have the facial abnormalities or growth impairment, yet do have the neurological deficits that affect learning, judgement, and problem solving. Initially these deficits were termed as fetal alcohol effects (FAE); these 'effects' were separated into more specific diagnostic categories in 1996 (Chudley et al., 2005). The diagnostic categories which currently

fall under the umbrella of FASD are: FAS with confirmed alcohol exposure, FAS without confirmed alcohol exposure, partial FAS (pFAS), and Alcohol Related Neurodevelopment Disorder (ARND) (Chudley et al., 2005; Chudley et al., 2007). As a result of this new method of categorization, the term FAE is generally no longer used; it has been replaced by ARND. These conditions vary depending on the extent to which each of the FASD diagnostic requirements is represented (see Table 1). The extent to which the condition is 'present' or 'absent' is assessed along a 4-point likert scale, from 1 = 'absent', 2='mild', 3='moderate', and 4='heavy'. The exact terminology varies from one assessment characteristic to another, however the scale does not change.

Table 1

Harmonization of Institute of Medicine (IOM) nomenclature and 4-digit diagnostic code ranks for growth, face, brain and alcohol history*.

IOM nomenclature	4 –digit diagnostic code ranks			
	Growth deficiency	FAS facial phenotype	CNS damage or dysfunction	Gestational exposure to alcohol
FAS (with confirmed exposure)	2, 3 or 4	3 or 4	3 or 4	3 or 4
FAS (without confirmed exposure)	2, 3 or 4	3 or 4	3 or 4	2
Partial FAS (with confirmed exposure)*	1, 2, 3 or 4	2, 3 or 4	3 or 4	3 or 4
ARND (with confirmed exposure)	1,2,3 or 4	1 or 2	3 or 4 (2 for < 6 years)	3 or 4

Note: ARND – alcohol- related neurodevelopmenal disorder, CNS – central nervous system; FAS = fetal alcohol syndrome.
Source: Developed by Kwadwo Asante and Julianne Conry
*Any final 4-digit code that can be made with these combinations of numbers and that is not also an FAS code signifies partial FAS. Combinations of face 2 that include two significant facial features also meet criteria for partial FAS.
*Reproduced from Chudley et al., 2005.

Diagnosing the FASDs (FAS, pFAS, and ARND) require a thorough examination of information from a multitude of sources, and involves a multidisciplinary team of professionals from psychology, speech language pathology and occupational therapy, as well as a physician with expertise in FASD or genetics (Chudley et al., 2005). FASD is termed a "differential diagnosis", which means that all other possible causes and similar conditions must be ruled out

before determining that prenatal alcohol exposure is the cause of the observed pattern of deficits (Chudley et al., 2005). Obtaining information on prenatal alcohol exposure can be challenging as Streissguth et al. (1991a) reported almost one-third of the individuals diagnosed in their study were raised by someone other than a biological parent.

FASD is the leading cause of preventable developmental disabilities in Canada (Health Canada, 2003) and "the single most prevalent preventable cause of congenital neurobehavioural dysfunction in the Western world" (Nash et al., 2006). Disabilities associated with it are varied but overall can be classified as primary and secondary. According to Streissguth, Bookstein, Barr, and Sampson (1998), primary disabilities are present at birth and result directly from vulnerable developing systems exposed to alcohol. Included in this category are intellectual deficits and learning disabilities, physical disabilities, hyperactivity, attention and/or memory deficiencies, inability to manage anger, difficulties with problem solving, and growth impairment (Boland et al. 2002; Burd Selfridge, Klug, & Juelson, 2003; Chudley et al. 2005; Streissguth, 1997). These disabilities are permanent but can be managed with proper diagnosis and treatment.

Streissguth (1997) describes secondary disabilities as resulting from an interaction between primary disabilities and one's environment and/or experiences. Secondary disabilities manifest as: mental health problems, alcohol and/or drug abuse, inappropriate sexual behaviour, disrupted school experience, trouble with the law, and confinement (Streissguth, 1997). FASD is a disorder that continues to impact people's lives from childhood into adulthood, though its manifestations may vary greatly; not all adults with an FASD exhibit the same disabilities, or level of disability (Streissguth, Aase, Clarren, Randels, LaDue, & Smith, 1991a; Streissguth, Barr, Sampson, & Bookstein, 1994; Streissguth, Randels, & Smith, 1991b).

The disabilities associated with FASD have considerable implications for quality of life. Many believe that FAS is considered a more serious diagnosis under the spectrum of alcohol related disabilities, and that those with FAS are more severely affected. However, this is not necessarily so. In a study by Streissguth et al., (2004), participants with FAE (ARND) were found to have higher rates of adverse life outcomes compared to those with FAS. Streissguth and colleagues propose that since many people within the FASD spectrum do not always have sufficient impairment to access support services (e.g., their intellectual disabilities do not meet the standard criteria), or may not have the hallmark facial features, they may not be able access interventions and supports that could otherwise help. In addition, secondary disabilities become

4

more pronounced as undiagnosed individuals with an FASD grow older and experience the frustrations and challenges of coping in school and the adult world without the skill sets or interventions necessary for learning and social adaptability (Streissguth et al., 1991b).

The expression of FASD is complex. Both primary and secondary disabilities can have a considerable implication on a person's ability to live independently in the community. In their study of youth and adults with FASD, Streissguth and colleagues (1991b) found that participants with FASD were likely to have problems living independently and more likely to engage in problem behaviour due to disabilities commonly associated with FASD (e.g., problems processing abstract concepts such as time and money). In addition, issues with impulsivity, attention deficit, poor judgement and being unaware of the consequences of their actions increased the likelihood for problems with the law. According to Streissguth and colleagues (1991b), it seems that it is not simply the magnitude of impairment but also the type of behaviour affected that plays a role in the inability of many individuals to experience independent day-to-day living.

Rates of FASD

Currently, there is no accurate estimate of the national incidence rate of FASD in Canada, although Health Canada (2003) has estimated that it is around 9 per 1000 live births. Similarly, some reports estimate the incidence in the United States to be approximately 9 per 1000 live births (Chudley et al., 2005).

Rates of FASD in specific communities across Canada have been observed as low as 0.515 per 1000 (Habbick, Nanson, Snyder, Casey, & Schulman, 1996) and as high as 190 per 1000 live births (Robinson, Conry, & Conry, 1987). Studies on small Aboriginal communities have estimated rates of FASD ranging from 25 per 1000 to 190 per 1000 in two British Columbia communities to 55-101 per 1000 in one Manitoba study (Chudley et al., 2005). As Chudley and colleagues (2005) point out, however, these are small isolated studies and should not be generalized to other communities or the Canadian population in general. Chudley et al., (2007) propose that such variability in rates of FASD as illustrated above can be attributed, at least in part, to four factors: variable poverty rates between study sites; genetic and ethnic differences; historical variability in diagnostic criteria; and lack of knowledge and understanding by primary care providers.

In the criminal justice system, Fast, Conry, and Loock (1999) estimated that 23% of young offenders remanded for a psychiatric assessment in a Canadian youth facility had an FASD. This was a specialized population referred for psychiatric services, where the rate of FASD might be expected to be higher than the general young offender population. In the United States, Streissguth et al. (2004) found that 60% of a sample of youth and adults with an FASD had problems with the law. Of this 60%, 13% of children, 67% of adolescents and 87% of adults had been charged, arrested and/or convicted of a crime.

Although these studies point to the difficulties individuals with FASD have with the criminal justice system, these are small studies focused on a particular subset of the population. There are no published studies to date on the rates of FASD within Canada's adult criminal justice population.

Gaps in screening for FASD

A diagnostic assessment for FASD is expensive and there are few diagnostic clinics in Canada, particularly for adults (Clarren & Lutke, 2008). Screening for FASD usually occurs by assessing "risk" characteristics in the mother and/or individual (usually infant or child) (for example, refer to Abel & Hannigan, 1995; Astley, Bailey, Talbot, & Clarren, 2000; Bagheri et al., 1998; Nash et al., 2006; Wenman, Joffres, Tatryn, & Edmonton Perinatal Infections Group, 2004).   Most services for screening, diagnosis, and intervention of FASD are targeted for children and youth, while services for adults are lacking (McKechnie, 2000; Roberts & Nanson, 2000).

Currently, no assessment tool of known reliability or validity is available to assist correctional systems in screening adults who may be affected by FASD (for a review see Goh, Chudley, Clarren, Koren, Orrbine, Rosales & Rosenbaum, 2008). Screening tools do exist such as the Alcohol Related Neurodevelopmental Disability (ARNDD) Behavioral Checklist (Burd et al., 1999), the FASNET Assessment Tool (BC FASNET), the Fetal Alcohol Exposure Risk Assessment for Adolescents and Adults (LaDue, Schacht, Tanner-Halverson, & McGowan, 1999), the GGPC FASD Screening Tool (Perry, Prediger, & Blakley, 2003) and the Fetal Alcohol Behavior Scale (Streissguth, Bookstein, Barr & Sampson, 1998). However, these tools are either no longer widely used, are not validated, focus on children and youth, over-emphasize one diagnostic requirement, are impractical for a correctional setting because they require an

6

investment of significant resources or are not applicable to adult offenders (MacPherson & Chudley, 2007).

The FASD Brief Screen Checklist (BSC) was developed to address the shortcomings of the existing screening tools and to address key factors that are pertinent to the offender population. Incorporation of screening for FASD in the intake assessment process of all federal correctional institutions is key to establishing prevalence estimates in the general offender population, to demonstrate through identification the magnitude of the issue for correctional services and to ensure this group of offenders receive effective services to address their unique needs.

Goals of project

The study was designed to address the various issues described above and five specific goals were indentified.

1. Determine the prevalence of FASD in a sample of male offenders over an 18 month period.
2. Describe the characteristics of offenders diagnosed with an FASD;
3. Determine the best source of information (i.e., collateral source or self-report) to diagnose the offender;
4. Evaluate the utility of a screening tool (BSC) to identify offenders at risk for an FASD
5. Assess the utility of a Facial Photographic Analysis Software (Astley 2005) to identify facial characteristics of offenders with FAS.

Method

Sample

Three key inclusion criteria were established for study participants. These were: starting a new federal sentence; age 30 and under; and from the local geographic area (Winnipeg). Over the study period (March 2005-September 2006), 160 offenders met the inclusion criteria and of those, 106 (66%) agreed to participate. During the study, four offenders participated in all aspects of the FASD assessment but had invalid neuropsychological results,[4] which excluded them from the study as their data could not be assessed for diagnostic purposes. In addition, 11 offenders withdrew throughout the study for various reasons, which resulted in a final sample of 91 offenders.

Participants in this study also included collateral contacts: family, close friends and birth mothers. Offenders who agreed to participate were asked to provide the names and contact information of their birth mother (maternal contact) and family member or close friend (collateral contacts) to be interviewed. These collateral sources were interviewed using the Brief Screen Checklist and were asked to provide as much information as possible on the behavioural characteristics of the participants and information on prenatal alcohol exposure.

Demographic characteristics of the sample are presented in the results section.

Community Procedure

Recruitment

According to Correctional Service Canada (CSC) protocol, after receiving a new federal sentence, offenders complete a preliminary assessment interview with a parole officer. For research purposes, at the end of the CSC preliminary interview the offender was asked to meet with a Community Research Assistant (CRA) who was responsible for recruiting participants, conducting offender consent interviews, and contacting and interviewing maternal and other collateral sources. If the offender agreed to meet with the CRA, the consent interview was completed.

The CRA explained the research to the offender in detail, both verbally and in writing.

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[4]These participants completed all assessments; however their neuropsychological results were inconclusive. For two participants the neuropsychological testing was conducted in handcuffs; the two others had results strongly indicating a lack of motivation and effort while completing the tests as determined by the project neuropsychologist.

Separate signed consent forms were obtained for participation, for releasing medical records from birth and for digital photographs to be taken of the offender to be analysed using an FAS facial photographic recognition software. The offender (hereafter referred to as participant) was then asked questions from the Brief Screen Checklist (BSC, Appendix A), which included questions about the participant's behaviour, personal history and mother's use of alcohol (during the participant's youth and mother's pregnancy).

Collateral and maternal interviews were completed either over the telephone or in person by the Community Research Assistant. A log was kept to keep track of names, phone numbers and addresses of collaterals as well as number of attempts made to contact each. In cases where it was difficult to reach the contact by telephone or the contact did not have a telephone, a package with the study materials was mailed to the collateral along with a self-addressed stamped envelope to return the completed BSC and a toll-free number to contact the researchers if questions or concerns arose. Once contact was made, the details of the study were explained. Collaterals were informed that the participant was voluntarily participating in a research study on FASD and that he had provided his or her name to contact for an interview. Collaterals were always informed that their participation was voluntary, they did not have to participate, and that their responses would be kept confidential. If the collaterals did not know maternal alcohol history, they were asked to complete only the first two sections of the BSC (behavioural and historical items).

The maternal and collateral interviews with the BSC took approximately 15 minutes to complete. Mothers were always requested to have a face-to-face meeting to conduct the interview; this was an attempt to eliminate the impersonal nature of a phone interview and to ensure that if information of a sensitive nature was provided the interviewer could offer support to the mother. Additionally, after the BSC was completed, mothers were asked for permission to release medical records from their pregnancy; if consent was granted, a separate consent form was completed. Upon completion of interviews, contacts were offered a copy of the BSC, consent forms, study brochure and a toll-free telephone number to call if there were any questions or concerns. All mothers, regardless of information provided, were offered information on free local resources offering counseling and FASD support services.

Overall, there was a high participation rate among collaterals able to be contacted, with between 63% of grandparents and 100% of romantic partner, friends and other relatives agreeing

to an interview. Common-law partners were most likely to report not knowing the status of prenatal alcohol exposure. A number of collaterals could not be reached to request participation, either due to a lack of current contact information, or multiple attempts to contact going unanswered.

Of the 91 participants, 77% (70) provided their biological mother as a contact. Among participants who did not provide their mother as a contact, 14% of mothers were deceased, 7% no longer had contact with their mother, 4% of participants were adopted, and 4% preferred that the research assistant not contact their mother.

Of the original 70, 19% (n=13) could not be contacted, or, if contacted, could not be interviewed. Seven percent could not be reached, 9% did not have valid contact information, and 3% had a language barrier leaving 57 collaterals, or 81%, who were contacted. Of those, 84% agreed to participate while 16% declined.

Among the nine participants diagnosed with FASD, only one mother participated in the research. Six birth mothers of participants who received an FASD diagnosis were not contacted for participation. Of these, one mother could not be reached, one did not have valid contact information, two did not have contact with their son, one participant was adopted at birth, and one participant preferred that his mother not be contacted. Of the three mothers that were contacted, two declined to participate.

Institutional Procedures

Reception and Testing

Once the participant was transferred to the penitentiary, a Research Liaison Officer (RLO), met with him within 24 hours of his arrival. The RLO would first confirm with the participant that he was willing to continue with the study, in recognition of the fact that there was a possibility of a high rate of memory problems and impulsivity in the study population. This also served to provide the participant with time to consider the decision to participate. Once participation was confirmed, the RLO conducted a Medical Intake Interview (MII, Appendix B). At this time, the RLO also took three digital photographs of the participant using a digital camera for later analysis of characteristic facial features associated with FAS (Appendix C).

FASD Assessment

Medical Exam

The medical assessment (Appendix D) consisted of a 10 minute examination of facial features by a trained physician who was blind to all prior data collected. Structural deficits were assessed by the physician looking for microcephaly using head circumference as a proxy measure. A medical exam form was used by the physician to record information collected during the physical examination of each participant. Information recorded included facial measurements, height, weight and head circumference, and other physical characteristics that the physician deemed notable during the exam.

Medical Records

All participants were asked to release medical records relating to their birth. These records were sent directly to the physician from the hospital, and the information was used during the case conference to assess for FASD. The physician examined the medical records for indices of possible FASD at birth such as smaller birth weight, head circumference, and lower Apgar scores. The birth mothers who participated in the study were also asked to release medical records relating to their pregnancy. These records were also sent directly to the diagnosing physician from the hospital.

Neuropsychological Assessment

Participants completed a battery of neuropsychological tests (see Appendix I) to assess central nervous system functioning. According to the Canadian guidelines for the diagnosis of FASD (Chudley et al., 2005), nine brain domains should be assessed for central nervous system damage. These include: IQ, attention, memory, executive functioning, academic achievement, communication/language, adaptive behaviour, sensorimotor functioning and structural deficits.

The neuropsychological assessment battery was administered by psychometrists who had been trained in the administration of psychological assessments. All testing took place in the psychology department of the institution. Testing was typically done in one day, conducted in one morning session and one afternoon session. In total, the assessment battery took approximately 3.5 hours to complete for each participant.

The assessments were conducted in the same order for each participant. Prior to testing a

short interview was conducted. Questions regarding school experiences, work experiences, health issues, and problems with drugs or alcohol were asked. In addition to providing the psychometrists with additional information to assist in the scoring of test results, these questions also provided a means to establish rapport. A registered neuropsychologist with experience in identifying FASD interpreted all tests.

Case Conference

A diagnostic case conference followed the medical examination and neuropsychological testing. All information collected from the participant, collateral and maternal screening tools, questionnaires, birth records and neuropsychological testing was summarized by the research team and brought to the case conference (Appendix E). Each participant was discussed by the physician, neuropsychologist and RLO. The case conferences were based on the Canadian guidelines for diagnosis in one of the FASD categories (Chudley et. al, 2005). Once each case was summarized and discussed, a decision regarding a diagnosis was reached. Please refer back to Table 1 for a summary of these guidelines.

Debriefing

All participants were offered a debriefing by the RLO after the case conference. Those who received a diagnosis in one of the FASD categories were debriefed by the physician, with the RLO present. They were offered counselling and assistance by the RLO in order to help them understand their diagnosis and come to terms with the impact it may have on them. For those participants who had evidence of neuropsychological impairment, the neuropsychologist was present during the debriefing via conference call or in some cases, in person. For participants with no deficits identified, the RLO conducted the debriefing alone.

All participants were asked if they would like to share the results of the FASD assessment with CSC. For participants who received a diagnosis and consented to releasing the information to their CSC file, the RLO was able to offer formal assistance while they were incarcerated. The release of information permitted the RLO to act as liaison between the offender and correctional staff both formally and informally, as the consent to release the information also acted as a waiver of confidentiality of the research results. As part of the debriefing, participants received a letter from the physician (Appendix F) and the

neuropsychologist (Appendix G) explaining the results of the assessment. All participants also received a certificate of appreciation for participating in the research (Appendix H).

Follow Up

The RLO served as both coordinator of the medical and psychological testing and institutional liaison for participants in the study. In addition, the RLO conducted a series of presentations on FASD to Correctional Officers, Parole Officers, Program Officers, and other correctional staff as time and institutional routine would allow. In addition, much informal training occurred through daily interactions with staff members involved in the participants' lives while during the study period.

Participants who received a diagnosis in one of the FASD categories, as well as those whose outcome was uncertain, were offered follow-up support by the RLO while in the institution. Follow-up with participants consisted of weekly individual meetings with each participant, where they were provided with information on FASD, practical assistance in the form of coping methods (e.g. use of daily calendars, lists, etc.), and the opportunity to discuss any issues or concerns they might have. These meetings were generally pre-arranged and initially took place weekly; however as rapport was built and trust established, meetings with some participants became more frequent and were occasionally instigated by the participants themselves.

The RLO issued passes for diagnosed participants to attend meetings, sent reminders through institutional mail, and contacted Correctional Officers to confirm appointments. They also attended meetings with the participants and other correctional staff to provide support, assistance, and information to staff on behaviours associated with FASD.

Data Sources

FASD Brief Screen Checklist (BSC)

The Brief Screen Checklist, or BSC, contained 48 questions broken down into three sections: Behavioural Indicators, Historical Indicators, and Maternal Indicators. The behavioural (28) and historical (9) indicators were chosen based on a thorough reading of the FASD literature, examination of previously developed FASD screening tools, and expert consultation.

The behavioural indicators of the BSC were scored on a 5-point Likert scale (1=strongly

disagree to 5=strongly agree). Examples include "Would you describe ___as someone who acts impulsively?" and "Would you describe __ as someone who has few friends?" The historical items included questions about the participants' experience with adoption or foster care, early school failures, or other mental health diagnoses.

The prenatal alcohol exposure section of the BSC contained 11 indicators. Three indicators at the beginning of the section explored the participants' mothers' use of alcohol while the participant was young, followed by questions relating to their mothers' use of alcohol while she was pregnant. The questions were designed to most closely mimic the criteria used for the assessment of FASD during diagnosis, and were related to the timing of alcohol exposure during pregnancy, duration during pregnancy, as well as frequency (eg. weekly, monthly) and amount (eg. one drink per drinking occasion) of alcohol consumed. Finally, there was one question relating to other possible prenatal exposures such as illicit drugs and tobacco.   The questions were developed by one FASD diagnostician and one non-medical (Ph.D.) expert in the field of FASD. Due to the sensitive nature of the topic, in order to reduce some distress on the part of the participant and collaterals and especially birth mothers, placing the questions relating to alcohol consumption during the participants' childhood first in the set of indicators was designed to ease into speaking about alcohol consumption generally. All participants and collaterals had been well-informed prior to this, however, that the research study was about FASD and questions relating to prenatal alcohol consumption would be asked.

There were four versions of the BSC: one for participant self-report, one for birth mothers, one for collateral sources including family and friends, and one version created for parole officers that did not include questions relating to prenatal alcohol exposure, but only the behavioural and historical indicators. The parole officer who conducted the preliminary interview in the institution with the participant and the parole officer (or in some cases, a contract agency representative) who conducted the CSC-mandated post-sentence community assessment with the participant's community contact completed the BSC for the participant after their interviews. The maternal questions were not included in this version, as questions relating to prenatal alcohol exposure or prenatal alcohol use are not standard questions in either the preliminary assessment or post-sentence community assessment. In other cases where collaterals stated they had no information regarding the mother or her use of alcohol, the parole officer version of the BSC was used. In the present study, all four versions were administered for each

participant when possible, with the aim of determining the most reliable source of information.

Medical Intake Interview

The Medical Intake Interview (MII) was a nine page interview completed by the participant with the assistance of the RLO. It was adapted for use with adults based on a standard parent intake form used by the Clinic for Alcohol and Drug Exposed Children (CADEC) based in Winnipeg, Manitoba. The MII consisted of questions relating to the participants' medical history including hospitalizations, traumatic head injuries, chronic medical conditions, and family history of medical problems both acute and chronic. This tool was used by the physician during the diagnostic assessment to rule out other possible disorders.

Facial Photographic Analysis Software

The software, developed by Susan Astley (2005), required three digital photographs to be taken: one frontal photograph, one three-quarters turned, and one lateral (side) photograph. The frontal photograph was used to analyse palpebral fissure length (width of each eye opening from inner to outer canthus or corner of the eye), and inner canthal distance (distance between two inner corners of the eyes). The frontal and three-quarter photos were also used to measure the depth of the philtrum (the groove between the bottom of the nose and the upper lip) using the Lip-Philtrum Guide created by the University of Washington (2004)[5]. The Lip-Philtrum Guides are 5-point pictorial rulers that are used to measure philtrum smoothness and upper lip thinness. The Lip-Philtrum Guide reflects the full range of lip thickness and philtrum depth one would see in a population. The thinness of the upper lip was measured in two ways: 1) using the frontal photo, a 'circularity tool' built into the software program calculated the area of the upper lip by tracing the outline of the lip using the computer mouse; 2) using the Lip-Philtrum Guide. The lateral photograph was used to assess for other discernable anomalies notable to the physician.

The software used to analyse facial features was part of the pilot project to determine the feasibility of its use in a correctional setting, as well as the accuracy between the software assessment and the physical exam conducted by the physician. If the level of agreement between the software and the physician's measurements was acceptable, it was believed that the standard photograph taken of all offenders newly admitted to penitentiaries could be analysed for the

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[5] University of Washington FAS Diagnostic and Prevention Network (2004). Lip Philtrum Guides. Retrieved November 13, 2007 from http://depts.washington.edu/fasdpn/htmls/lip-philtrum-guides.htm

characteristic facial features of FAS as an additional tool in screening offenders in need of further assessment. Additional permissions from institutional security and institutional management were required to allow the digital camera to enter the institution.

Neuropsychological Assessments

Neuropsychological tests were administered to assess the following cognitive domains: general intellectual ability (IQ), memory, cognitive ability, language, academic achievement, visuomotor ability, adaptive behaviour, executive functioning, and attention. (Table 2). Hard and soft neurological signs, which are part of the recommended assessments for FASD diagnosis, were assessed during the medical exam. Neuropsychological assessment measures were chosen based on recommendations of the project neuropsychologist. All tests were published, standardized measures with solid psychometric properties that have been validated. A description of the neuropsychological measures used for each neuropsychological domain assessed is provided in Appendix I.

Table 2

Neuropsychological tests used in the assessment of FASD

Domain Assessed	Test Used	Reference
General Intellectual Ability (IQ)	Wechsler Abbreviated Scale of Intelligence (WASI)	PsychCorp (1999). *Wechsler Abbreviated Scale of Intelligence Manual*. San Antonio, TX: Harcourt Assessment, Inc.
Academic Achievement	Wechsler Individual Achievement Test Second Edition-Abbreviated (WIAT-II-A)	The Psychological Corporation, a Harcourt Assessment Company. (2001). *Wechsler Individual Achievement Test Second Edition Abbreviated: Manual*. San Antonio, TX: Author.
Language	WASI Verbal IQ Subtest	PsychCorp (1999). *Wechsler Abbreviated Scale of Intelligence Manual*. San Antonio, TX: Harcourt Assessment, Inc.
Memory	Wechsler Memory Scale Third Edition-Abbreviated (WMS-III-A)	Wechsler, D. (1999). *Wechsler Memory Scale – Third Edition Abbreviated: Manual*. San Antonio, TX: The Psychological Corporation, a Harcourt Assessment Company.
.	Digit Span subtest of Wechsler Adult Intelligence Scale	PsychCorp (1999). *Wechsler Abbreviated Scale of Intelligence Manual*. San Antonio, TX: Harcourt Assessment, Inc.
	Rey Complex Figure Test and Recognition Trial (immediate and delayed recall)	Meyers, J.E.. & Myers, K.R. (1995*). Rey Complex Figure Test and Recognition Trial: Professional Manual*. Lutz, FL: Psychological Assessment Resources, Inc.

Table continues on next page

Domain Assessed	Test Used	Reference
Executive Function	Wisconsin Card Sorting Test (WCST)	Heaton, R.K, Chelune, G.J., Talley, J.L., Kay, G.G., & Curtiss, G. (1993). *Wisconsin Card Sorting Test Manual: Revised and Expanded*. Lutz, FL: Psychological Assessment Resources, Inc. Reynolds, C.R. (2002).
	Comprehensive Trail Making Test (CTMT)	*Comprehensive Trail-Making Test: Examiner's Manual*. Austin, TX: PRO-ED, Inc.
	Rey Complex Figure Test and Recognition Trial (copy strategy)	Meyers, J.E.. & Myers, K.R. (1995*). Rey Complex Figure Test and Recognition Trial: Professional Manual*. Lutz, FL: Psychological Assessment Resources, Inc.
		Table continues on next page
Adaptive Behaviour	Adaptive Behaviour Assessment System Second Edition – Adult form (ABAS-II)	Harrison, P.L. & Oakland, T. (2003). *Adaptive Behavior Assessment System – Second Edition*. San Antonio, TX: Harcourt Assessment, Inc.
Attention	Connors' Continuous Performance Task (CPT-II)	Conners, C.K. (2004). *Conners' Continuous Performance Test (CPT II) Version 5 for Windows Technical Guide and Software Manual*. Toronto: Multi-Health Systems Inc.
	Digit Span subtest of Wechsler Adult Intelligence Scale	PsychCorp (1999). *Wechsler Abbreviated Scale of Intelligence Manual*. San Antonio, TX: Harcourt Assessment, Inc.

The Offender Management System

The Offender Management System (OMS) is an electronic administrative database used by the Correctional Service of Canada to maintain all offender records. The system includes all information that is required for administrative and operational purposes, from intake to warrant expiry. This database includes, but is not limited to, the following information: demographics, sentence and conviction information, all admission and release records, risk and need assessments, substance abuse assessment, urinalysis results, disciplinary charge information, reports on offender performance during incarceration and while in the community, supplementary assessment information and related records.

The Offender Intake Assessment (OIA) consists of a Dynamic Factor Identification and Analysis (DFIA) and a Static Factor Analysis (SFA) and is conducted by an institutional parole officer. This process consists of interviews with the offender as well as in-depth analyses of information from collateral sources, such as police agencies, family members, and professionals from other jurisdictions as well as analysis of validated and normed assessment tools. Within the DFIA, seven need areas or dynamic risk factors are assessed: substance abuse, employment/education, marital/family, associate/social interaction, community functioning, personal/emotional orientation, and attitude.   Each indicator has a dichotomous response format ("yes" indicates the presence of a problem; "no" indicates the absence of a problem). The higher the number of yes responses, the more instability within the domain and the higher the priority ranking for the domain.

The OIA Static (Risk) Factor rating is based on the Criminal History Record (CHR), the Offence Severity Record (OSR) and the Sex Offence History (SOH). The CHR investigates the significant factors related to the offender's involvement with the criminal justice system. The OSR measures the nature and degree of psychological and physical harm inflicted on the victim(s) and on society. The SOH looks at the nature and extent of sexual offending, if any, and the amount of victim harm. It also highlights involvement in any prior sex offender assessment, treatment and/or intervention activities

Once all questions are completed by the parole officer, OMS automatically scores the number of dichotomous yes/no responses from the CHR, OSR and the SOH. A point is assigned for each "yes" response. Generally, the higher the number of "yes" responses, the greater the criminal risk. A level of intervention of either "low", "moderate" or "high" is automatically

assigned based on the results from this static factor analysis (i.e., analysis of the CHR, OSR and the SOH).

All data from the OIA was used to compare characteristics across participant outcome groups.

Data Analysis

Brief Screen Checklist

Each version of the screening tool was administered in three sections: behavioural indicators, historical indicators and maternal indicators. Behavioural indicators were rated on a Likert scale, from 1 (strongly disagree) to 5 (strongly agree). Upon examination of the distributions for each indicator a bimodal distribution was found, with few people choosing the third category (neither agree nor disagree). It was decided that the items be re-coded, with 3 most likely to mean 'no more or less than anyone else' and therefore placing it with the 'disagree' items. For the final analysis, categories 1, 2 and 3 were re-coded as 0 (for disagree) and 4 and 5 were recoded as 1 (agree). The frequency of each response for behavioural items on the Likert scale was examined.

The number of collateral respondents for each participant was not equal, for example some participants had no collaterals to contact while others had up to 7. Therefore collateral responses were collapsed and averaged, to obtain one score per participant. The frequency distribution of items was examined and again a bimodal pattern in responses emerged. A total score for the average collateral responses on the behavioural items was obtained.

To determine the psychometric properties of the screening tool, logistic regression and receiver operating characteristics (ROC) analyses were conducted. Separate analyses were conducted for participants and collaterals for each section of the screening tool. Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy were determined from the analysis. The 'gold standard' used to determine these properties was the medical diagnosis of an FASD. Item total correlations (ITC) were also conducted to look for individual indicators that were not highly correlated with the total score. Nunnally and Bernstein (1994) have suggested that items that are not correlated at least .40 with the total score are candidate items that could be removed or reworded; in other words, they are items that may not be working well. This analysis was conducted using a very liberal threshold of .20, as this

analysis was conducted on a pilot sample and the sample size was small. Items that were below this threshold were removed and the effect on the alpha was assessed. Cronbach's Alpha was calculated using the correlation procedure in SAS®.

Supplemental Assessments

To determine the differences between the four outcome groups on the Medical Intake Interview and the Offender Intake Assessment data from OMS, Pearson's χ^2 was used (proc freq, SAS®).   Analysis of Variance using Generalized Linear Models (proc glm, SAS®) was used to explore significance between outcome groups on the facial photographic analysis software. Correlations were conducted to assess agreement between the software analysis and physical exam.

Neuropsychological assessment

Upon completion of the neuropsychological assessment battery, the individual assessments were scored by psychometrists under supervision of the project psychologist, with the exception of the Conners' Continuous Performance Task – II which was computer scored. The completed assessment protocols were sent to the Addictions Research Centre (ARC) along with a summary of the results for each participant. Upon receipt, the data were entered in to a SAS® database for data analysis. Because standardized scores are not available for the RCFT Copy score, the RCFT Copy raw score was used in the analysis. All other scores were converted to z-scores for use in the analyses.

Analysis of Variance (ANOVA) was used to determine if there were differences among the study outcome on the neuropsychological measures. If the ANOVA revealed a main effect among the study groups, further analyses were carried out using the Tukey-Kramer multiple comparisons test to establish significant difference between the four groups. The level of significance was set at $p = .05$ for all ANOVAs and post-hoc comparisons. Data obtained from the neuropsychological testing was examined to ensure the ANOVA assumptions of homogeneity of variance and normality were met. If either assumption was violated, attempts were made to transform the data to meet these assumptions. This transformed data was used in subsequent analyses. The original (non-transformed) data was used in the cases where the data transformations were unable to correct the ANOVA violations. These analyses were conducted

using proc GLM in SAS$^{®}$.

FASD and Outcome Group Characteristics

Characteristics of Admissions to Study Site

Overall, there were very few differences between the final study sample and the general population of admissions age 30 and under at the reception unit over the study period. There were fewer offenders of First Nations origin in the study sample (31.6%) compared to the general admissions population (53.1%), and more offenders of Métis origin (32.6% vs. 14.3%). The proportion of Caucasian offenders was similar, as was the population of offenders representing other racial backgrounds. There were no differences between the marital status of participants and general admissions, and a small difference between the proportions of offenders whose native language was English. There were no differences in the average age of each population (Table 3).

Table 3

Demographic characteristics of offenders who agreed to participate and general admissions population

	Percent of Study Sample (n=95)[1]	Percent of General admissions 30 and under (n=176)	x^2
Race			
Caucasian	25.3	23.4	16.5***
First Nation	31.6	53.1	
Métis	32.6	14.3	
Other	10.5	9.1	
Marital Status			
Single	53.7	61.3	n.s.
Common Law	44.2	35.2	
Country of origin			
Canada	97.9	92.6	n.s.
Other	2.1	7.4	
Home Language			
English	100.0	94.3	5.6**
Other	0.0	5.7	
Age (mean, SD)	24 (2.9)	24 (3.4)	n.s.

**=p<.01 ; ***=p<.001
1. Includes four offenders with invalid neuropsychological results.

There were also no differences between the Offender Intake Assessment characteristics of the population who agreed to participate and the general population of admissions age 30 and under,

with one exception: the offenders who agreed to participate were rated as slightly lower risk to re-offend upon release. For a list of intake assessment characteristics of offenders who agreed to participate and the general admission population see Table 4.

Table 4
Intake assessment characteristics of offenders who agreed to participate and general admissions

Assessment Area[2]	Percent of Study Sample (n=95)[1]	Percent of General admissions age 30 and under (n=176)	X^2
Substance abuse	56.8	56.2	n.s.
Personal/emotional orientation	62.1	56.8	n.s.
Family	10.5	10.2	n.s.
Community functioning	4.2	5.7	n.s.
Employment	7.4	9.7	n.s.
Associates	27.4	25.6	n.s.
Attitude	21.1	20.5	n.s.
Overall dynamic risk (high)	46.3	48.9	n.s.
Overall static risk (high)	30.5	42.6	6.1*
Motivation level (low)	28.4	19.3	n.s.

*p<.05
1. Includes four offenders with invalid neuropsychological results.
2. Individual need areas reported are based on 'some' or 'considerable' need.

Demographics of eligible participants

The characteristics of offenders who agreed to participate, who withdrew, and who refused to participate showed some differences with regards to country of origin and home language (see Table 5). Participants were more likely to be English speaking, and to be from Canada. There were no differences in the distribution of offenders across racial backgrounds or average age.

Table 5

Demographic characteristics of offenders who agreed to participate, withdrew, or refused to participate.

	Study Sample (n=95)[1]	Withdrew (n=11)	Refused (n=54)	X^2
Race				
Caucasian	25.3	45.5	25.9	n.s.
First Nation	31.6	36.4	35.2	
Métis	32.6	0.0	20.4	
Other	10.5	18.2	18.5	
Marital Status				
Single	53.7	45.5	63.0	n.s.
Common Law	44.2	54.6	31.5	
Country of origin				
Canada	97.9	81.8	83.3	11.38***
Other	2.1	18.2	16.7	
Home Language				
English	100.0	90.9	94.4	6.46**
Other	0.0	9.1	5.6	
Age (mean, SD)	24 (2.9)	26 (3.7)	24 (3.1)	--

**=p<.01 ; ***=p<.001

2.   Includes four offenders with invalid neuropsychological results.

Similar to the Offender Intake Assessment characteristics of study participants and the general population of admissions, the only significant difference between those who agreed to participate, those who withdrew, and those who refused was on risk to re-offend (see Table 6). Offenders who agreed to participate were least likely to be rated as a high risk to re-offend (30.5%), 48.2% of offenders who refused to participate were rated as high risk, while those who withdrew during the study period were most likely to be rated as high risk to re-offend (63.6%).

Table 6

Intake assessment characteristics of offenders who agreed to participate, withdrew, or refused to participate.

Assessment Area[2]	Study Sample (n=95)[1]	Withdrew (n=11)	Refused (n=54)	X^2
Substance abuse	56.8	45.5	44.4	n.s.
Personal/emotional orientation	62.1	63.6	46.3	n.s.
Family	10.5	9.1	7.4	n.s.
Community functioning	4.2	0.0	5.6	n.s.
Employment	7.4	0.0	11.1	n.s.
Associates	27.4	9.0	29.6	n.s.
Attitude	21.1	54.5	22.2	n.s.
Overall dynamic risk (high)	46.3	54.6	48.2	n.s.
Overall static risk (high)	30.5	63.6	48.2	11.14**
Motivation level (low)	28.4	27.3	22.2	n.s.

$p<.01=**$

1. Includes the four offenders with invalid neuropsychological results.
2. Individual need areas reported are based on 'some' or 'considerable' need.

These analyses suggest that overall the study sample did not differ from the general population of offenders under 30 years of age and that within the groups eligible to participate there were minimal differences between those who participated and those who did not. The only consistent difference was that non-participants were more likely to be rated as high static risk.

Results of FASD Assessment

Ten percent (n=9) of study participants were diagnosed with an FASD (Table 7), but three other groups were identified through the diagnostic case conferences. The FASD group contained participants who were diagnosed with pFAS or ARND (refer to Table 1). An Uncertain group emerged (UC), wherein participants did not have sufficient information to either confirm or rule out a diagnosis. Within this group there were two subgroups: Alcohol Unconfirmed (AU), where significant CNS dysfunction in three or more brain domains was

26

found, however prenatal alcohol exposure was unknown (unable to confirm/eliminate possibility), and Alcohol Confirmed (AC), where prenatal alcohol exposure was confirmed but there was not enough evidence from neuropsychological testing to meet the criteria for an FASD diagnosis (i.e., significant dysfunction in two brain areas but not three, which is required for a diagnosis). A Central Nervous System Deficit group (CNS) was identified, which contained participants with evidence of moderate to severe CNS dysfunction (as determined by the project neuropsychologist) not related to prenatal alcohol exposure. Finally a No Deficit (ND) group was identified, wherein participants had no significant CNS deficits, with or without prenatal alcohol exposure.

Table 7
Results of FASD diagnostic case conferences

	Fetal Alcohol Spectrum Disorder		Uncertain		Central Nervous System	No Deficits	Total
	(ARND)*	(pFAS)*	(AU)*	(AC)*			
N	8	1	7	7	41	27	91
%	8.8	1.2	7.7	7.7	45.1	29.7	100.0

*Note: ARND=Alcohol Related Neurodevelopmental Disorder; pFAS=partial Fetal Alcohol Syndrome; AU=Alcohol unconfirmed; AC=Alcohol confirmed.

As can be seen in Table 7, 10% of participants were diagnosed in one of the FASD categories. Fifteen percent were found to have insufficient information to make a diagnosis (UC); 45% were found to have neuropsychological deficits unrelated to prenatal alcohol exposure (CNS); and 30% were found to have no deficits identified through the assessment process (ND). Overall, 70% of the study sample had moderate to severe neuropsychological deficits identified. For the majority of the analyses, the two FASD categories (ARND and pFAS) were combined, as were the two UC categories (AU and AC).

Demographics of study groups

On demographic characteristics, no statistically significant differences emerged. However, it should be noted that in this study sample only Aboriginal participants received a diagnosis; no Caucasian participants or participants of other racial groups were diagnosed with

an FASD (Table 8). Twenty-one percent of offenders in the UC group were Caucasian, suggesting that they may have been diagnosed had more information been available during the assessment. In addition, only the ND group contained participants from countries outside Canada. Within the nine cases diagnosed with FASD, one birth mother was Caucasian, five were First Nations, and three were Métis (data not shown).

Table 8
Demographic characteristics of study groups

	FASD (n=9)	UC (n=14)	CNS (n=41)	ND (n=27)	X^2
Race					
Caucasian	0.0	21.4	29.3	29.6	n.s.
First Nation	55.6	50.0	24.4	25.9	
Métis	44.4	28.6	39.0	25.9	
Other	0.0	0.0	7.3	18.5	
Marital Status					
Single	55.6	42.9	51.2	55.6	n.s.
Common Law	44.4	57.1	43.9	44.4	
Country of origin					
Canada	100	100	100	92.6	n.s.
Other	0.0	0.0	0.0	7.4	
Home Language					
English	100	100	100	100	n.s.
Other	0.0	0.0	0.0	0.0	
Age (mean, SD)	23 (2.6)	23 (2.1)	24 (3.3)	24 (2.6)	n.s.

Note: FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Characteristics and Criminal Profile of Study Groups

Dynamic Need

Table 9 provides information on the overall need areas for the FASD group and other participants. There is evidence to demonstrate that the participants with FASD had a higher level of overall need compared to other participants, with 78% rated as high needs by an intake parole officer, X^2 (3, 91)= 18.8, p<.001. Individual need areas showed a trend towards participants with an FASD being higher need than other groups, however not all areas were statistically

28

significant. In the area of employment 43% of diagnosed participants were rated as high need compared with only 14% of those with no deficits, $X^2(3, 91)= 18.4$, p<.001. Participants with FASD were rated as higher need in the area of community functioning, $X^2(3, 91)= 11.0$, p<.0514, and in the area of family, however not statistically significant. The FASD and AU groups had similar levels of need in the area of personal emotional orientation, higher than the CNS and ND groups but again not statistically significant. In the domain of attitude, participants with FASD were not rated the highest need, as this was similar among the three groups with CNS deficits. The ND group were significantly less likely to be found with problematic attitudes, $X^2(3, 91)= 10.9$, p<.0443. Interestingly, there was a high level of need identified in the area of substance abuse among most participants, with a notably lower level of need among participants with no CNS deficits (Table 9). This difference was not statistically significant.

Table 9
Offender Intake Assessment (OIA) characteristics of study participants

Assessment Area	FASD (n=9) %	UC (n=14) %	CNS (n=41) %	ND (n=27) %	X^2
Employment	33.3	14.2	2.4	3.7	18.4***
Family	55.6	28.6	29.3	37.0	ns
Associates	22.2	35.7	34.2	14.8	ns
Substance abuse	66.7	64.3	65.9	33.3	ns
Community functioning	22.2	7.1	2.4	-	11.0*
Personal/emotional orientation	77.8	78.6	58.5	51.9	ns
Attitude	55.6	57.1	51.2	22.2	10.9*
Overall dynamic risk (high)	77.8	64.3	41.5	33.3	18.8***
Overall static risk (high)	66.7	57.1	17.1	25.9	17.65**

*p<.05; **=p<.01; ***=p<.001
Note: Individual need areas reported are based on 'some' or 'considerable' need.
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Individual DFIA indicators were studied to determine patterns of results. Full results for these are presented in Appendix J, Supplemental Analysis, but key results are discussed below.

The FASD group were more likely than others to have less than a grade 8 education, $X^2(3, 91)= 17.74$, p<.0001 and less likely to have a high school diploma, $X^2(3, 91)= 10.05$, p<.01.

They were significantly more likely to have learning difficulties (66%), memory problems (67%), and concentration problems (67%). They were significantly more likely to have been unemployed for 90% or more of the time than the other three groups (78%), X^2(3, 91)= 7.62, p<.05, and were more likely to have unstable accommodations (67%), X^2(3, 91)= 8.56, p<.01.

Participants diagnosed with an FASD had significantly more issues relating to family relationships. They were significantly more likely to be disconnected from family members, including having an absent mother (89%), X^2(3, 91)=19.63, p<.0001, or a poor relationship with their mother (67%), X^2(3, 91)= 20.39, p<.0001. They also had poorer relationships with their father (89%), X^2(3, 91)=12.56, p<.01. They were rated as more likely to have poor relationships with other relatives (33%), and a childhood lacking in family ties (100%), X^2(3, 91)=17.31, p<.0001. They were significantly more likely to be considered socially isolated (33%), unfortunately participants in the FASD group (100%) were also more likely to have many criminal acquaintances, X^2(3, 91)= 10.67, p<.01. All participants with an FASD were rated as having a lifestyle that lacked direction, X^2(3, 91)= 10.98, p<.01.

Issues with mental health were also evident. Participants with FASD were significantly more likely to have had a current (22%) or prior mental health diagnosis (22%), X^2(3, 91)= 7.85, p<.05. They were also more likely than other groups to have a current prescription for a mental health condition, X^2(3, 91)= 14.10, p<.001. Several indicators also demonstrated specific difficulties facing participants with an FASD. They were more likely to have poor problem recognition (89%) and poor problem solving abilities (100%). They were rated as having significantly more challenges in the ability to generate choices (100%) and to resolve conflict (100%). Along with these, they were significantly more likely to have a low frustration tolerance (89%), X^2(3, 91)= 13.35, p<.001. In addition, parole officers were more likely to rate those with FASD as more likely to worry unreasonably (56%) and more likely to be unaware of consequences (89%), X^2(3, 91)= 8.20, p<.01.

Youth Criminal History

Consistent with the literature, participants in the FASD group showed extensive involvement with the youth criminal justice system. As illustrated in Figure 1, 89% of the FASD group had a previous offence in youth court, and 56% had 15 or more youth convictions, X^2 (3, 91)= 15.2, p<.001. The FASD group had higher rates of youth community supervision (89%), X^2

(3, 91)= 15.61, p<.001, and secure custody (89%), x^2 (3, 91)= 14.7, p<.001, compared to the other outcome groups.

Figure 1.Youth court history of study groups as assessed by the Offender Intake Assessment.
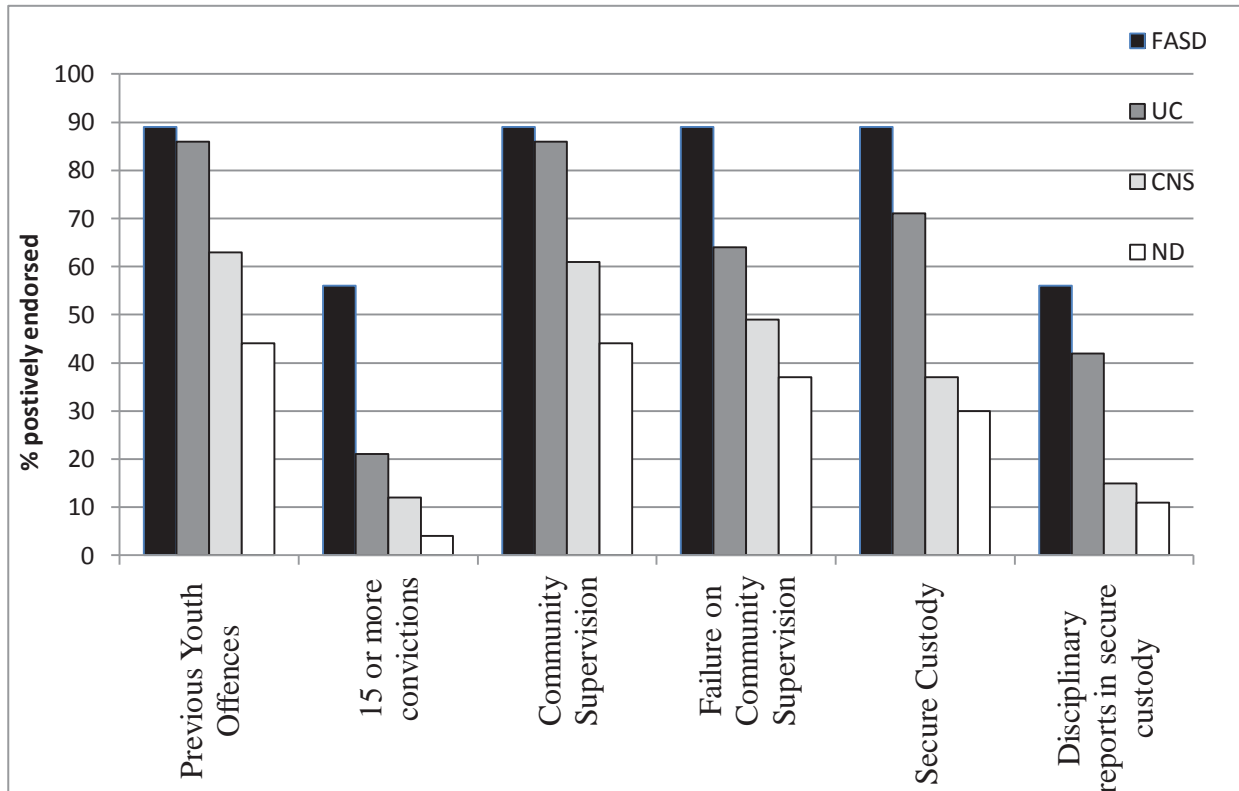
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

It appears that as youth they also had difficulty adapting to community supervision and secure custody situations, as they were more likely to fail on community supervision, x^2 (3, 91)= 8.3, p<.01 and to have disciplinary reports in secure custody, x^2 (3, 91)= 7.7, p<.05, (Figure 1).

Adult Criminal History

Most participants had some previous contact with the adult criminal justice system (Figure 2). None of the participants had previous terms in federal prisons, however as was the case with youth criminal activity, participants with an FASD had more extensive adult criminal histories. Thirty-three percent were found to have 15 or more past adult convictions, x^2 (3, 91)= 8.9, p<.01. Although all groups reported some community supervision as adults, participants

with FASD appeared to have higher rates of community supervision and higher rates of failure while in the community although these were not statistically significant.

Figure 2. Adult community supervision history of study groups
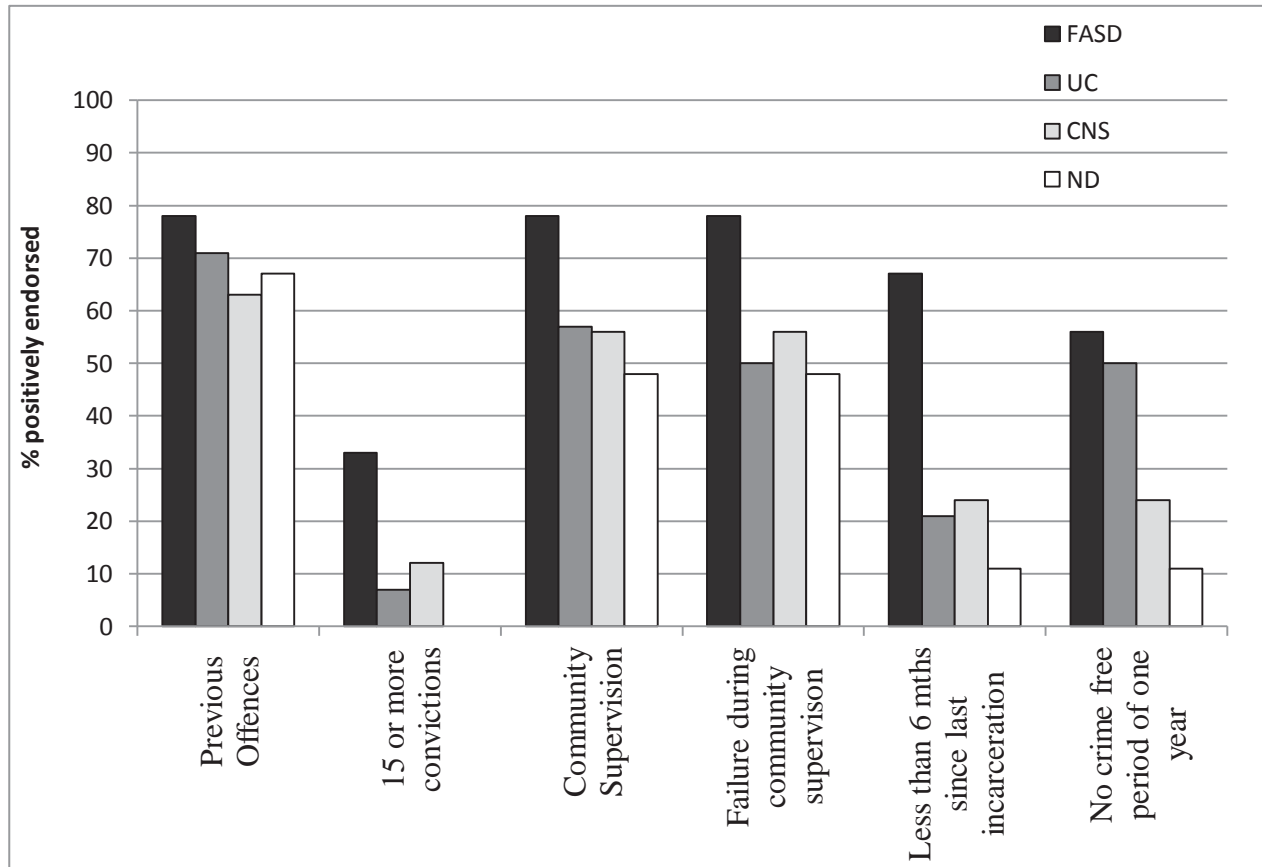
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Participants with FASD also tended to return to custody sooner. They were more likely to be re-incarcerated within the first six months of release, X^2 (3, 91)= 11.4, p<.001 or to have no history of being away from justice involvement for a continuous period of a year as an adult, X^2 (3, 91)= 11.0, p<.01.

Information obtained through the OIA process also provides information about the offender's current sentence (Figure 3). Sixty-seven percent of the FASD group was incarcerated currently for an offence of a violent nature. This percentage was fairly consistent across the study groups and was not statistically significant. Fifty-six percent of the FASD group were currently incarcerated for an offence related to robbery, and 11% of the group were incarcerated for drug related offences and homicide. Drug related offences were the only current offence category that

showed significant difference between study groups, $x^2 (3, 91)= 7.2$, p<.05, with the ND group most likely to be involved in drug-related offences.

Figure 3. Offence categories for current sentence
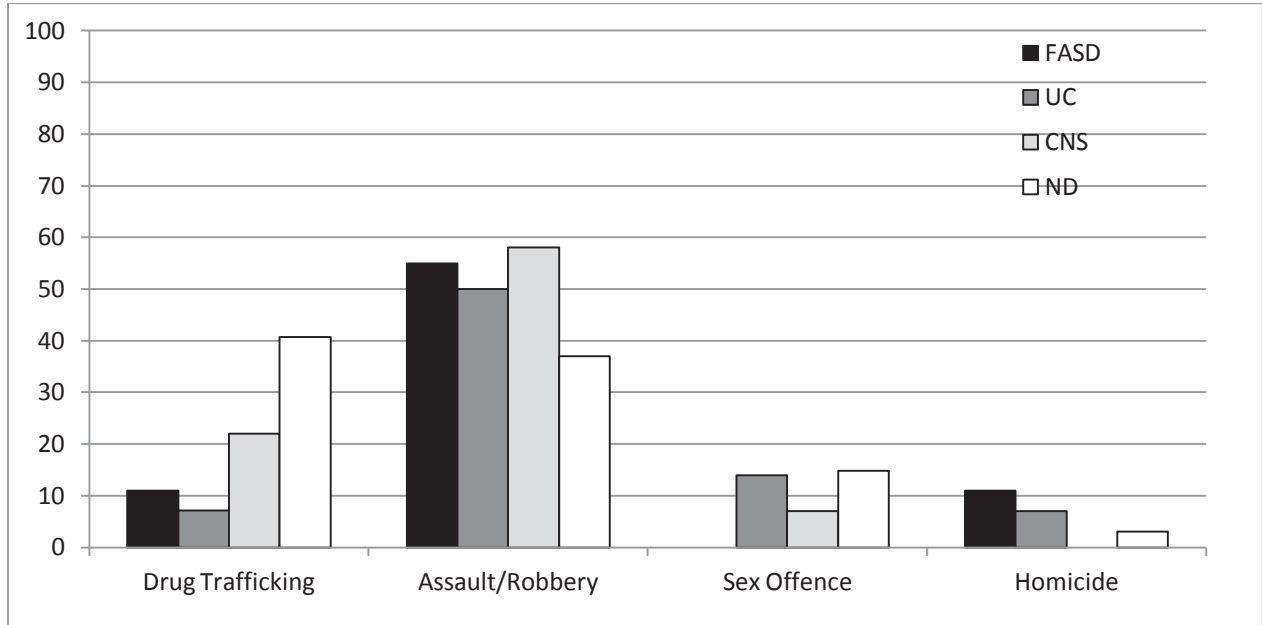
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Medical Intake Interview

The results from the Medical Intake Interview (MII) show a definite trend. Participants with an FASD endorsed items on the MII at a higher rate than did participants in other outcome groups with few exceptions (Table 10).

Chi-square was used to analyse the results. Those items that were statistically significant included many variables relating to personal experiences of abuse (physical, emotional and sexual), and a family history of alcoholism, drug use and delinquency. Many items relating to a family history of mental illness, while endorsed more frequently by participants with an FASD, were statistically non-significant. However there were more reported suicide commissions or attempts by mothers of participants with FASD, which was statistically significant.

Participants with an FASD reported more physical problems, although not statistically significant, but were significantly more likely to have been assessed by a medical professional.

Table 10

Percentage of study groups positively endorsing items on the Medical Intake Interview

	Do not know	FASD (9)	UC (14)	CNS (41)	ND (27)	χ^2
Traumatic head injury (with loss of consciousness)	3.3	44.4	57.1	48.7	46.2	n.s.
Assessed by a medical professional	1.1	88.9	71.4	43.9	34.6	11.08**
Victim of physical abuse	1.1	88.9	64.3	25.0	25.9	18.57****
Emotional abuse	0.0	88.9	42.9	26.8	33.3	12.52**
Sexual abuse	4.4	62.5	14.3	12.2	12.5	12.67**
Fail any grades	2.2	66.7	61.5	42.5	34.6	n.s.
Expelled or suspended from school	0.0	100.0	92.9	78.1	70.4	n.s.
Diagnosed with ADHD	2.2	33.3	21.4	12.8	11.1	n.s.
Ever worried about development as a child	1.1	37.5	21.4	24.4	11.1	n.s.
Problems with self-help skills	2.2	57.1	21.4	17.1	3.7	11.65**
Problems with social skills	3.3	37.5	14.3	22.5	11.5	n.s.
Problems relating consequences	0.0	22.2	21.4	19.5	18.5	n.s.
Mother mental illness	7.7	0.0	15.4	2.6	3.9	n.s.
Sibling mental illness	9.9	16.7	7.1	2.7	4.0	n.s.
Father alcoholic	13.2	77.8	75.0	50.0	45.8	n.s.
Mother alcoholic	6.6	88.9	71.4	23.7	16.7	24.80****
Siblings alcoholic	8.9	50.0	46.2	31.6	8.7	8.25*
Mother committed/attempted suicide	8.8	37.5	14.3	10.8	0.0	8.97*
Sibling committed/attempted suicide	9.9	25.0	15.4	5.4	4.2	n.s.
Father delinquent	14.3	62.5	54.6	33.3	23.1	n.s.
Mother delinquent	5.5	66.7	23.1	10.5	11.5	16.39***
Sibling delinquent	6.6	77.8	28.6	29.7	12.0	13.79***
Mother illicit drug use while pregnant	20.9	85.7	33.3	6.1	5.0	29.06****
Mother tobacco use while pregnant	26.4	87.5	60.0	60.7	42.9	n.s.

*Missing values are listed for participants who answered 'do not know' for that particular question. For questions pertaining to siblings, the missing values may also include numbers for those participants who did not have any siblings.
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

A history of traumatic head injury with loss of consciousness was not endorsed more frequently by those with an FASD, as all groups were equally likely to report this condition. On further examination, 28% of participants in the CNS group had more than one instance of

traumatic head injury vs. 11% for FASD, 14% for UC, and 15% for ND, and although not statistically significant (p=.57), this may perhaps in part account for some of the neuropsychological deficits in this group.

The percentage of missing values were quite low in the MII interview, however became higher with medical questions relating to immediate and extended family. Not all questions on the MII are reported here, however the complete list of questions can be found in Appendix B (MII) and more results are reported in Appendix J (Supplemental Analyses).

Neuropsychological Testing

Analyses of the neuropsychological assessment data were carried out with the participants who were identified as having CNS deficits, 70% of the total sample. The UC group was divided into two groups for the neuropsychological analyses. For seven participants prenatal alcohol exposure could not be confirmed or ruled out, but they had CNS deficits in at least three of the domains examined (AU). The other seven participants in the UC group had confirmed alcohol exposure but had deficits in only two of the domains examined (AC), which did not meet the criteria for an FASD diagnosis. In summary, the four groups included in the neuropsychological analyses were FASD (n=9), CNS (n=41), AC (n=7), and AU (n=7).

The results of ANOVA testing on the neuropsychological measures revealed only a few significant differences between the groups (see Table 11). Across all domains examined, there were significant differences in measures of attention and executive functioning. In the attention domain the FASD group had the highest number of omissions on the Connor's Performance Task-II (CPT-II) Omission Errors score, $F(3,55) = 3.43$, $p = .02$. The higher number of omission errors may be indicative of participants not orienting to stimuli or it may be indicative of a slow response time. On the executive functioning domain there was a difference on the Rey Complex Figure Task (RCFT) Copy Score, $F(3,63) = 3.36$, $p = .02$, with the AU group having the highest number of errors .

Even with limited differences, there were some interesting findings in the data. For all indicators, either the FASD or the AU group's performance was the lowest. Not only did these groups' scores show the most impairment across the domains, there was also a difference between these two groups in terms of which domains were impaired. The FASD group had poorer performance on attention, adaptive behaviour, and executive functioning indicators

whereas participants in the AU group had poorer performance on IQ, achievement, and on three of the four memory indicators.

Table 11

Neuropsychological Assessment Results for Groups with CNS Deficits

	Study Outcome				
	FASD (n = 9) *M (SD)*	CNS (n = 41) *M (SD)*	AC (n = 7) *M (SD)*	AU (n = 7) *M (SD)*	*F*
WASI					
Verbal IQ	-1.36 (.55)	-1.16 (.85)	-1.29 (.91)	-1.45 (.47)	0.38
Performance IQ	-0.24 (.51)	-0.29 (.85)	0.15 (.72)	-0.66 (1.01)	1.17
WIAT-II-A					
Reading	-1.06 (.86)	-1.01 (1.12)	-1.22 (1.00)	-2.04 (.81)	1.93
Spelling	-1.53 (1.07)	-1.44 (1.11)	-1.15 (.74)	-2.30 (.55)	1.72
Numerical Operations	-1.81 (.55)	-1.66 (.75)	-1.48 (.67)	-1.86 (.89)	0.43
WMS-III-A					
Logical Memory I	-1.41 (1.18)	-0.96 (.99)	-1.04 (.81)	-1.29 (.64)	0.67
Logical Memory II	-0.82 (1.80)	-0.75 (1.00)	-0.76 (.52)	-1.11 (.59)	0.23
RCFT					
Immediate Recall	-1.30 (1.54)	-1.09 (1.57)	-0.04 (1.16)	-1.91 (1.10)	1.93
Delayed Recall	-1.20 (1.57)	-1.29 (1.48)	-0.43 (1.19)	-2.06 (1.07)	1.52
Copy Raw Score	32.83 (3.30)	31.63 (3.39)	33.50 (2.47)	27.89 (6.52)	3.36*
WCST					
% Conceptual Level Responses	-1.23 (1.09)	-0.54 (1.17)	0.14 (1.88)	-0.77 (1.14)	1.66
% Perseverative Errors	-1.42 (1.31)	-0.01(1.79)	0.76 (2.21)	0.28 (2.17)	2.22
ABAS					
GAC	-1.82 (.73)	-1.09 (.97)	-1.14 (.91)	-1.24 (0.95)	1.55
DS					
Digit Span[a]	-0.57 (.52)	-0.38 (.75)	-0.35 (0.76)	-1.11 (0.78)	2.07
CTMT[b]					
Trail 5	-1.56 (.54)	-1.29 (.80)	-1.35 (1.41)	-1.42 (1.03)	0.24
CPT-II[c]					
Omissions	1.64 (1.91)	0.11 (1.08)	0.38 (1.45)	0.12 (1.48)	3.43*
Commissions	1.14 (1.22)	0.47 (1.14)	0.71 (0.70)	0.28 (0.76)	1.04

[a]Digit Span scores were available for 61 participants (FASD *n* = 9; CNS *n* = 38; UC-AC *n* = 6; UC-AU *n* = 7).
[b]CTMT was introduced after the study start and was administered to 54 participants (FASD *n* = 8; CNS *n* = 37; UC-AC *n* = 4; UC-AU *n* = 5).
[c]CPT-II was introduced after the study start and was administered to 56 participants. One test was deemed invalid and not included in the analyses (FASD *n* = 9; CNS *n* = 37; UC-AC *n* = 5; UC-AU *n* = 5).
*$p < .05$.
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Comparisons for all outcome groups

Figure 4 shows graphically the trends in the original four outcome groups (FASD, UC, CNS, ND). As can be seen, the FASD group differs from the ND group on all measures, with one exception. Commission errors on the CPT-II test of attention did not show significant differences between study groups, $F(3,73) = 2.17$, $p = .09$.

Figure 4. Overall mean *z*-scores for neuropsychological domains for each of the four outcome groups (FASD, UC CNS, ND)
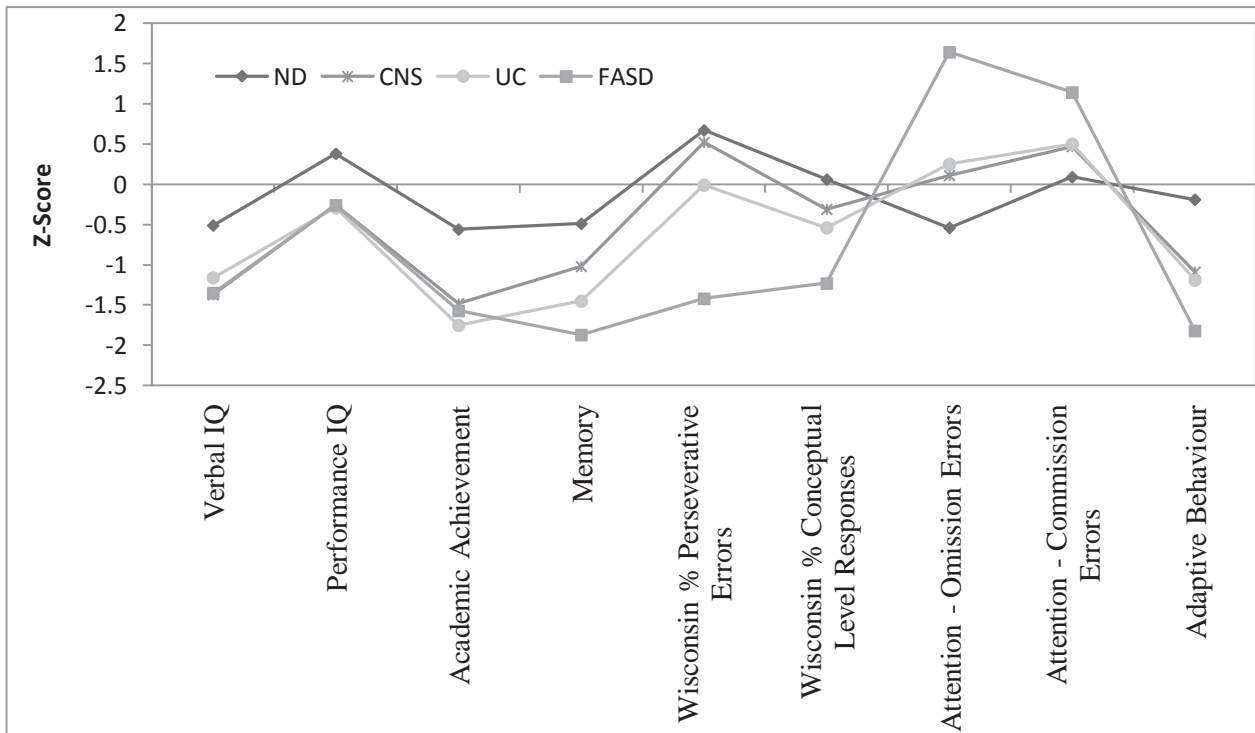
Tukey post-hoc assessments demonstrated that the FASD group differed significantly at a minimum of p<.05 from all other groups on CPT-II omission errors and on percentage of perseverative errors on the Wisconsin Card Sorting Task, a measure of executive functioning. With only two exceptions (academic achievement and performance IQ), most tests demonstrated a non-significant trend with the FASD group having lower scores than all other participants.

When examining the full-scale IQ score of participants, a significant difference between groups emerged, $F(3,90) = 7.66$, $p = .0001$. Tukey post-hoc assessments demonstrated that the mean score of the FASD group (mean 87) differed from the ND group (mean 98), as did the UC group (mean 86) and the CNS group (mean 88). None of the participants with an FASD

diagnosis had IQ's equal to or less than 70 which is the criteria most social services use to determine who is eligible for disability services in the community. The lowest IQ score was 77 for those diagnosed with an FASD. Three participants in the CNS group did have IQ's less than 70, however; two participants had a score of 69 and one had a score of 56.

Summary and Conclusions

Examination of the neuropsychological profile of participants in this research demonstrated a high level of deficits across all domains assessed, although participants with FASD seemed to have a unique profile. Their main deficits were in the areas of executive functioning, attention, and adaptive behaviour. Fortunately, as all participants received a full FASD diagnostic assessment, the research captured a snapshot of the neuropsychological characteristics of an intake population over a period of 18 months. In this period, of offenders who agreed to participate, 70% of the entire study sample demonstrated neuropsychological deficits.

Interestingly, participant self-report on the medical intake interview indicated there was no difference between the four groups on the incidence of previous head injury resulting in loss of consciousness; however participants with CNS deficits were more likely than any other group to have multiple instances of traumatic head injury with loss of consciousness. This could be a contributing factor to the neuropsychological deficits seen across this particular outcome group.

Participants with an FASD diagnosis have multiple and complex needs as compared to their counterparts. They were more likely to have parole officers in the institution rate them as having high needs in multiple areas, in particular in the community functioning, employment, and family domains. The employment needs of this group of participants stand out as being severe, with most not having any employment history. They have problems with dysfunctional parents, they have poor relationships with both their mothers and their fathers, and during the self-report medical intake interview they were more likely than other groups to report both maternal and paternal relations to have a history of delinquency and a history of substance abuse. Consistent with the literature on individuals with an FASD, participants diagnosed were more likely to report being a victim of physical, emotional and sexual abuse. They were more likely to have problems in school, poor self-concept, and previous diagnoses of ADD or ADHD. They

were also more likely than the other groups to have been hospitalized, to have had a previous or current mental health condition and to currently be taking medication for this condition.

In addition, participants with an FASD had lengthy criminal histories. They had multiple convictions as a juvenile offender, and multiple (15 or more) previous convictions in adult provincial court. They were more likely as juveniles to fail under community supervision, and more likely to have disciplinary reports while in secure custody. As adults, participants with FASD were also more likely to fail under community supervision, less likely to have a crime free period of over a year, but more likely to be re-incarcerated within six months. While incarcerated, they were more likely to be segregated for disciplinary infractions and more likely to be transferred to a higher level of custody (from medium to maximum security, for example).

Clearly, compared to the other three outcome groups, participants with an FASD have lengthy criminal histories and do not do well either in the community under supervision or while incarcerated. Their disabilities in understanding consequences, generalizing knowledge to new settings, in impulsivity and in successfully performing activities of daily living including impairments in social skills make them vulnerable in all areas of the criminal justice system. For example, they may have difficulty remembering appointments with probation/parole officers and in remembering the conditions of their release and the consequences of not following those conditions. While incarcerated, they have great difficulty navigating the 'unwritten rules' of prison. They are misunderstood, expected to work harder to apply any skills they were taught, and generally not provided the proper supports they need to succeed.

FASD Brief Screen Checklist (BSC)

The Brief Screen Checklist (BSC) was analysed by the subsections of behavioural, historical, and maternal indicators in sequence. It was of interest to determine if in fact the FASD group scored higher on the checklist compared to those who were not diagnosed with an FASD (CNS, ND).

Due to the 'uncertain' nature of the UC group, where some or all may have received an FASD diagnosis had more information been available during the assessment process, the UC group was excluded from further analysis of the BSC. As this group may contain individuals with an undiagnosed FASD, it was considered a confounding in the analysis as including it did not allow for a clean assessment of diagnosed FASD. However, the UC group was used to test the properties of the screening tool. Once a determination was made regarding the characteristics of each of the subscales, the UC group was assessed against these characteristics.

Behavioural Indicators

Many of the items in the behavioural section of the BSC were purposefully redundant; for example being 'easily victimized' is related to being 'easily manipulated', while 'restless' is related to 'hyperactive' and 'agitated'. Although participants with FASD did endorse all items more frequently than the other groups,' being victimized' was statistically different while 'easily manipulated' was not. Also, the FASD group was significantly more likely to report being 'restless' and 'agitated' but not 'hyperactive'. The redundancy was built in to determine whether there were subtle but significant differences between the terminology used to describe particular characteristics, as the goal was to reduce the number of questions to be asked while retaining predictive power.

As was mentioned previously, participants, collateral contacts and parole officers completed the BSC. There was a very high level of missing data from the parole officer sources on the behavioural and historical indicators, therefore this data was not used in the analysis of the BSC.

Participants

Overall the participants diagnosed with FASD were more likely to self-report that they agree with the behavioural indicators than those in the other three groups (see Table 12). A non-

significant trend was apparent for many of the indicators, with participants with an FASD showing the highest agreement, followed by the UC group, the CNS group, and the ND group. There were two indicators that did not show this pattern; rather the UC group had a higher endorsement of 'unaware of the consequences of your actions' and 'interrupt a lot during conversations'. These were both statistically significant (p<.01).

Participants with FASD were more likely to report having poor social skills, χ^2 (3, 91)=12.19, p<.01, having few friends, χ^2 (3, 91)=9.97, p<.01, and being easily victimized, χ^2 (3, *91*)=18.41, p<.0001. This echoes the results from the Offender Intake Assessment, with parole officers rating those with an FASD as having poor community functioning and few family connections.

Table 12

Percentage of participants positively endorsing BSC behavioural indicators

	Do not know	FASD (9)	UC (14)	CNS (41)	ND (27)	χ^2
1. Acts impulsively	2.2	66.7	50.0	40.0	19.2	7.93**
2. Has trouble following directions	-	66.7	42.9	21.9	7.4	15.26***
3. Is restless	-	88.9	21.4	43.9	37.0	10.80**
4. Has a problem with spelling	-	55.5	21.4	29.2	7.4	9.61**
5. Shows poor judgement	2.2	55.5	21.4	43.9	28.0	n.s.
6. Is easily distracted	-	88.9	57.1	60.9	37.0	8.31**
7. Has temper tantrums	-	55.6	35.7	26.8	14.8	n.s.
8. Has strong mood swings	4.4	66.7	35.7	28.2	20.0	n.s.
9. Is hyperactive	4.4	44.4	38.5	27.5	16.0	n.s.
10. Has a problem budgeting or handling money	1.1	44.4	30.8	43.9	22.2	n.s.
11. Unaware of the consequences of his actions	1.1	11.1	53.9	17.1	14.8	9.95**
12. Has a problem with arithmetic	-	44.4	21.4	34.2	25.9	n.s.
13. Interrupts a lot during conversation	-	33.3	42.9	19.5	3.7	10.14**
14. Is agitated	3.3	77.8	61.5	39.0	28.0	8.81**
15. Is very forgetful of everyday things	-	33.3	35.7	26.8	22.2	n.s.
16. Talks a lot but says little	2.2	33.3	21.4	18.0	3.7	n.s.
17. Has a poor memory	3.3	44.4	14.3	23.1	19.2	n.s.

	Do not know	FASD (9)	UC (14)	CNS (41)	ND (27)	χ^2
18. Has a problem with reading	-	22.2	14.3	17.1	-	5.60*
19. Is easily victimized	1.1	55.6	7.1	14.6	-	18.41****
20. Is strongly opinionated	6.6	55.6	50.0	61.5	64.0	n.s.
21. Has trouble completing tasks	2.2	55.6	28.7	19.5	14.8	n.s.
22. Has a poor attention span	-	77.8	7.1	41.5	24.0	14.13**
23. Has few friends	1.1	62.5	35.7	21.9	11.1	9.97**
24. Is easily manipulated	1.1	37.5	14.3	25.0	7.4	n.s.
25. Is disorganized	1.1	22.2	28.6	25.0	18.5	n.s.
26. Has trouble staying on topic	-	66.7	35.7	21.9	11.1	12.07**
27. Is stubborn	1.1	77.8	71.4	63.4	65.4	n.s.
28. Has poor social skills	2.2	50.0	23.1	24.4	-	12.19**

=p<.01; ***=p<.001;**=p<.0001

FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Participants with an FASD also rated themselves as having a poorer attention span, χ^2 (3, 91)=14.13, p<.001, having trouble staying on topic, χ^2 (3, 91)=12.07, p<.01, and having trouble following directions, χ^2 (3, 91)=15.26, p<.001, which also connects to issues with inattentiveness as found in the neuropsychological test results.

A 3 x 4 analysis of variance (ANOVA) procedure was conducted to determine if there were differences between outcome groups and collateral contacts on the total score of the behavioural section of the BSC. It was found that there were significant differences between the groups in the total score of the behavioural subscale (Table 13).

Table 13

Analysis of Variance main effects and interactions for total behavioural scores between outcome groups (FASD, CNS, ND) and participant and collateral sources

Source	df	MS	F	P
Outcome Group	2	409.3	17.26	<.0001
Source[1]	3	40.1	1.69	.1698
Outcome Group * Source	6	10.7	0.45	.8424

1. Source includes participants, collaterals, and birth mothers.

The results from the total score on the behavioural subscale demonstrated that there was a significant main effect of outcome group, with the FASD group scoring higher (mean 12.4) than the CNS (mean 7.2) and ND (mean 4.6) groups. Post hoc tests demonstrated that the FASD group differed from both the CNS and ND groups (p<.01). There were no significant differences between sources, nor was there any interaction between source and outcome group.

When examined separately, the participant and collateral behavioural subscale demonstrated similar significant main effects. Post hoc analysis indicated that the behavioural scores for the FASD group were higher (by more than a standard deviation) than those for CNS and ND groups for both offender reports and collateral reports ($p < .01$), while the CNS and ND groups did not differ from each other.

The mean total score (SD) on the participant and collateral behavioural scales are shown in Figure 5. The FASD group scored higher on the behavioural item subscale regardless of respondent type.

Figure 5. Average score on behavioural items from participant and collateral Brief Screen Checklist
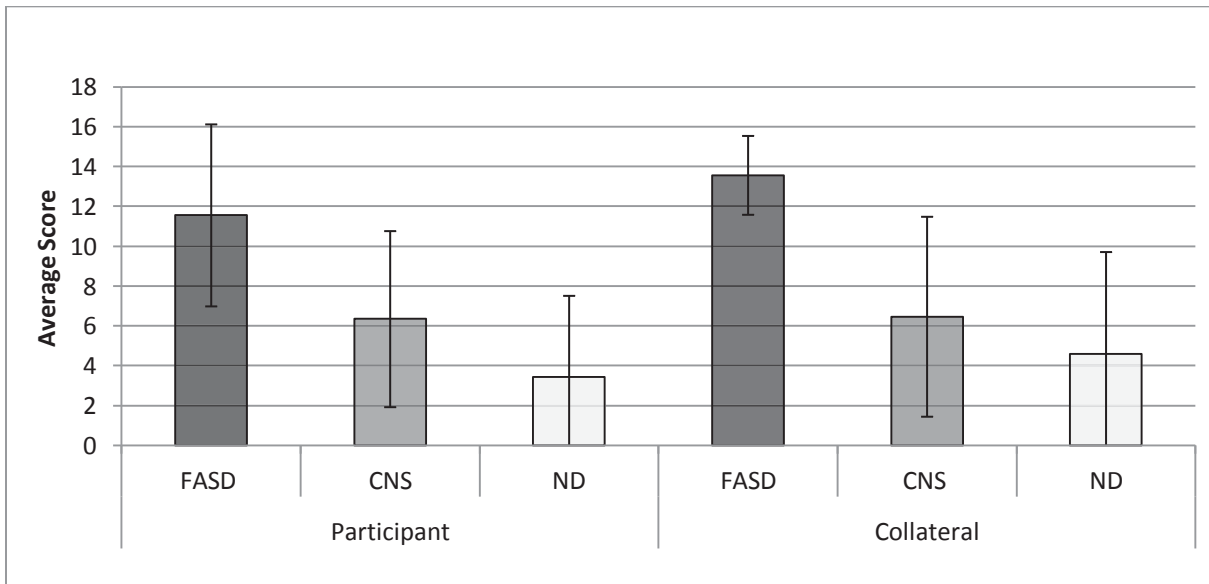
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Participant Behavioural ROC Analysis

A receiver operating characteristic (ROC) curve is a plot of the sensitivity vs. the false

positive rate (1-specificity) computed at a number of different cut-points to select the optimum cut-point for distinguishing between FASD positive and FASD negative participants. The 45° line represents a test with discriminating ability no better than chance alone (.50). The closer the ROC curve gets to the top left hand corner of the plot, the better the ability of the test to discriminate between FASD positive and FASD negative groups. The area under the curve (AUC) is used to determine the probability that a randomly selected individual with FASD has a higher test value than someone who does not have FASD. A test that does no better than chance alone in predicting the probability of an individual having a certain condition will have an AUC of .50.

To determine the optimal threshold for distinguishing FASD from non-FASD groups, sensitivity and specificity were calculated for a range of scores on the behavioural subscale. As this was the first pilot of the screening tool and the number of FASD cases was small, cut off scores can only be estimated, not confirmed. A validation study of the FASD checklist will allow further confirmation of cut off scores.

Figure 6. ROC curve for participant BSC behavioural item total score
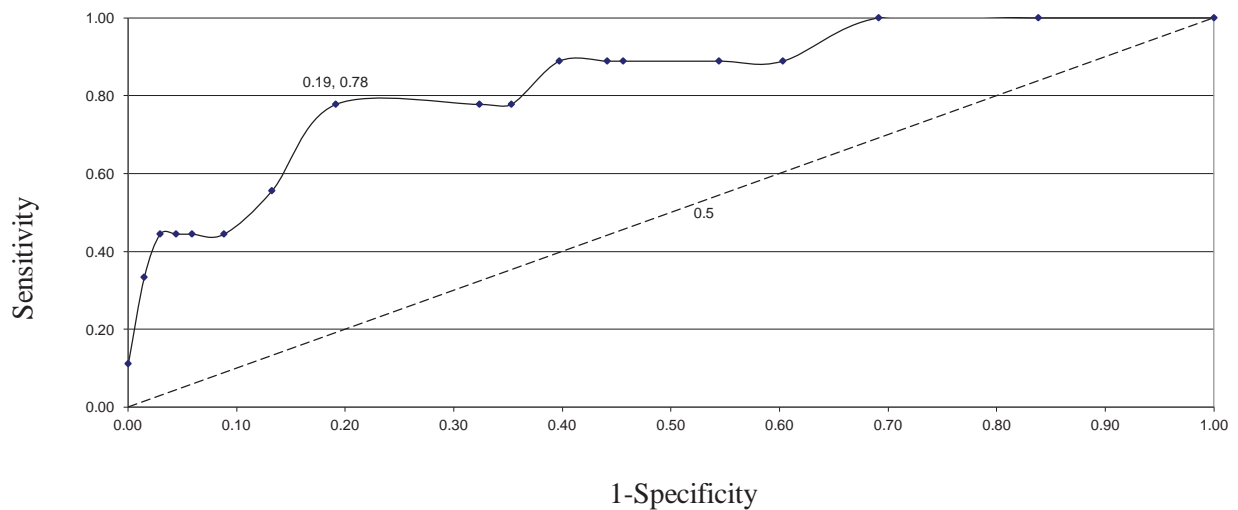
The area under the curve (AUC) for the participant self-report scale of behavioural items was 0.834. This is far better than chance alone, at .50. From this chart (Figure 6), it was determined that the optimal cut-off, where the line is furthest towards the upper left corner, was a score of 10. At this threshold, sensitivity was .78 and 1-specificity was .19. Using the threshold

of 10, 7 of 9 FASD participants were correctly identified by the test, and 55 of 68 non-FASD were correctly identified. Using logistic regression, it was determined that an offender scoring 10+ on the behavioural subscale of the BCS was 15 times more likely to be diagnosed with an FASD than someone scoring less than 10, 95% CI [2.75, 79.75]. At a cut off of 10, sensitivity=.78, specificity=.81, positive predictive value (PPV)=.35, and negative predictive value (NPV)=.96.   Positive predicted value indicates the percentage of FASD cases that are correctly classified by the checklist at the proposed cut-off, and negative predicted value indicates the percentage of non-FASD cases that are correctly classified by the chosen cut off score. For a range of cutoff scores, see Appendix J.

Of the 14 offenders in the UC group, 6 (43%) scored above the threshold of 10 indicating risk for an FASD.

Collateral Behavioural ROC Analysis

The ROC curve for the behavioural items from the collateral responses is shown below (Figure 7). The area under the curve (AUC) for the collateral behavioural item total score was 0.93, indicating the collateral responses to the behavioural BSC items predicted FASD far better than chance alone.

Figure 7. ROC curve for collateral BSC behavioural indicator total score
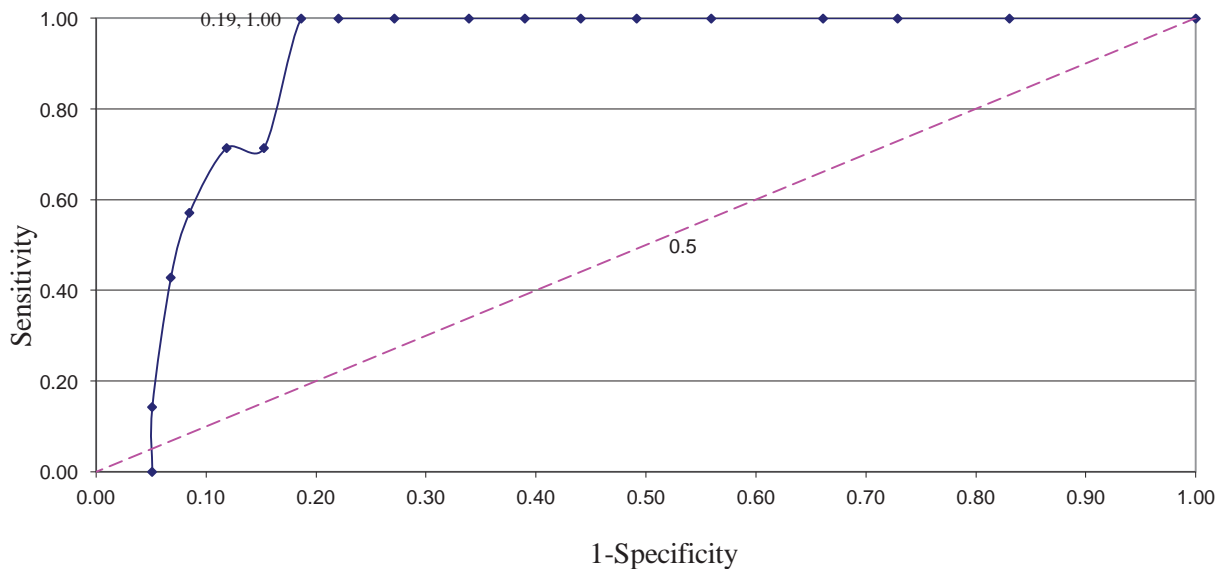
The optimal cut-off point for the scale was 11, sensitivity=1.0, specificity=.81, PPV=.39, and NPV=1.0. Psychometric details are shown for scores 0 through 17 in Appendix J.

Although the optimal threshold suggested by this analysis is one point higher than that suggested by the analyses of the participants' self-reports, it is important to note that the participant reports were based on a smaller sample and that the difference between the threshold of 10 and 11 was marginal.

It was also of interest to determine the level of agreement between collaterals and offenders on the behavioural subscales. The level of agreement between offenders and collaterals was modest but significant: the correlation of participants' score with his collaterals' score was $r = .23$ ($p = 0.03$). Using the threshold of 10 for offenders and 11 for collaterals, agreement as measured by Cohen's kappa was 0.37, 95% CI [0.11, 0.62], with an accompanying McNemar's test value of 0.25, which was not significant (p=.62). The non-significant McNemar's test indicated significant agreement, and a kappa score of 0.37 is typically considered 'fair to 'moderate' agreement. For comparative purposes, a kappa score of 0.8 or greater is considered almost perfect agreement.

In comparing the UC group to the score of 11 and above on the collateral behavioural score, it was found that five of the 14 would be screened into an FASD 'risk' group using this standard, or 36%, one less than was the case with the participant behavioural total score.

Historical Indicators

Participants

Nine historical items comprised the personal history section of the checklist. Similar to the analysis conducted with the behavioural items, a frequency distribution of items was conducted to determine the distribution of responses for individual indicators. Three of the nine questions had missing data and low variability. Only three participants out of 91 answered affirmatively to any of these questions, whereas the rest answered 'no' or 'do not know'. Questions with a high rate of missing data included questions relating to history of sibling diagnosis of an FASD and the participants' own experience with health professionals mentioning the possibility of an FASD (Table 14). Due to the number of missing or 'do not know' responses and the low variability in responses, these items were dropped from the analysis. The remaining questions were re-coded such that items with follow-up questions (eg. If yes, how many...) were

combined into a single categorical indicator.   The remaining variables were summed into a historical total, which was used to assess predictive validity for FASD and assessed using ROC analysis to determine a cut-off score. Finally, the UC group was assessed using the cut-off score as determined by the ROC, and an estimate of 'cases' was derived.

Results indicated that being in foster care, χ^2 (3, *91*) =14.37, p<.0024, in care more than three times, χ^2 (3, *91*)=21.76, p <.0001, and having problems with school from an early age χ^2 (3, *91*)=13.70, p<.0030, were highly associated with FASD. Issues related to mental health treatment were not significant despite a trend towards higher endorsement from the FASD participants, however participants in the FASD group were the only participants previously diagnosed with a developmental disability, χ^2 (3, *91*) =6.85, p=.0766.

Table 14
Percentage of groups endorsing BSC historical indicators

	Do not know	FASD (9)*	UC (14)	CNS (41)	ND (27)	χ^2
1. Ever adopted	-	22.2	7.14	2.44	-	8.67**
2. Ever in foster care	-	77.80	57.14	24.39	22.22	14.37***
3. In care 3 times or more	1.10	66.67	28.57	7.5	7.4	21.76****
4. Problems with school early	2.20	77.78	71.43	57.5	23.08	13.70***
5. Ever had mental health treatment	-	44.44	14.29	9.76	14.82	n.s.
6. In mental health treatment 3 times or more	2.20	12.50	-	-	7.69	n.s.
7. Diagnosed with a developmental disability	-	22.22	-	-	-	18.63****
8. Have a sibling diagnosed with FASD	12.09	-	-	-	-	-
9. Ever been told (offender) has FASD	2.20	-	7.14	-	-	n.s.

**=p<.01; ***=p<.001; ****=p<.0001

FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.
[1] The Uncertain (UC) group was not used in the psychometric analysis of the historical section of the BSC.

ANOVA was used to determine differences between the FASD, CNS and ND groups[6] and to determine the difference between respondent type. There was a significant difference between outcome groups, and post-hoc analyses demonstrated that the FASD group (mean 2.6) was significantly different from the CNS (mean 1.0) and ND (mean 0.7) groups at $p<.01$, while the CNS and ND groups did not differ from each other. There were no significant differences between collateral source, or any interaction between outcome group and source (Table 15).

Table 15
Analysis of Variance main effects and interactions for total historical scores between outcome groups (FASD, CNS, ND) and participant and collateral sources

Source	df	MS	F	P
Outcome Group	2	17.3	18.9	<.0001
Source[1]	3	0.9	1.0	.3875
Outcome Group * Source	6	0.2	0.2	.9665

1. Source includes participants, collaterals, and birth mothers.

The collateral scores were combined to create an average collateral score. When analysed separately, the participant and collateral scores on the historical items demonstrated similar results (Figure 8). For both participants and collaterals, the FASD mean was significantly different than the CNS and ND means, while the CNS and ND means did not differ from each other.

Figure 8. Average score on historical items from participant and collateral Brief Screen Checklist
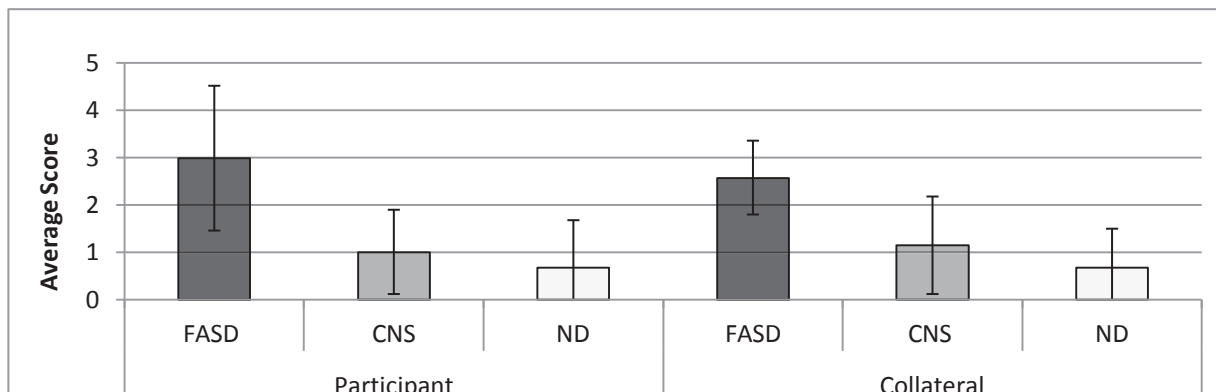
FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

Logistic regressions were conducted on the individual items, and it was found that of the individual indicators, a history of being in multiple foster care placements was the strongest predictor of FASD among the historical items, Wald $\chi^2(1, 77)=12.59$, p=.0004. The likelihood (odds ratio) that an individual had an FASD diagnosis was 6 times higher if they had multiple foster care placements, 95% CI [2.02, 15.44]. When combined in a logistic model with the cut-off value of 10 on the participant behavioural scale, both were a better predictor of FASD together than alone, Wald $\chi^2(2, 77)=13.12$, p=.0014 .

When examining the total historical items, where adoption, foster care, trouble in school and mental health problems were summed and assessed using logistic regression the historical items together outperformed foster care and behavioural indicators combined, Wald $\chi^2(1, 77)=13.09$, p=.0003. The OR for the historical scale was 3.9, indicating that participants with an FASD were roughly 4 times more likely to have a history of problematic environmental and mental health issues than those without an FASD.

Participant Historical ROC Analysis

A cut-off value for the total historical score was calculated using logistic regression and ROC analysis. Figure 9 demonstrates the ROC curve, and according to the technique of finding optimal sensitivity and specificity, a cut-off score of 2 was established.

Figure 9. ROC curve for participant risk history total score
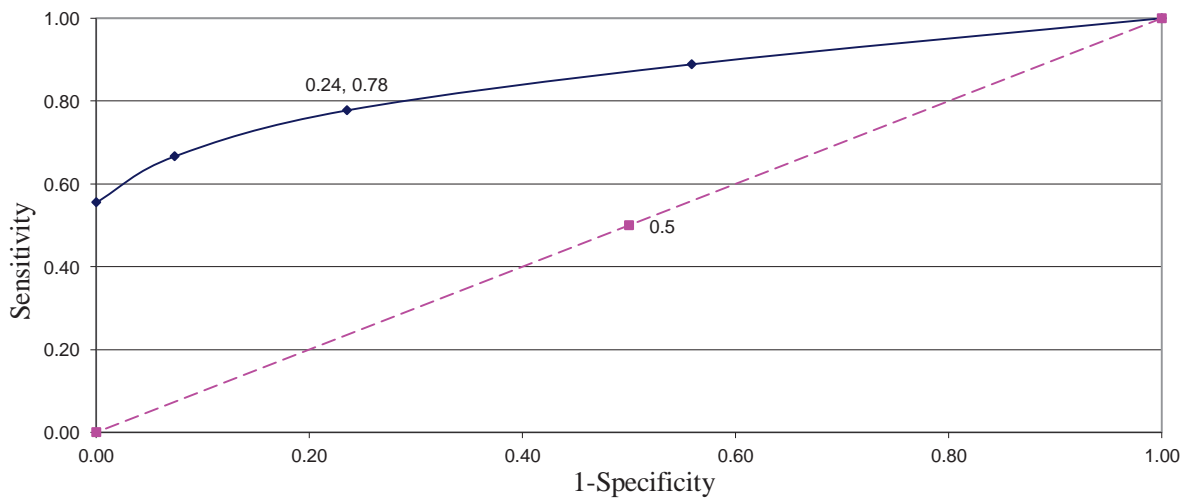
The area under the curve for the historical items was 0.848, similar to that which was found for the participant behavioural indicators. The psychometric properties of this smaller subscale were: sensitivity= 78%, specificity=76%, PPV=30% and NPV=96%. There was 77% agreement, in that 77% were correctly classified as true positives and true negatives. The Cronbach's alpha score on the historical indicators was 0.54.

Using the UC group again, the number of participants that would be screened in using the criterion of a score of two or above on the participant historical item subscale was assessed. This resulted in 8 of the 14 participants being screened in as a 'risk' for an FASD diagnosis, or 57%.

Collateral source

Similar to the comparisons on the behavioural indicators, the historical indicators were compared between participants and collaterals. Some similarities were found between the participant and collateral responses to the personal history subscale. As was the case with the participant version, there was a great deal of missing data ('do not know' responses) for the last three items on the scale (see Appendix A). These items were dropped. The collateral responses to the items that remained were averaged across collaterals (birth mothers and close family and friends) to obtain one score per participant. The items that remained were then summed to obtain a total historical item score. The Cronbach's alpha was .41 for the collateral historical item scale.

Logistic regression was conducted on individual indicators, and history of foster care was found to be a significant predictor of FASD, Wald χ^2(1, 64)=7.71, p=.0055. The likelihood that a participant with an FASD had a history of multiple foster care placements was 6 times higher than those without an FASD, 95% CI [1.72, 23.24]. The total historical score was assessed using logistic regression, and it was found that the total historical score was also significant, Wald χ^2(1, 66)=8.51, p=.0035. Unlike the participant historical scale, there was not a large difference between the predictive ability of a history of foster care and the total historical score in the collateral BSC. In addition, adding the total score on the behavioural items to the model with the total historical score improved the overall model, Wald χ^2(1, 66)=10.10, p=.0064, while dropping the individual variables to just below significance. The historical score (p=.0575) had an odds ratio of 3.07; in other words those with higher historical scores were 3 times more likely to be at risk for an FASD, 95% CI [0.97, 9.78], and the behavioural item total (p=.0887) had an

odds ratio of 1.25, which was not significant 95 CI [0.97, 1.63].

Collateral Historical ROC Analysis

Also similar to the participant historical subscale, a total score of 2 was found to be the optimal cut-off for the collateral responses. Logistic regression was conducted and the ROC curve was determined. From this, the optimal psychometric properties of the scale were obtained. The ROC curve had an AUC of 0.88 (see Figure 10).

Figure 10. ROC curve for collateral risk history total score
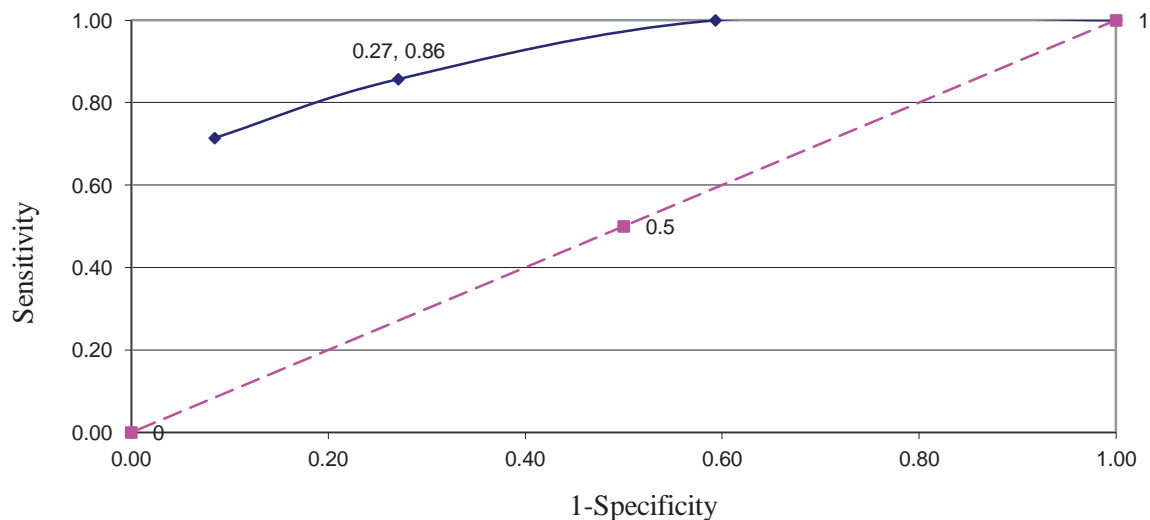
From the ROC analysis, the psychometric properties were assessed. The optimal balance of sensitivity and specificity were found at a score of two on the collateral historical item scale. Similar to the trend found in the participant historical items, the level of agreement (true positive + true negative) was 74%, somewhat lower than the level of agreement on both the participant and collateral behavioural indicator total scores. Sensitivity was .86, Specificity was .73, PPV was .27, and NPV was .98. For a range of scores, see Appendix J.

The correlation between the participant historical score and the collateral historical score was 0.59, (p<.0001). The kappa score between the two sets of respondents was 0.34, and McNemar's Test was not significant (p=.83). This represents significant fair to moderate agreement between the two respondent types.

The number of participants from the UC group that would be screened in using the

criterion of a score of two or above on the collateral historical item subscale was found to be 8 out of 14, or 57%, similar to that for participants.

Maternal Indicators

Seven percent of participants, 22% of collaterals and 19% of birth mothers reported prenatal alcohol consumption. Roughly half of all participants reported that they did not know whether their mother consumed alcohol during pregnancy.

For respondents who reported a known history of prenatal alcohol exposure, collaterals reported that nearly half of the mothers who consumed alcohol during pregnancy did so throughout their full pregnancy (45%), while 11% of birth mothers reported drinking during the full pregnancy. Birth mothers were more likely to report alcohol consumption on a less frequent basis, however were more likely than collaterals to report binge drinking during pregnancy (56% vs. 41%). These percentages are based on individuals responding to the maternal drinking section of the BSC, and not all participants were represented by both birth mothers and collaterals. As was stated earlier, only one birth mother was contacted for those in the FASD group. Therefore, discrepancies in the percentages of collateral report and birth mother report could be due to reporting on different participants, and are likely not directly comparable to each other.

There were differences between respondent types in the knowledge of prenatal alcohol consumption. Friends and common law spouses most often reported no knowledge of the participants' mothers' alcohol consumption history, while close family (grandparents, aunts, uncles, etc) were more likely to report they did have knowledge of the mothers' drinking habits during pregnancy. Regardless of respondent type, all collaterals and participants had difficulty answering the more detailed questions regarding duration, frequency and amount of alcohol consumption during pregnancy. These detailed questions regarding prenatal alcohol use had high levels (range 53% to 74%) of missing data ('do not know' responses), and for this reason were not used in the analysis.

The data that were received for this section of the BSC varied in quality. Some questions seemed easier for participants to answer than others. The general question 'did __ mother drink while you were young' received the fewest missing, or 'do not know' responses. Detailed questions relating to drinking while the participant was young had fewer missing responses than

detailed questions relating to timing, duration, frequency and amount of alcohol consumed during pregnancy (Table 16.).

Table 16

Percentage of participants positively endorsing BSC maternal indicators

	Do Not Know	FASD (9)	UC (14)	CNS (41)	ND (27)
1. **Did mother drink when offender was young**	**16.5**	**100.00**	**91.67**	**58.82**	**60.87**
2. Once per month	25.27	100.00	91.67	54.84	55.00
3. 2-4 times per month	25.27	100.00	83.33	25.81	25.00
4. 2-3 times per week	25.27	100.00	25.00	9.68	15.00
5. Four or more times per week	25.27	-	16.67	-	-
6. One drink per occasion	38.46	100.00	88.89	39.13	50.00
7. 2-4 drinks per occasion	38.46	100.00	77.78	30.43	44.44
8. Five or more drinks per occasion	38.46	83.33	66.67	21.74	27.78
9. **Drink while pregnant**	**47.25**	**83.33**	**14.29**	**-**	**-**
10. During first trimester[a]	52.75	50.00	14.29	-	-
11. During part of pregnancy[a]	52.75	50.00	14.29	-	-
12. During full pregnancy[a]	52.75	50.00	14.29	-	-
13. One drink per occasion[a]	50.55	66.67	14.29	-	-
14. 2-4 drinks per occasion[a]	50.55	66.67	14.29	-	-
15. Five or more drinks per[a] occasion	50.55	33.33	14.29	-	-
16. **Other drug use while pregnant**	**-**	**66.67**	**35.71**	**46.34**	**25.93**
17. Used tobacco while pregnant	10.99	66.67	38.46	50.00	33.33
18. Prescription drug use from a doctor	14.23	11.11	7.69	5.88	4.55
19. Other illicit drug use	7.69	55.56	7.69	7.69	0.0

FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

The question of drinking while pregnant, although still high in missing or 'do not know' values for participants, was lower than detailed maternal prenatal alcohol consumption questions. Collaterals were more likely than participants to provide a history of prenatal alcohol consumption (73% vs. 52%), which is not surprising given the lack of first-hand knowledge of prenatal alcohol consumption among participants.

Most participants and collaterals were able to answer questions relating to the mothers'

use of alcohol while the participants were young. For this reason, four main variables were chosen to retain in the analysis: did mother drink while 'participant' was young', 'how often did mother drink while 'participant' was young', 'how many drinks did mother have on a typical drinking occasion while 'participant' was young', and the one question relating to prenatal alcohol consumption 'did mother drink while pregnant with 'participant''.

These questions were assessed for each participant and collateral source in an effort to determine how accurately each respondent's information predicted a diagnosis in one of the FASD categories. They were also assessed to determine how well one respondent type agreed with another. The questions relating to drinking while the participants were young were analysed for level of agreement with responses to drinking while pregnant, and to determine if this type of information could act as a reasonable proxy measure for the more difficult to obtain information on maternal drinking during pregnancy. Finally, using the information obtained from the maternal questions, the UC group was compared to the responses for the participants with confirmed FASD and a number of possible 'cases' was estimated.

Due to missing values and occasional discrepancies between respondent types (participant, collateral or mother), the main variables were combined such that if any source reported prenatal alcohol exposure then exposure was coded as 1 for yes, 0 for no. If any source reported maternal drinking during the participants' childhood the consumption was coded as 1 for yes, 0 for no. A logistic regression was conducted using the binomial 'drinking while pregnant' to examine the likelihood that a participant would be diagnosed with an FASD if the mother was reported to have consumed alcohol during pregnancy. It was found that the likelihood of being diagnosed with an FASD was 41 times higher for those with prenatal alcohol exposure histories than without 95% CI [4.70, 365.53]. This was significant, Wald χ^2(1, 77)=11.23, p=.0008.

The variables regarding drinking while the participant was young were more difficult to assess using logistic regression, due to zero cell counts in the frequency distributions. All participants diagnosed with an FASD had a history of maternal alcohol consumption in their childhood, and all had histories of mothers who drank heavily and often. The χ^2 value for drinking often during childhood (several times per week) was significant, χ^2 (1,56)=11.59, p=.0007, as was drinking heavily (more than four drinks) per occasion, χ^2(1,47)=8.52, p=.0035.

To assess the joint probability that a participant had a history of maternal alcohol

consumption during childhood and a history of prenatal alcohol exposure, a series of logistic regressions were completed. Categorical variables for drinking while the participant was young were created and were coded 0-3, which included a moderate level of consumption as level 2. These variables included "drank often while *the participant* was young" and drank a large (more than 1) number of drinks during a single drinking occasion while *the participant* was young". Following this, variables that combined the two highest consumption categories were created: "drank often (at least twice per week) while *the participant* was young" and "drank a large number of drinks (four or more) during a single drinking occasion while *the participant* was young, which were binomial in nature.

Table 17

Unconditional odds ratios for the predictive validity of alcohol consumption during childhood on prenatal alcohol consumption*

	β	*SE*	Wald χ^2	OR	CI	*p*
Drink frequently during participants' childhood (0-3)	0.68	0.28	5.95	2.00	[1.14, 3.39]	.0147
Consume large quantities during a single drinking occasion during participants' childhood (0-3)	0.85	0.31	7.51	2.34	[1.28, 4.30]	.0061
Drink frequently during participants' childhood (binomial)	1.76	0.65	7.26	5.82	[1.62, 20.97]	.0070
Consume large quantities during a single drinking occasion during participants' childhood (binomial)	2.13	0.83	6.59	8.41	[1.65, 42.76]	.0130

*reference category is drink while pregnant=1 (yes).

As can be seen in Table 17, all variables, both categorical and binomial, were predictive of drinking while pregnant. The number of drinks per drinking occasion was slightly more predictive, with odds ratios of 2.34 and 8.41 for the categorical and binomial variables, respectively. These results demonstrated that the more alcohol consumed by the mother during the participants' childhood on any particular drinking occasion was predictive of consuming alcohol during pregnancy.

Finally, the binomial childhood maternal consumption variables were combined to create a proxy measure of heavy alcohol consumption in general. This measure was assessed for its ability to predict FASD. The logistic regression showed that combining measures of frequent

and heavy alcohol consumption during the participants' childhood did predict FASD, Wald χ^2(1, 77)=6.19 p=.0129.   The odds of receiving a diagnosis of an FASD was 16 times higher if the mother drank heavily and often during the participants' childhood.

The criterion upon which to assess the UC group for a possible diagnosis was chosen to be the variable that combined the two significant maternal drinking categories during the participants' childhood. Only four of the 14 participants in the UC group did not have this criterion. Ten participants, or 71%, using only the criterion of maternal consumption during childhood would be screened in as 'high risk' for an FASD.

Final BSC

As no significant differences between respondent type were found and significant agreement between participant and mean collateral scores was also found, the final version of the BSC is based on participant response. If an offender is rated high risk based on the cut-off scores determined from behavioural and historical self report and a history of heavy drinking during the offender's childhood is established, collaterals in the community should be contacted for corroborating maternal drinking information.

The final version of the screening tool consisted of 26 behavioural, six historical and three maternal drinking questions.   The ROC for the final BSC is shown in Figure 11.

Figure 11. ROC curve for final BSC
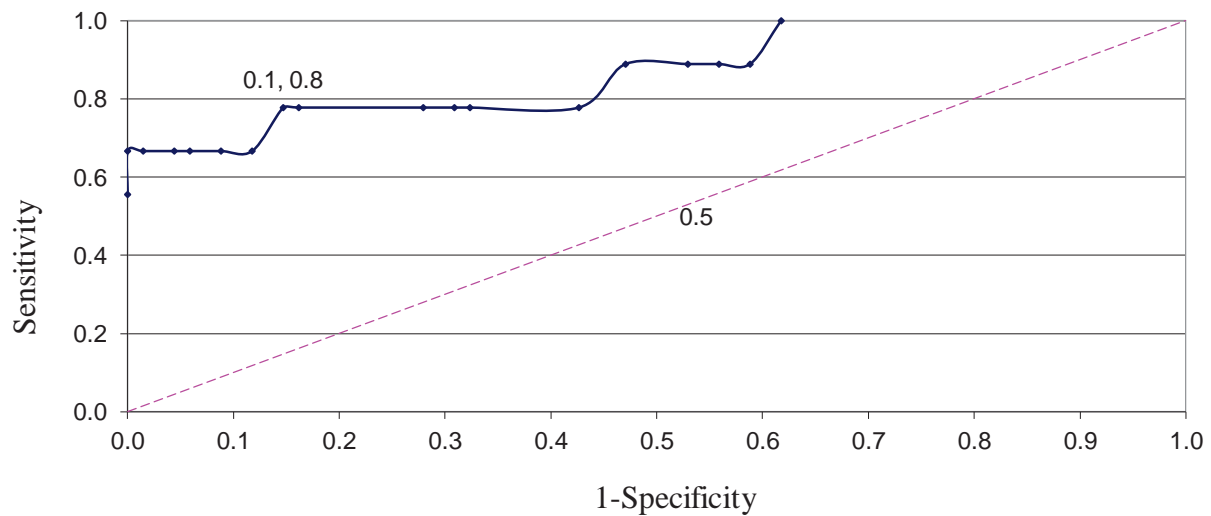
The participant version of the BSC subsections (behavioural, historical and maternal)

56

were assessed together in a logistic model which was statistically significant, Wald χ^2 (3,77)=13.14, p=.0044.   The area under the ROC curve was .86, higher than the previously reported participant AUC. The psychometric properties were also improved in the overall model, with Se=78%, Sp=85%, PPV=41% and NPV=97%. Overall agreement was 84%. Examining the individual scales together with logistic regression showed that individuals with FASD were twice as likely to have a score of 10 or more on behavioural indicators, 3 times more likely to have a score of 2 or more on the historical indicators, and 9 times more likely to have a history of frequent and heavy maternal alcohol use during childhood. The final version of the BSC can be found in Appendix K.

Using all three screening subsections, four participants from the UC group met all three criterion. Examination of the original results from the diagnostic assessment, it was found that two of the four participants were recorded as having 'unknown' alcohol exposure. According to screening criteria however, they were more likely to be at risk for prenatal alcohol exposure. Three of the four participants were found to have received neuropsychological scores less than that which is required for a full diagnosis of an FASD (ie significant damage in two brain domains, not three).   As their final study outcome was 'uncertain', had more information been available at the time of diagnosis the prevalence rate for this pilot study could be as high as 14% (13 individuals).

Summary and Conclusions

The psychometric analyses demonstrated that the screening tool, the Brief Screen Checklist (BSC) worked well with the population of offenders in an institutional setting. Item total correlations and an examination of variability in the item responses resulted in some interesting findings and potential variables for exclusion. There was some consistency between the participant and collateral version of the behavioural and historical sub-scales, in that the same items were identified during the item analysis process. It was found that the behavioural items for both the participant and collateral versions of the BSC had excellent internal consistency, and cut-off scores were determined based on the psychometric properties the scales possessed.   The historical items had somewhat lower internal consistency, but this may be expected as somewhat unrelated concepts comprised the historical section of the BSC. Nevertheless, the historical section was found to be predictive of a diagnosis of an FASD, and was found to be useful as a

tool in the screening process. Interestingly, including the historical items in a logistic model with the behavioural items demonstrated an increase in the screening tool's predictive ability, particularly with the collateral version of the BSC.

The historical subscale of the BSC was the most predictive of an FASD, as demonstrated by the logistic regression analysis. The likelihood of someone scoring high on this section of the BSC increased the chance that they would be ultimately diagnosed with an FASD. This seems particularly true for the indicators of foster care and being in care more than three times. It is common for individuals with FASD to be placed in foster care, as this phenomenon has been well documented (Streissguth et al, 1996). Reasons for this relationship vary; for example children born to mothers who drank heavily during pregnancy often have turbulent and disrupted early years, as evidenced by several sources from this research (MII, BSC, OIA) and others (see Streissguth et al., 1996 for example). Unstable home environments are a well-documented characteristic of individuals who are affected by prenatal alcohol exposure, which can lead to an increased likelihood of developing secondary disabilities such as later homelessness and getting into trouble with the law (Streissguth et al, 1996). In the present study a history of foster care significantly differentiated the outcome groups. In addition, only one birth mother was willing to speak with the research team, and only three birth mothers were given as possible collateral contacts from the FASD group suggesting a higher level of maternal absence for those in the FASD group.

As well as a higher rate of foster care and multiple placements for the FASD group, 100% of participants and their collaterals reported that birth mothers drank while they were young. This was also corroborated with a high endorsement of maternal alcoholism reported in the MII, suggesting that a history of maternal alcoholism could be one factor contributing to the higher rate of foster care in this group.

The maternal indicators were more challenging to analyse due to the nature of the items and the percentage of missing data. During the pilot study, it was a challenge to obtain information on prenatal alcohol exposure, which accounts for the majority of the missing data. Modifications to the maternal section need to occur. For the maternal section, there were no probing questions built into the screening tool. There was no attempt made within the structure of the screening tool to allow for relationship-building, relieving possible guilt associated with prenatal drinking, or normalizing drinking behaviour. There were no questions relating to the

possibility of drinking during the first trimester before the mother knew she was pregnant. The protocol was such that one interview was conducted per collateral source, including birth mothers. It is now well understood that relationship building and development of trust and rapport, in particular with birth mothers, is critical to the ascertainment of accurate information regarding drinking behaviour during pregnancy (Poole & Urqhuart, 2009). Therefore there could have been significant underreporting of prenatal alcohol exposure by all collaterals.

It was of interest to determine if a proxy measure, maternal alcohol consumption during the offenders' youth, could be useful in the screening process. Following this line of questioning, the maternal postnatal alcohol consumption patterns were examined closely and it was found that those with an FASD diagnosis were more likely to have mothers who drank heavily and often during their childhood. Examination of the variable related to drinking at all during childhood did not have much variability, as most study participants, no matter the group, endorsed this item. The distinguishing characteristic was that mothers of participants with an FASD drank weekly, often multiple times per week and drank heavily, drinking four or more drinks per drinking occasion. This criterion predicted an FASD diagnosis very strongly.

In some ways this is intuitive, in that it would be expected that mothers who drink heavily and often may be addicted, and may have more trouble ending their consumption of alcohol when they become pregnant. Research from other areas, however, has demonstrated that there is another group of women who are at high risk for having offspring affected by FASD; women who are well educated, older, and have fewer drinks per occasion (Astley et al., 2000). It is possible that there are two populations of women who are at risk for having a child with FASD; those who are older and more moderate in their alcohol consumption and the population that we found, who are younger than mothers of other participants (data not shown), and consume alcohol frequently and heavily. This difference in maternal population demographics could likely be a factor of the population studied, as children affected by FASD born of mothers who are overall more stable in the community may be more likely to receive support early in childhood and to be raised in nurturing, protective environments thereby avoiding situations that place them at risk for coming into contact with the justice system.

The BSC data from participant and collateral sources, excluding the parole officer source, were shown to have similar response patterns in that both participants and collaterals in the FASD group were more likely to endorse items on the behavioural and historical subscales. The

59

responses from each collateral type (family, friend) differed in the amount of 'do not know' responses, with family collaterals having the lowest percentage of missing data. The total scores on both the behavioural and historical scales demonstrated clearly that both collaterals and participants responded similarly, and that the FASD group scores were significantly higher than the other groups on both scales and with both respondent types (participant/collateral). In addition, kappa scores indicated a fair to moderate agreement between participants and collaterals on both subscales.

It has been suggested that individuals diagnosed with an FASD are not reliable historians and are not capable of providing accurate self-report information (Paige, 2007; Roach & Bailey, 2009). In some situations this may be accurate; however the data provided in this context does not support this conclusion. The similarity of responses between participants and collaterals on both BSC subscales indicates the opposite: that the questions in the BSC can be answered by individuals with FASD as accurately as other sources close to the individual. It was demonstrated however, that collaterals must have a moderate to substantial level of familiarity with the individual, as parole officers meeting the offender for the first time were not able to answer most questions in the BSC. For practical purposes, offender self-reported information would be most readily accepted by federal penitentiaries. Many types of offender self-report instruments are already administered at intake assessment centres, and it is a format least likely to tax an already overburdened system. Of particular note, with respect to screening, was the finding that a history of maternal alcoholism while the participant was young was predictive of drinking during pregnancy, and participants were more likely to have this information than information on prenatal alcohol exposure. For screening purposes, a specific history of maternal alcohol consumption during an offender's youth (i.e. drinking many drinks per occasion, drinking frequently) should act as a proxy measure for adults administered the BSC. Including a question regarding the possibility of the mother drinking while pregnant should be retained, however the screening process would not rely on this information. More in-depth knowledge regarding prenatal alcohol exposure should be sought out during the diagnostic assessment.

Further analyses are needed to reduce the number of items in the behavioural indicators. Next steps will be to examine the Dynamic Factor Identification and Analysis (DFIA) portion of the Offender Intake Assessment (OIA) to determine which items could be used as proxy measures for the behavioural indicators, and which few additional items need to be added to the

OIA to effectively screen for FASD.

Facial Photographic Analysis

Photographic analysis and physical exam

The photographic analysis was included in this study to determine its' utility in screening in an adult correctional setting. There were four main facial features examined: The left and right palpebral fissure lengths (left and right eye width), the depth of the philtrum (groove between nose and upper lip), and the thickness of the upper lip. Individuals with Fetal Alcohol Syndrome (FAS), one of the diagnostic categories under the FASD spectrum, have shorter palpebral fissures, a flattened philtrum and a thinner upper lip. These are sentinel physical features and are found consistently in individuals with FAS. In other FASD diagnostic categories (ie. pFAS, ARND), some of these features may or may not be present, and are not part of the criteria for a diagnosis. In order to determine which diagnosis an individual should receive, all are assessed for these facial characteristics.

The physician in this study examined every participant in person during a medical exam, which included assessing facial characteristics. Two independent assessors used the photographic analysis to also assess facial characteristics. All assessors were blind to the prenatal alcohol history of the participant and to each others' findings. Ten participants were not assessed using the photographic assessment. Table 18 demonstrates the mean (SD) of each facial characteristic between assessors.

Table 18
Facial measurements (in millimetres) between photographic and physical exam assessors

	Facial Characteristics (mm)			
	LPFL	RPFL	Philtrum	Lip
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Assessor				
Software 1	29.2 (1.5)	29.7 (1.6)	3.1 (0.6)	2.8 (0.7)
Software 2	29.9 *(1.7)*	30.1 *(1.7)*	2.9 *(.70)*	2.7 *(.86)*
Physical Exam	29.0 *(1.5)*	29.3 *(1.6)*	2.4 *(.75)*	2.2 *(.91)*

Although all mean scores within facial characteristics are within 1 mm of each other, significant differences were found between assessors. Table 19 shows the results of the ANOVA

for each characteristic.   Post hoc comparisons revealed little consistency; differences between the three assessor types varied by facial feature.

Table 19
Univariate ANOVA between assessors (software 1, software 2, and physical exam) for each main effect on characteristic FAS facial features

	df	MS	F	p
Left Palpebral Fissure Length	2	16.62	6.75	0.001
Right Palpebral Fissure Length	2	11.01	4.25	0.015
Lip Score	2	9.40	13.03	<.0001
Philtrum Score	2	9.03	18.89	<.0001

Even though significant differences were found using ANOVA, there were very high correlations between each assessor within each facial characteristic (Table 20). Correlations ranged from .88 (between software assessors on right palpebral fissure length) to .38 (between software assessor 2 and physical exam on philtrum score). The lowest correlations were within the characteristic of the philtrum score, where depth is assessed visually by using a pictorial five-point Likert chart for both the software and physical assessment. In all cases, however, correlations were highly statistically significant indicating excellent agreement between assessors.

Table 20
Correlations between assessors for each facial feature

	LPFL	RPFL	Philtrum	Lip
Software 1 x Software 2	.84****	.88****	.44****	.68****
Software 1 x Physical Exam	.69****	.70****	.45****	.67****
Software2 x Physical Exam	.70****	.72****	.38***	.69****

Note: LPFL=left palpebral fissure length; RPFL=right palpebral fissure length.
***p<.001; ****p<.0001

In addition to an analysis of assessors, it was of interest to determine if there were differences between outcome groups and facial scores. The mean (SD) of each facial characteristic for each outcome group is shown in Table 21.

Table 21
Facial measurements (in millimetres) between outcome groups

	Facial Characteristic (mm)			
	LPFL *(SD)*	RPFL *(SD)*	Lip *(SD)*	Philtrum *(SD)*
Outcome Group				
FASD	28.9 *(1.3)*	29.4 *(1.7)*	2.5 *(.80)*	3.0 *(.68)*
UC	29.1 *(1.8)*	29.5 *(1.9)*	2.6 *(.99)*	2.9 *(.84)*
CNS	29.4 *(1.3)*	29.7 *(1.4)*	2.5 *(.84)*	2.7 *(.71)*
ND	29.7 *(1.3)*	30.0 *(1.8)*	2.6 *(.99)*	2.8 *(.74)*

FASD=Fetal Alcohol Spectrum Disorder; UC=Uncertain; CNS=Central Nervous System; ND=No Deficits.

As none of the participants were diagnosed with FAS, It would be surprising if there were differences between study groups. However, the prenatal alcohol exposure experienced by those in the FASD and UC groups may influence the results from facial characteristics. Although participants with FASD did have lower scores on both left and right palpebral fissure lengths, indicating shorter eye openings, these were not statistically different $F (3, 242)=2.22$, p=.08, and $F (3, 242)=1.08$, p=.35. The philtrum score was highest in the FASD group, again not statistically different $F (3, 242)=1.75$, p=.15. The lip score was also not different between outcome groups, $F (3, 242)=0.57$, p=.64.

As was stated, alcohol exposure is known to be directly related to the facial characteristics of FAS. A number of participants, not necessarily in the FASD group, were found to have confirmed prenatal alcohol exposure. Therefore, an analysis was undertaken to determine what, if any effect alcohol exposure had on facial characteristics, regardless of diagnostic outcome.

Table 22 presents the mean (SD) of each facial characteristic between categories of prenatal alcohol exposure. As can be seen, in all cases where alcohol is confirmed the mean PFL length is shorter, and the upper lip is smaller. In addition, the two highest categories on the Likert scale for philtrum score include the confirmed and unknown categories. These differences are statistically significant.

Table 22
Mean scores (in millimetres) on facial features between assessors, alcohol exposure and result

	n	Facial Characteristic			
		Left PFL *(SD)*	Right PFL *(SD)*	Lip *(SD)*	Philtrum *(SD)*
Confirmed	48	28.8 *(1.5)*	29.2 *(1.9)*	2.4 *(0.8)*	3.0 *(0.8)*
Absent	132	29.6 *(1.6)*	29.9 *(1.6)*	2.5 *(0.9)*	2.6 *(0.7)*
Unknown	63	29.4 *(1.7)*	29.9 *(1.4)*	2.9 *(0.9)*	3.0 *(0.7)*

Table 23 shows the ANOVA conducted between alcohol categories for each facial characteristic. There are significant differences between alcohol categories on each facial feature. Tukey post hoc assessments demonstrated that for left PFL, the alcohol absent category was significantly different from the confirmed category ($p<.05$). On the right PFL, both the unknown and absent categories were different from the confirmed alcohol exposure, while unknown and absent did not differ from each other ($p<.05$). The absent and confirmed categories did not differ on the lip score, however the unknown category differed from both absent and confirmed ($p<.05$). Finally, the unknown and confirmed alcohol exposure categories did not differ from each other on philtrum score, however the absent category differed from both ($p<.05$).

Table 23
Univariate ANOVA between alcohol exposure categories (Confirmed, Absent, Unknown) for each main effect on characteristic FAS facial features

	df	**MS**	**F**	*p*
Left Palpebral Fissure Length	2	10.78	4.29	0.015
Right Palpebral Fissure Length	2	10.26	3.95	0.020
Lip Score	2	3.81	4.97	0.007
Philtrum Score	2	3.32	6.30	0.002

Summary and Conclusions

The facial photographic software (Astley, 2000) was included in this study as a way to determine if the facial characteristics of FAS could be accurately identified in adults in a correctional setting. Each offender, upon intake into the federal correctional system, has

photographs taken of his or her face and one hypothesis was that these photographs could eventually be used as part of the screening process for FASD. This study found that none of the participants who received a diagnosis in an FASD category demonstrated the sentinel facial features of FAS, which are shortened eye openings (palpebral fissures), a flattened philtrum (groove between nose and upper lip), and a thin upper lip. It has been postulated that as children grow into adulthood their facial characteristics 'fill out', and that the facial features disappear. However, there is evidence to support that if an individual was born with FAS, the facial features will continue to be present through adulthood. In particular, if palpebral fissure lengths (PFL) are shortened when compared to normative data for each age group, they will always be smaller compared to age-matched norms (see discussion on this issue in more detail in Chudley et al., 2007.).

Two assessors blind to the FASD status of the participant and blind to each others' findings used the facial software to analyse characteristic features for each participant. In addition, a physician, also blind to the participants' status conducted a physical exam to measure facial features in the traditional way, with a ruler for the eyes and the lip-philtrum guide. Facial measurements were compared, and excellent correlations between assessors were found indicating excellent agreement and support for the utility of the facial software. Interestingly, analysis of variance showed statistically significant differences. These differences may not have been clinically significant however, as recent research examined PFL's across a mixed race population that represented most major ethnic groups from a general, non-FASD school-age population (Clarren et al., 2010). They found that in all cases, PFL's fell within a millimetre of each other, and therefore concluded that there was no significant difference between racial groups and that one set of norms could be used for the majority of individuals regardless of race. This supports the accuracy of the facial photographic software as all differences found in this study were within 1 mm of each other.

The utility of the facial photographic software also needs to be examined for necessity. Is it necessary to assess facial characteristics in a federally incarcerated population since none of the participants in this study were diagnosed with FAS? Research in other correctional populations, typically juvenile offender populations, also find the majority of cases to be ARND, rather than full FAS (Conry et al, 2008). There is an argument that children with FAS are diagnosed earlier in life due to the 'visibility' of their facial characteristics, and are therefore less

likely to fall through the cracks. They may be more likely to receive supports early in life for their disability and through these supports are protected from some of the secondary disabilities identified by Striessguth (1997), such as homelessness, trouble with the law, and drug and alcohol abuse problems. Those with ARND or pFAS do not have all the facial or growth characteristics of FAS, yet they do have similar brain-based disabilities as those with FAS. The characteristic facial features are related to timing and amount of exposures, as different tissue and organ systems develop at different points during pregnancy. The facial characteristics develop during a specific period early in pregnancy, but the brain is vulnerable throughout gestation. Therefore, the damage to the brain can be just as profound or more profound in individuals without recognizable facial characteristics. Therefore, it may not be necessary or useful to use facial characteristics as screening tools for adults with an FASD in the criminal justice system, given that the brain-based disability of an individual with ARND mirrors that of an individual with full FAS, and given that those with FAS may be less likely to end up in the criminal justice system. Further research is needed to determine if presence of facial features could be of itself a 'protective factor' for prevention of criminal involvement. To diagnose FASD however, facial characteristics must be examined. The results of this study suggest that it is not useful or necessary to assess facial features to screen adult offenders for FASD; however the software was found to be accurate in measuring facial features therefore this tool could be used during a diagnostic assessment.

Discussion

This research was the first of its kind worldwide. The report outlines the results of a pilot study at a male federal penitentiary in the Prairie region of Canada, the aim of which was to screen and diagnose a sample of offenders for FASD who were entering the federal prison system for the first time. The results of the screening and diagnostic process using a brief screening tool demonstrated that this type of work is feasible within a correctional setting for adults. The FASD Brief Screen Checklist (FASD BSC) itself proved to work well with both participant self-report and collateral report, particularly on the behavioural and historical sections. Analysis of the BSC demonstrated excellent preliminary psychometric properties for predicting FASD. It was found that during the study period, the prevalence of an FASD diagnosis was 10% in the study population. This rate is 10 times higher than current general Canadian population estimates (lower-upper range 1-9 in 1000, Health Canada).

Analysis demonstrated that offenders diagnosed with an FASD had more extensive criminal histories and more problems adjusting while incarcerated and while under supervision in the community, however the level of violence used during the commission of their crimes was not different from other offenders in the study. They had a higher severity of needs as assessed by the Offender Intake Assessment (OIA), and individual items on the OIA revealed that they were more likely to have problems with family, with employment, and in many areas of cognitive functioning. They were less likely to have completed school and dropped out at an earlier age than other offenders. They were also more likely to report a personal and family history of abuse, substance abuse and delinquency.

The FASD BSC performed well with this population, demonstrating an ability to predict FASD. Offenders diagnosed with an FASD scored higher on the behavioural and historical sections of the BSC. They were much more likely to have histories of multiple foster care placements; as well they were more likely to have a history of heavy maternal alcohol use during the offender's childhood.

Finally, the facial photographic analysis software was shown to be accurate in measuring the characteristic facial features of FAS. No one in the sample of offenders was diagnosed with full FAS; there were 8 offenders diagnosed with ARND and 1 with pFAS and neither of these diagnostic categories include the characteristic facial features. As the functional disabilities are

67

similar between diagnostic categories the facial photographic analysis may not be useful for screening purposes in this population.

Screening adult offenders for FASD

As evidenced by this report, adult male offenders with an FASD have unique needs and a higher severity of needs in general, as compared to offenders without an FASD. Development of a screening tool to identify those at risk for an FASD is an important step and has been demonstrated as feasible in a correctional context. In addition, medical and neuropsychological requirements of a diagnosis can be successfully implemented with individuals incarcerated in an adult federal penitentiary. As was found, none of the offenders who were diagnosed had any physical characteristics to identify them readily as someone who may have an FASD. Individuals with an FASD who are not 'visibly' impaired are often misunderstood, and are labelled as troublemakers, wilfully disobedient, manipulative, and are also often misdiagnosed with a multitude of conditions such as conduct disorder, oppositional defiant disorder, borderline personality disorder, and ADD or ADHD (Malbin, 2002, Center for Substance Abuse Prevention, 2005). This makes the delivery of effective and appropriate interventions difficult and could result in multiple unsuccessful attempts to reintegrate offenders into the community.

It was determined that the BSC can be administered effectively to offenders in a structured interview format. Collateral contacts provided information, however there was a fair to moderate level of agreement between the responses of offenders and collaterals, in particular on the behavioural and historical sections. The maternal alcohol section was the most difficult for both types of respondents to answer; however it was found that a history of heavy drinking during an offender's childhood predicted drinking during pregnancy. These questions were also more easily answered by respondents with fewer people responding 'do not know' than on questions related to prenatal alcohol exposure. For the revised BSC (BSC-R), the number of questions has been reduced and the structure of questions in all three sections (behavioural, historical and maternal) has been changed.   The revised BSC can be found in Appendix K.

It is important to note that screening alone can not determine if an offender has an FASD. The purpose of screening is to determine if an offender is at risk for having an FASD; this must be followed up with a medical diagnosis. The BSC can flag offenders in need of further assessment and referral to a physician for diagnosis.   Screening for FASD should be followed by

a medical assessment to avoid the possibility of labelling someone with an FASD who does not have the disorder. In addition, a thorough assessment of neuropsychological functioning is a diagnostic requirement; therefore those who are diagnosed by a medical professional will have the benefit of an assessment of their strengths and weaknesses which will assist staff with the offender's rehabilitation and treatment.

Limitations

The research was conducted in one federal institution in the Prairie region, which had a high proportion of offenders of Aboriginal descent on the intake unit, higher than what is found in other regions across Canada. Given that all of the offenders who were diagnosed with an FASD were Aboriginal, generalizing the results to all correctional populations is problematic.

Recommendations

This report has demonstrated that offenders with a Fetal Alcohol Spectrum Disorder do comprise a unique subgroup of the general offender population. Due to their neuropsychological deficits as well as their environments, they have experienced multiple challenges and failures throughout their lives within and outside of their involvement with the criminal justice system. None of our study sample had been previously assessed for or diagnosed with an FASD. With effective screening and identification, treatment and other intervention can be adapted to the needs of these offenders.

Recommendation 1:

Given the rate of FASD identified in the study, correctional systems should consider instituting FASD screening at admission. Screening, however, should only be implemented if resources are available to undertake diagnostic assessments. Screening, by itself, is not sufficient and would leave many offenders identified as at risk for FASD, without the benefit of a confirmatory diagnosis. The FASD Brief Screen Checklist-Revised (BSC-R) could be used for screening, but is not a diagnostic test; if an offender screens positive this must be followed by a diagnostic assessment by a qualified physician.

Recommendation 2:

The following guidelines are offered for use of the BSC as a screening tool:

(1a) The offender should be the primary source for the BSC-R. The BSC-R should be administered in an interview format.

(1b) Collateral sources, if used, must be individuals who have significant familiarity with the offender (mother or other family members).

(1c) Parole officers cannot act as collateral sources.

(1d) If an offender is found to be high risk for FASD, he/she should be referred for medical assessment.

(1e) Physical examination of the offender is not required for screening (Institutional and Community).

(1f)   Official records should indicate that the individual has been diagnoses with FASD after the diagnosis complete.

Recommendation 3:

Staff in correctional agencies should understand and accommodate offenders with an FASD while incarcerated and on community supervision. Treatment and supervision approaches should consider FASD and all of the implications with respect to learning, memory, executive functioning and adaptive functioning.

Future Directions

In order to validate the screening tool and to obtain an accurate estimate of FASD prevalence for Correctional Service Canada, this research will need to be replicated with another sample of offenders from a different geographic location and population demographic. Ideally, this work would be conducted at several institutional sites across Canada to increase the sample size such that more in-depth analysis and increased generalizability of results could occur. It is important that CSC determine the prevalence of offenders with an FASD to better assist them while incarcerated and while released to the community to prevent re-offending by this population.

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Appendix A: Brief Screen Checklist

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┌─────────────────────────────────────────────────────────────┐
│ ┌─────────────────────────────────────────────────────────┐ │
│ │                                                         │ │
│ │           Fetal Alcohol Spectrum Disorder               │ │
│ │              Brief Screen Checklist                     │ │
│ │                  Participant                            │ │
│ │                                                         │ │
│ └─────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────┘
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Instructions:

The checklist should be completed by the research assistant during the consent interview with the participant.

All questions on the checklist should be completed. If respondent does not know the answer to one or more questions, please circle "do not know" or "unknown". For questions that do not apply, check off "Not Applicable" or "Did not Drink/Use". Do not leave any questions blank.

_____

Client (name):_____

Case ID:_____

FPS: _____

Date: _____

Case ID:_____

Date: _____

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┌─────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────┐  │
│  │                  Part 1                       │  │
│  │           Behavioural Indicators              │  │
│  └───────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```

The first set of questions is about your behavior and learning abilities. **Directions**: Please rate yourself on the following questions. There are no right or wrong answers, please use your best judgment. I will begin asking you the first set of questions now.

		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Do Not Know
1.	Acts impulsively.	1	2	3	4	5	0
2.	Has trouble following directions.	1	2	3	4	5	0
3.	Is restless.	1	2	3	4	5	0
4.	Has a problem with spelling.	1	2	3	4	5	0
5.	Shows poor judgment.	1	2	3	4	5	0
6.	Is easily distracted.	1	2	3	4	5	0
7.	Has temper tantrums.	1	2	3	4	5	0
8.	Has strong mood swings.	1	2	3	4	5	0

Table continues on next page

		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Do Not Know
9.	Is hyperactive.	1	2	3	4	5	0
10.	Has problem budgeting or handling money.	1	2	3	4	5	0
11.	Seems unaware of the consequences of his/her actions.	1	2	3	4	5	0
12.	Has a problem with arithmetic.	1	2	3	4	5	0
13.	Interrupts a lot during conversation.	1	2	3	4	5	0
14.	Is agitated.	1	2	3	4	5	0
15.	Is very forgetful of everyday things.	1	2	3	4	5	0
16.	Talks a lot but says little.	1	2	3	4	5	0
17.	Has a poor memory.	1	2	3	4	5	0
18.	Has a problem with reading.	1	2	3	4	5	0
19.	Is easily victimized.	1	2	3	4	5	0
20.	Is strongly opinionated.	1	2	3	4	5	0
21.	Has trouble completing tasks.	1	2	3	4	5	0
22.	Has a poor attention span.	1	2	3	4	5	0
23.	Has few friends.	1	2	3	4	5	0
24.	Is easily manipulated.	1	2	3	4	5	0
25.	Is disorganized.	1	2	3	4	5	0
26.	Has trouble staying on topic.	1	2	3	4	5	0
27.	Is stubborn.	1	2	3	4	5	0
28.	Has poor social skills.	1	2	3	4	5	0

Score on behavioural items _____ (Maximum 140)

The second set of questions is about your family and personal history. **Directions**: Please answer the following questions to the best of your ability. There are no right or wrong answers, please use your best judgment. I will begin asking you the second set of questions now.

29.	Were you adopted?	**Yes**	**No**	**Do not know**
30.	Have you ever been in foster care?	**Yes**	**No**	**Do Not Know**

30a.	If yes: Please specify how many times.	**1-2**	**3-5**	**5+**	**Do Not Know**	**N/A**

Please specify approximate number of times in foster care / group homes if more than five: _____

31.	Have you had problems with school from an early age?	**Yes**	**No**	**Do Not Know**
32.	Have you ever received treatment for a mental health problem?	**Yes**	**No**	**Do Not Know**

If yes: Please provide details.

_____

32a.	If yes: Please specify how many times.	**1-2**	**3-5**	**5+**	**Do Not Know**	**N/A**

33.	Have you ever been diagnosed with a developmental disability?	**Yes**	**No**	**Do Not Know**
34.	Do you have a brother or sister diagnosed with FASD?	**Yes**	**No**	**Do Not Know**
35.	Have you been told by a health professional that you might have FASD?	**Yes**	**No**	**Do Not Know**

Score on historical items _____ (Maximum 11)

Part 3

Maternal Indicators

The final set of questions is about your mother's use of alcohol when you were young and during the time she was pregnant with you. **Directions:** Please answer the questions to the best of your ability. There are no right or wrong answers, please use your best judgment. I will begin asking you the last set of questions now.

36.	Did your mother drink alcohol when you were young? **(if answer is 'no' or 'do not know' then go to question 38)**	**Yes**	**No**	**Do Not Know**

36a.	If yes: how often did your mother drink? ☐ **Once monthly or less** ☐ **2-4 times per month** ☐ **2-3 times per week** ☐ **4 or more times per week** ☐ **Do Not Know** ☐ **Not Applicable**

37.	How many drinks of alcohol did she usually have on a typical drinking occasion? *One standard drink is defined as:* • *12 oz (341 ml, standard bottle) of regular beer* • *5 oz (142 ml, regular size wine glass) of table wine,* • *3 oz (85 ml) of fortified wine (sherry, port, vermouth),* • *1.5 oz (43 ml, single shot) of spirits (whiskey, rum, gin)* ☐ **One** ☐ **Two to four** ☐ **Five or more (specify number if possible): _____** ☐ **Do Not Know** ☐ **Not Applicable**

38.	Did your mother drink alcohol when she was pregnant with you? **(If answer is 'no' or 'do not know' then go to question 43).**	**Yes**	**No**	**Do Not Know**

39.	When during her pregnancy did your mother drink? ☐ **Not longer than the first 43 days of the pregnancy** ☐ **During the full pregnancy** ☐ **During part of the pregnancy** ☐ **Do Not Know** ☐ **Did not drink**

Table continues on next page

40. How often did your mother drink when she was pregnant with you?

☐ **Less than once per month**
☐ **Once monthly**
☐ **2-4 times per month**
☐ **2-3 times per week**
☐ **4 or more times per week**
☐ **Do Not Know**
☐ **Did not drink**

41. How many drinks of alcohol did she usually have on a typical drinking occasion when pregnant?

☐ **One**
☐ **Two to-four**
☐ **Five or more (specify number if possible): ___**
☐ **Do Not Know**
☐ **Did not drink**

42. During the time she was pregnant, on how many drinking occasions did she consume five or more drinks?

☐ **Never**
☐ **Less than once a month**
☐ **At least once a month**
☐ **At least once a week**
☐ **4 or more times per week**
☐ **Do Not Know**
☐ **Did not drink**

43. Did your mother use any other drugs during pregnancy?

☐ **Tobacco**
☐ **Prescription – from a doctor _____**
☐ **Prescription – used without a doctor's order _____**
☐ **Illicit**
☐ _____
☐ **Do not know**
☐ **Did not use**

44. Please specify the source of your information for the answers given. Check all that apply.

☐ **Personal Information**
☐ **Other Relatives/friends**
☐ **Foster/adopted parent**
☐ **Health Professional**
☐ **Other:_____**

That is the end of the questions. Thank you for participating in this research.

NOTE TO INTERVIEWER: Please provide any other details discussed during the interview regarding the participant's behaviour, family history or mother's use of alcohol.

Appendix B: Medical Intake Interview

Medical Intake Interview – Cover Page

Instructions:

The medical interview should be completed by the Research Liaison Officer during her initial meeting with the offender at SMI.

All questions should be completed. If the respondent does not know the answer to one or more questions, please write unknown or 'U' or put a check mark in the spot indicated for unknown. For questions that do not apply, write 'N/A' or put a check mark in the spot indicated for Not Applicable. Do not leave any questions blank.

Client Name: _____

Case ID: _____

FPS: _____

Date: _____

To be completed by Research Liaison Officer only

Case ID:_____
Date:_____

Please answer the following questions to the best of your ability.

PERSONAL HISTORY

Do you have any history of the following?

	Yes	No	Unknown
1. **Hearing or Vision concerns**			
Details:			
2. **Chronic Illnesses**			
Details:			
3. **Hospitalizations or Surgeries**			
Details: (include approximate dates)			
4. **History of traumatic head injury resulting in loss of consciousness**			
Details: (include number of times)			
5. **Has a Psychiatrist, Psychologist, Mental Health Worker, or Elder ever assessed or treated you?**			
Details (include approximate dates and methods of treatment):			
6. **Have you ever been a victim of physical abuse?**			
Details:			
7. **Have you ever been a victim of emotional abuse?**			
Details:			
8. **Have you ever been a victim of sexual abuse?**			
Details:			
9. **Have you ever been a victim of an 'other' form of abuse?**			
Details:			

EDUCATION

10. What is the highest grade you've completed? _____

11. Did you fail any grades?
     Yes _____ No _____   If yes, which grades? _____   _____
_____

12. Which grades did you repeat? _____   _____   _____   _____   _____

13. Were you ever expelled or suspended from school?
     Yes _____ No _____

     If yes, please provide details
     _____
     _____

14. What are your strengths, or what do other people say you are good at?
     _____
     _____

15. What are your weaknesses?
     _____
     _____

DEVELOPMENTAL HISTORY

16. Have you ever been diagnosed with Attention Deficit Hyperactivity Disorder
     (ADHD)?
     Yes _____   No _____

     If yes, have you ever been treated?
     Yes _____ No _____   N/A _____

17. When you were a child, were you ever worried about your physical or
     emotional development?
     Yes _____ No _____

     If yes, please explain _____
     _____
     _____

18. Have you ever had trouble with any of the following? (Check all that apply.)

		Yes	No	Unknown
18a	**Gross Motor Skills**			
Details:				
18b.	**Fine Motor Skills**			
Details:				
18c	**Language Skills**			
Details:				
18d.	**Self-Control Skills**			
Details:				
	Table continues on next page			
18e.	**Self-Concept**			
Details:				
18f.	**Bed Wetting or Soiling**			
Details:				
18g.	**Self-Help skills**			
Details:				
18h.	**Social Skills**			
Details:				
18i.	**Are you accident prone?**			
Details:				
18j.	**Are you fearless?**			
Details:				
18k.	**Do you have difficulty understanding the consequences of your behavior?**			
Details:				

FAMILY HISTORY

19. Mother's age at child's birth: _____

20. Mother's race: _____

21. Father's race: _____

22. Are parents related e.g. blood cousins? _____

23. List Offender's brother(s) and/or sister(s)

Name	**M or F**	**Date of Birth (Y/M/D)**
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Has anyone in your biological family ever had any of the following? Please check all that apply. Please do not leave any spaces blank. Put 'Y' for yes, 'N' for no, 'U' for unknown and 'N/A' for not applicable.

		Birth Father	Father's Family	Birth Mother	Mother's Family	Siblings
24.	**Vision Problems**					
Details:						
25.	**Hearing Problems**					
Details:						
26.	**Birth Defects**					
Details:						
27.	**Stillbirths**	N/A				
Details:						
28.	**Miscarriages**	N/A				
Details:						
29.	**Learning Disorders**					
Details:						
30.	**Attention Deficit Disorder**					
Details:						
31.	**Hyperactivity**					
Details:						
32.	**Mental Illness**					
Details:						
33.	**Mental Retardation**					
Details:						
34.	**Other Developmental Disabilities**					
Details:						
					Table continues on next page	

		Birth Father	Father's Family	Birth Mother	Mother's Family	Siblings
35.	**Depression**					
Details:						
36.	**Alcoholism**					
Details:						
37.	**Suicide**					
Details:						
38.	**Delinquency**					
Details:						
39.	**Child Abuse**					
Details:						
40.	**Sexual Abuse**					
Details:						
41.	**Epilepsy**					
Details:						
42.	**Neurological Disease**					
Details:						
43.	**Chronic Illnesses**					
Details:						
44.	**Any specific genetic condition**					
Details:						
45.	**Other**					
Details:						

46.   Other Maternal Drug Use
Did your birth mother use any of the following other substances during pregnancy?
     Please check the appropriate response(s).

46a. **Drugs**
                    Yes _____   No _____   Unknown _____

b) **If yes: Check specific substance(s)**

Type of Drug	Yes	No	Unknown	N/A
THC (cannabis)				
Amphetamines				
Heroin				
Opiates				
Opioids				
Benzodiazepines				
Cocaine				
Crack Cocaine				
Dissociatives				
Volatiles				
Hallucinogens				

c) **If yes: Month of Pregnancy**

Month of pregnancy	Yes	No
Not Applicable		
Unknown		
First Month		
Second Month		
Third Month		
Fourth Month		
Fifth Month		
Sixth Month		
Seventh Month		
Eighth Month		
Ninth Month		

47a. **Tobacco**　　　　Yes ＿＿＿ No ＿＿＿ Unknown ＿＿＿

 b) **If yes:**

Month of Pregnancy

Month of Pregnancy	Yes	No
Not Applicable		
Unknown		
First Month		
Second Month		
Third Month		
Fourth Month		
Fifth Month		
Sixth Month		
Seventh Month		
Eighth Month		
Ninth Month		

48a. **Medication**　　　　Yes ＿＿＿ No ＿＿＿ Unknown ＿＿＿

 b) **If yes: List specific substance(s)**

 ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

 ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

 c) **If yes: Month of Pregnancy**

Month of Pregnancy	Yes	No
Not Applicable		
Unknown		
First Month		
Second Month		
Third Month		
Fourth Month		
Fifth Month		
Sixth Month		
Seventh Month		
Eighth Month		
Ninth Month		

49. Please provide any further information   you may have that might help describe your mother's level of alcohol use before and during pregnancy.

＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Interviewer Comments:
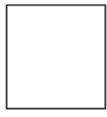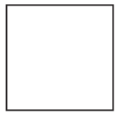
FAS Facial Photographic Analysis Report

IDENTIFICATION

Name: _____ Case _____ _____ _____
           First   Middle   Last

Subject I.D. _____ _____

Source of Photo _____

Gender _____ Male _____

Race _____ - _____

Birth Date _____

PHOTO ASSESSMENT

* Normal PFL Charts: Hall   Lip-Philtrum Guide: Caucasian

	Frontal	¾ View	Lateral
File Name	0_f,v.2.JPG	0_d,v.1.JPG	0_s.JPG
Date of Photo	1-11-	1-11-	1-11-.
Age (yrs) in photo	21.56	21.56	21.56
Date of Photo Assessment	1-20-	1-20-	1-20-
Photo Assessor			

Length of Real Internal Measure of Scale(sticker) placed on forehead (mm)   19.05

Length of Internal Measure of Scale in Frontal Photo (pixels)   102.3

Left Palpebral Fissure Length:	In photo (pixels) 148.9	True Length (mm) 30.5	* Z-score -0.20
Right Palpebral Fissure Length:	In photo (pixels) 154.0	True Length (mm) 31.5	Z-score 0.61
Mean Palpebral Fissure Length:	In photo (pixels) 151.5	True Length (mm) 31.0	Z-score 0.21
Inner Canthal Distance:	In photo (pixels) 172.3	True Distance (mm) 32.1	Z-score 0.33

Flat Philtrum (5-point rank):   In Frontal Photo 3   In ¾ Photo 2

Thin Upper Lip: Circularity (perimeter^2/area) 50.6   5-Point rank (Circ) 2   5-Point rank (Scale) 2

clown eyebrows ☐   ptosis ☐   strabismus ☐   epicanthal folds ☐

flat midface ☐   protruding ears ☐   flat nasal bridge ☐   hypertelorism ☐

Other anomalies present: None reported

Comments:

Other syndromes present: None reported

PHOTO QUALITY

	Frontal	¾ View	Lateral
Side showing		Right	Right
Head rotation (5-point rank/degrees) to subject's Right (+) or Left (-)	0°	0	0
Head tilt (5-point rank) toward subject's Right (+) or Left (-) shoulder			0
Head tip (degrees) Up (+) or Down (-) from Frankfort Horizontal Plane	0°		
Exposure (3-point rank)	1 (good)	1 (good)	1 (good)
Focus (3-point rank)	2 (bit blurry)	1 (good)	1 (good)
Facial Expression (3-point rank)	1 (Relaxed)	1 (Relaxed)	1 (Relaxed)
Reliability of ABC-Score for palpebral fissure length (5-point rank)	2 (good)		
Reliability of ABC-Score for philtrum (5-point rank)	3 (moderate)	2 (good)	
Reliability of ABC-Score for upper lip (5-point rank)	2 (good)		

OUTCOME

ABC-Score	A	A	A
	PFL	Philtrum	Lip
Data Used	mean	3/4 View	circularity

4-Digit Diagnostic Code for Face   1: FAS features absent

0_f,v.2.JPG   0_d,v.1.JPG   0_s.JPG

University of Washington FAS DPN FAS Facial Photographic Analysis Software © 2006

Appendix D: Physical Exam Form

Case ID: _**Participant X**___   Date: _____

1a. HT _____ 1b. (%ILE)_____ 2a. WT _____2b. (%ILE)_____

3a. HEAD CIRC_____ 3b. (%ILE)_____

4a. PALPEBRAL FISSURE LENGTHS LT_____ 4b. (%ILE)_____

4c. RT_____ 4d. (% ILE) _____

5. LIP SCORE (1-5)_____ 6. PHILTRUM SCORE (1-5) _____

7. INNER CANTHAL DISTANCE   _____

8. PHILTRUM LENGTH   _____

9. EAR ANOMALY   YES____ NO_____
                                   DESCRIBE IF YES_____

10. PALATE ANOMALY   YES_____NO_____
                                   DESCRIBE IF YES_____

11. CHEST WALL ANOMALY   YES____ NO_____
                                   DESCRIBE IF YES_____

12. SPINE ANOMALY   YES____ NO_____
                                   DESCRIBE IF YES_____

13. CARDIAC AUSCULATORY   YES____ NO_____
     FINDING   DESCRIBE IF YES_____

14. LIMB DEFECT   YES____ NO_____
                                   DESCRIBE IF YES_____

15. PALMAR CREASE ANOMALY   YES____ NO_____
                                   DESCRIBE IF YES_____

16. SKIN ANOMALY   YES____ NO_____
                                   DESCRIBE IF YES_____

17. NEUROLOGICAL   YES_____NO_____
     ABNORMALITY   DESCRIBE IF YES_____

18. GLOBAL IMPRESSION   YES_____NO_____
     DYSMORPHIC   DESCRIBE IF YES_____

Appendix E: FASD Diagnostic Form

FASD: Screening and Estimating Prevalence in an Adult Correctional Population
FASD DIAGNOSTIC FORM

Case ID#		Date		Gender	
Name	**Participant X**	Race		Age (y)	

Form completed by:	
Diagnosis made by:	

OUTCOME

Table 4: Harmonization of Institute of Medicine (IOM) nomenclature and 4-digit diagnostic code ranks for growth, face, brain and alcohol history

	4-digit diagnostic code ranks			
IOM nomenclature	Growth deficiency	FAS facial phenotype	CNS damage or dysfunction	Gestational exposure to alcohol
FAS (with confirmed exposure)	2, 3 or 4	3 or 4	3 or 4	3 or 4
FAS (without confirmed exposure)	2, 3 or 4	3 or 4	3 or 4	2
Partial FAS (with confirmed exposure)*	1, 2, 3 or 4	2, 3 or 4	3 or 4	3 or 4
ARND (with confirmed exposure)	1, 2, 3 or 4	1 or 2	3 or 4 (2 for < 6 years)	3 or 4

Note: ARND = alcohol-related neurodevelopmental disorder; CNS = central nervous system; FAS = fetal alcohol syndrome.
Source: Developed by Kwadwo Asante and Julianne Conry
*Any final 4-digit code that can be made with these combinations of numbers and that is not also an FAS code signifies partial FAS.
Combinations of face 2 that include two significant facial features also meet criteria for partial FAS.

4-Digit Code Rank

Growth	3
Face	2
CNS	3
Alcohol	4

Diagnosis:

A; partial FAS (pFAS)

Research Outcome

A	**Diagnosis in one of the FASD categories**	√
B	**Does not meet diagnostic criteria but remains a possibility**	
C	**No FASD related diagnosis but other impairments noted**	
D	**Normal**	

GROWTH

Prenatal Growth

<birth record information>

H.C. 32.5 cm <3rd%ile

Postnatal Growth

<physical exam form>

H.C. 55.8cm   (50th%ile)

Date	Age (yr)	(cm)	(in)	Percentile	Kg	Lb	percentile
		Height				**Weight**	
Birth		49.5		10-25	2500gms		<3
Current	21		5'9''	25-50		140	25

Deriving the ABC-Score for Growth:

Percentile Range	Height	Weight
≤ 3rd	C	C
> 3rd and ≤ 10th	B	B
> 10th	A	A

Converting the Growth ABC-score to a 4 digit diagnostic rank for growth

4-Digit Diagnostic Rank	Growth Deficiency Category	Height-Weight ABC Score combinations
4	Severe	CC
3	Moderate	CB **BC** CA AC
2	Mild	BA BB AB
1	None	AA

4-Digit Code RANK:__3_____

FACIAL FEATURES (and other physical findings)

CURRENT PHENOTYPE: (Age__21__yrs)

DIRECT MEASURES:

	True estimate (cm)	Z-score	Normal chart used
Left PFL	2.7		
Right PFL	2.7		
Mean PFL			
Inner Canthal Distance	3.3		

Note: "Down-slanted"

	5 point rank	Lip philtrum guide used
Philtrum	3	
Upper lip	3	

MEDICAL INTAKE PHOTOGRAPH:

Participant X Report:

Frontal digital photo filename	Internal measure of scale (dot on forehead)		
	True dot size	Units (mm, cm, in)	Dot size in photo (pixels)
	¾"	19.05mm	113.3

	Length in photo (pixel or mm)	True estimate (mm)	Z-score	Normal chart used
Left PFL	144.2	26.7	-3.26	Hall
Right PFL	147.5	27.3	-2.77	Hall
Mean PFL	145.9	27.0	-3.02	Hall
Inner Canthal distance	216.0	36.3	2.04	Hall

Photo filename		5 point rank	Lip-philtrum guide used	
	Philtrum	(frontal)3; (3/4 photo)3		Upper Lip circularity
	Upper Lip	(circ)3; (scale)3		70.3

94

Anomalies/ comments:

Hypertelorism

Participant X report score: <u>CBB</u>

During Case conf; \<Doctor's\> adjusted scores to both graphs, here the z-scores would be in the   -2.0 SD range.

<u>Researcher's Report:</u>

Frontal digital photo filename	Internal measure of scale (dot on forehead)		
	True dot size	Units (mm, cm, in)	Dot size in photo
	¾"	19.05mm	114.0

	Length in photo (pixel or mm)	True estimate (mm)	Z-score	Normal chart used
Left PFL	147.1	27.0	-3.01	Hall
Right PFL	144.9	26.6	-3.34	Hall
Mean PFL	146.0	26.8	-3.18	Hall
Inner Canthal distance	217.0	36.3	2.04	Hall

Photo filename		5 point rank	Lip-philtrum guide used	
	Philtrum	(frontal)3; (3/4 photo)3		Upper Lip circularity
	Upper Lip	(circ)4; (scale)3		77.0

Anomalies/ comments:
Hypertelorism

Researcher's photometric score: <u>CBC</u>
During Case conf; Doctor's adjusted scores to both graphs, here the z-scores would be in the   -2.18 SD range.

<u>OTHER PHYSICAL FINDINGS/SYNDROMES/MEDICAL CONDITIONS:</u>

Global Impression; dysmorphic- "Smallish"
<u>Downslanted eyes</u>
<u>Hit by car age 9, injury to left leg</u>
<u>No meds, no drugs</u>
<u>Needs reading glasses</u>

<u>**Had very nervous behaviour during medical exam</u>

FACIAL ABC SCORE:

5-point Likert Rank for philtrum & Lip	Z-score for Palpebral Fissure Length	Palpebral Fissure	Philtrum	Upper Lip
4 or 5	≤ -2 SD	**C**	C	C
3	>-2 SD and ≤ -1 SD	B	**B**	**B**
1 or 2	> -1 SD	A	A	A
Source of Data for each Facial Feature →		All	Doctor	All

Converting the facial ABC-Score to a 4 digit diagnostic rank:

4-Digit Diagnostic Rank	Level of Expression of FAS Facial Features	Palpebral Fissure-philtrum-lip ABC-Score Combinations
4	Severe	CCC
3	Moderate	CCB CBC BCC
2	Mild	CCA CAC **CBB** CBA CAB CAA BCB BCA BBC BAC ACC ACB ACA ABC AAC
1	None	BBB BBA BAB BAA ABB ABA AAB AAA

4 Digit Code RANK:__2____

CENTRAL NERVOUS SYSTEM (CNS)

IMPAIRMENT SCORE:

0=unknown	1=within normal limits	2=mild to moderate	3=significant

STRUCTURAL

Structural anomalies:_____

Score:_____

<Doctor's physical exam findings>

FUNCTIONAL/Standardized measures

For outcomes measured on standardized scales, outcomes two or more standard deviations below the norm would be judged **significant**, whereas outcomes between one and two standard deviations below the norm could be judged **mild to moderate**.

96

Domain	Test	Impairment Score	
Cognitive	WASI	2	VIQ Borderline; PIQ average; > 1 SD between VIQ & PIQ
Academic Achievement	WIAT-II	3	Overall score borderline, impaired math skills; history reflects >1 grade failure
Adaptive Behaviour	ABAS	2	Indices all low average, but history appears to reflect some difficulty with adaptability
Memory	RCFT (Rey), WMS-III	1	Despite some impairment on RCFT (standardization broken therefore questionable validity of this measure & copy impaired resulting in poorer recall); Average range on WMS-III
Communication/Language	WASI Language subtest	3	Low average to impaired on indices; history reflects longstanding difficulties requiring intervention
Executive Function	WCST	2	Variability, but reflecting some level of impairment
Attention	CPT-II, Digit Span	1	low average digit span; CPT normal
Sensory/ Motor/ Regulatory "Soft" Signs	Medical Exam	3	Impaired RCFT copy
Structural	Medical Exam	3	

Psychologist's Notes:

OVERALL RATING: 3

Historical Notes:

- *Formal Assessments.* Some inconsistency reported: During his preliminary assessment with the parole officer he reported that he was diagnosed with ADD has a child and that he displayed learning and behavioural problems in school. However, during his medical interview with Participant X he reported that he has never been diagnosed with ADHD. He reported during his medical assessment that he has seen a psychologist (unknown date or number of times), but was never treated for anything.

- *Development.* Case X reported that he was worried about his development as a child. He said that he was small. Case X reported problems with language skills; when he was younger, he couldn't pronounce words properly and was placed in a special school for a speech impairment. He reported that he has problems with self-control, self-help, and self-concept. Case X reported bed wetting problems

when he was younger. He reported that he considers himself fearless. He also reported that he considers himself to have an anger problem.

- *Education.* Case X reported a grade 8 level of education. He failed and repeated grade 3. He was suspended before for fighting and talking back to teachers. He quit school in grade 9.
- No history of traumatic head injury or mental health issues.
- He suffered from physical and emotional abuse.
- He was hospitalized once in year XXXX after a car accident.
- Case X has no employment history

CRIMINAL HISTORY; Extensive criminal history with many failure to comply orders. He has a history of aggressive and assaultive behaviour. Case X has no gang affiliation and no history of institutional misconduct.

Case Conference Notes:

Language impairment based on test yielded a "2" for impairment, but due to report of special school placement for language skills, score was changed to "3".

4-digit Diagnostic Rank	Probability of CNS Damage	Confirmatory Findings
4	Definite **Structural and/or Neurologic Abnormalities** *Static Encephalopathy*	♦ Microcephaly: OFC 2 or more SDs below the norm *And/or* ♦ Significant abnormalities in brain structure of presumed prenatal origin. *And/or* ♦ Evidence of hard neurological findings likely to be of prenatal origin
<u>**3**</u>	Probable **Significant Dysfunction** *Static Encephalopathy*	♦ Significant impairment in three or more domains of brain function such as, but not limited to: cognition, achievement, memory, executive function, motor, language, attention, activity level, neurological 'soft' signs
2	Possible **Mild to moderate delay or dysfunction** *Neurobehavioural Disorder*	♦ Evidence of delay or dysfunction that suggest the possibility of CNS damage, but data to this point do not permit a Rank 3 classification
1	Unlikely	♦ No current evidence of delay or dysfunction likely to reflect CNS damage

4-Digit Code RANK: ___3____

MATERNAL ALCOHOL USE

Alcohol Consumption of the Birth Mother: Yes_√_____No_____Unknown_____

During Pregnancy	**Average number of drinks** per drinking occasion	Collateral reported that mother binge drank at least one per month during pregnancy.	
	Frequency of drinking		
	Binge drinking	**Yes**	No

Trimester in which alcohol was consumed	**1**st	**2**nd	**3**rd	Unknown	Conflicting reports
Was the birth mother ever reported to have a **problem** with alcohol	**Yes**	Suspected	No	unknown	
Was the birth mother ever **diagnosed** with alcoholism?	Yes	Suspected	No	**unknown**	
Did the birth mother ever **receive treatment** for alcohol addiction	Yes	Suspected	No	**unknown**	
Was alcohol use during this pregnancy **positively confirmed**?	**Yes**	No			
If yes, source of confirmation	Collateral (aunt)				
Reported use of alcohol during the pregnancy is	**Reliable**	Somewhat reliable	Unk. Reliability		
Other information about alcohol use **during** this pregnancy					
Both Offender & collateral reported that mother sniffed solvents and used other drugs during pregnancy					

After Pregnancy	Average number of drinks per drinking occasion	At least 12 drinks.
	Frequency of drinking	2-4 times per month.

4-DIGIT RANK for alcohol exposure:

4-Digit Diagnostic Rank	Prenatal Alcohol Exposure Category	Description
<u>4</u>	**High Risk**	♦ Alcohol use during pregnancy is CONFIRMED, <u>*and*</u> ♦ Exposure pattern is consistent with the medical literature placing the fetus at "high risk" (generally high peak blood alcohol concentrations at least weekly in early pregnancy)
3	**Some Risk**	♦ Alcohol use during pregnancy is CONFIRMED, <u>*and*</u> ♦ Level of alcohol use is less than in Rank (4) or level is unknown
2	**Unknown Risk**	♦ Alcohol use during pregnancy is UNKNOWN
1	**No Risk**	♦ Alcohol use during pregnancy is CONFIRMED to be completely ABSENT from conception to birth

File summary - alcohol

- *Offender reported*. During his BSC interview with Participant X, case X reported that his mother drank alcohol when she was pregnant with him. He was unsure of the duration or the frequency of use. He reported that she drank more than 5 drinks per drinking occasion. Case X reported that his mother abused solvents (sniffing) while pregnant and took prescriptions without a doctor's order. He also reported that she smoked tobacco during her pregnancy with him. Offender reported that his mother drank when he was young, approximately 2-3 times per week at a frequency of 30 drinks per drinking occasion. During his medical interview with _____ case X reported that his mother suffered from alcoholism. During his medical interview, he stated that his mother used cannabis and volatiles during her pregnancy with him. He reported that she used cannabis only during the first month of pregnancy, but used volatiles and smoked tobacco throughout the entire pregnancy. When asked to provide further details about his mother's use of alcohol he stated "she wasn't much into alcohol, was mostly sniff back then. Probably drank during pregnancy, doesn't sniff anymore". He reported during his preliminary assessment interview with the parole officer that his mother used to abuse solvents.

Collateral reported. Case X's aunt provided collateral information. She reported that she raised the offender from ages 9 months until he was 13. She reported that he has been told by a professional that he might have FASD. His aunt reported that his mother drank during her entire pregnancy with him. She reported that case X's mother drank approximately 2-4 times per month, drinking at least 12 drinks per drinking occasion. She reported that she binged drank at least once a month during pregnancy. His aunt also reported that his mother used solvents, tobacco, and illicit drugs (didn't specify what) during her pregnancy with case X. She reported that his mother drank while he was young, drinking 2-4 times per month, consuming at least 12 drinks per occasion

4 digit RANK: ___4_____

<div style="background-color:#595959; color:white; text-align:center; font-weight:bold;">OTHER PRENATAL AND POSTNATAL EXPOSURES / EVENTS</div>

PRENATAL

Circle one:

High Risk	Some Risk	Unknown	No Risk
4	3	2	1

Genetic
1. Parental learning difficulties (ie. Special education, ADD, RM, did not complete high school, etc.)
2. Other conditions of heritability or malformations that may be relevant to this case. (specify)

3. **Prenatal exposure to other substances** (eg. Medications, tobacco, illicit drugs, other teratogens, etc)
- **Tobacco, as per offender & collateral.**
- **Prescription meds, without Dr's order, as per offender.**
- **Sniffing volatiles, as per offender & collateral.**
- **Illicit drugs, as per collateral.**
- **Marijuana, as per offender.**

POSTNATAL

Circle one:

High Risk	Some Risk	Unknown	No Risk
4	3	2	1

Issues of Nurture:

1. Abuse: Physical & Emotional _____Y_____   Sexual: _____N_____

2. Number of home placements: ____ Apprehended by CFS btw ages 15-18_____

3. Other (eg. Neglect, adverse home environment, significant traumas, etc):

- He suffered from physical and emotional abuse.

- He was hospitalized once in year XXXX after a car accident.

- Case X has no employment history

- Biological parents were never together. His father was never a part of his life. Case X was initially raised by his aunt and great grandmother. His mother became involved in his life when he was

12. He lived with his mother and step-father for 6 months when he was 12, but he left because of her solvent abuse. He lived with other relatives until he was 15. At age 15 he was apprehended by CFS (unknown why or who he was living with when this happened) and was a ward of CFS until age 18.

4. **Other Issues that could explain CNS abnormalities:** (eg. Head injury, substance abuse by participant, etc.):

- No history of traumatic head injury or mental health issues.
- Since being incarcerated at Institution X. He has attempted to commit suicide once.

Appendix F: Sample Medical Debriefing Letter

Fetal Alcohol Spectrum Disorder (FASD): Screening and estimating incidence in an adult correctional population

Participant:_____X_____

Outcome: *Alcohol-Related Neurodevelopmental Disorder (ARND)*

RESULTS OF FASD MEDICAL ASSESSMENT

The reason for this FASD assessment was to **fulfil the requirements for participation in a research study** on the incidence of FASD in federal correctional institutions. This FASD assessment occurred while the participant was residing at Institution X. FASD is a condition that results from maternal drinking during pregnancy, and can cause life-long difficulties for those who are affected. Attached is a pamphlet which explains the disorder more fully.

The assessment for FASD included an evaluation of *growth*, *facial features*, *neuropsychological functioning* and evidence of *prenatal alcohol exposure*. In this case, no growth impairment or characteristic facial features that identify classical Fetal Alcohol syndrome or Partial Fetal Alcohol Syndrome were identified. <The participant> was found to have evidence of brain injury and abnormal functioning in patterns of thought and behaviour consistent with Alcohol Related Neurodevelopmental Disorders (ARND). Attached is a letter from the Department X at University X which details the results of the neuropsychological evaluation.

Through the course of the assessment it was found that there is evidence of prenatal alcohol exposure, however this does not mean that alcohol exposure during pregnancy is the only cause of <the participant's> current problems. A number of other factors could be contributing to the present situation, such as genetic background, other potential exposures or problems during pregnancy, and various experiences since birth. Such factors may partly explain why there is so much variability in the kinds of specific difficulties that patients with ARND have.

Individuals with ARND have significant CNS (brain) damage/dysfunction and should be viewed as individuals with disabilities. The ARND diagnosis has implications for educational planning, societal expectations, and health.

_____   _____

Name, Department, Affiliation   Date

Appendix G: Sample Neuropsychological Debriefing Letter

In September 2005, you completed a neuropsychological screening assessment as part of your participation in the following research study: **Fetal Alcohol Spectrum Disorder (FASD): Screening and estimating incidence in an adult correctional population.** The following is a summary of the results of the neuropsychological assessment.

As you know, I did not meet with you personally, but the psychometrist completed the testing with you. Therefore, please note that the following results are based only on test scores.

You were asked to complete a number of different tests that looked at different types of thinking abilities. Each of these tests was scored based on number of correct answers or based on how fast you finished the task. These scores were then compared to large databases that are made of healthy people who completed the same tests. In this way, we can determine if your scores were average, above average, or below the average person's test performance. I will describe your test performance using the following descriptive labels: above average, average, below average, borderline, and impaired. Borderline means that your score was well below average, but not in the impaired range. The last category (impaired) means that your performance on a test represents an area that is very weak when compared to the average person, and any day-to-day tasks that rely on this type of thinking ability may be difficult for you.

On a test of general intelligence, your overall score was in the average range, with both subsections – Verbal abilities (such as vocabulary) and Nonverbal abilities (such as putting blocks together to make certain designs) – also being in the average range.

You also completed a set of tests that looked at your achievement in several school-based activities. Your Word Reading and Spelling scores were in the average range, and approximately equivalent to a grade 12 level. However, your performance when working with numbers (math skills) was impaired, and considered to be approximately equivalent to a grade 5 level.

Another test you completed looked at your ability to solve problems. You may remember that you were asked to sort cards into different piles, but the person giving you the test did not directly tell you how to sort the cards. Your task was to figure out how to sort the cards based on the examiner telling you if you were right or wrong on each card. Your overall score on this test was in the average to above average range.

You also completed several memory tests. One was a test of your memory for something you had seen (also called visual memory). Your recall of the figure, both shortly after you had copied it

1

104

and after a longer delay, was in the average range. However, your recognition of elements of the figure was impaired. Another visual memory test required you to remember details of social scenes. Your scores were in the borderline range. Finally, your scores on the verbal memory test were average to below average.

Working memory, meaning your ability to hold information in mind for a short time (such as remembering a phone number before you dial it) was below average. As well, you completed a task that required you to focus your attention over time. Your performance on this task suggested that you have difficulties in this area.

Finally, you filled out a questionnaire that rated your ability to carry out different day-to-day activities. All of your scores were considered to be impaired, including: communication, functional academics (everyday skills that are based on reading, writing, and arithmetic and includes activities such as checking for change after you buy something), health and safety, community use (for example, using the local library), home living (for example, operating home appliances), leisure, self-direction, and social. The Self-care scale was mildly below average.

In summary, you performed well on many of the tasks, with some areas of reduced performance. Your general intellectual ability is in the average range. Academic achievement appears to be consistent with your actual grade-level achieved, with the exception of math skills. You may wish to upgrade in this area through adult education classes. Simple attention, that is, your ability to hold information in mind for a short time, appeared relatively preserved, however, more sustained attention may be impaired. Although some of your memory scores were below average, there does not appear to be a significant memory dysfunction. One area of concern is that of adaptive behaviour. You may benefit from taking a life skills program to assist in this area.

Correctional Service
Canada

Service correctionnel
Canada

university of manitoba

CERTIFICATE OF APPRECIATION

THE ADDICTIONS RESEARCH CENTRE OF CORRECTIONAL SERVICE CANADA AND THE UNIVERSITY OF MANITOBA PRESENT THIS CERTIFICATE TO:

PARTICIPANT X

IN RECOGNITION OF HIS PARTICIPATION IN THE FETAL ALCOHOL SPECTRUM DISORDER (FASD) SCREENING AND ESTIMATING PREVALENCE PILOT PROJECT

_____   _____

SIGNATURE: RESEARCH LIAISON OFFICER   DATE

Appendix I: Description of Neuropsycholgical Tests

Memory. Memory was assessed using two subtests from the Wechsler Memory Scale – Third Edition Abbreviated (WMS-III-A) and two scales (immediate and delayed recall) from the Rey Complex Figure Test and Recognition Trial (RCFT).

The WMS-III-A is an individually administered, norm-referenced test that assesses auditory and visual memory abilities (Wechsler, 1999). The scale contains four subtests (Logical Memory I, Family Pictures I, Logical Memory II, and Family Pictures II). The Logical Memory subtests assess auditory memory and the Family Pictures subtests assess visual memory. The four subtests form three composite scores – Immediate Memory, Delayed Memory, and Total Memory. Composite scores have a mean of 100 and a standard deviation of 15 (Wechsler, 1999).

The Logical Memory I subtest and Logical Memory II subtest scores of the WMS-III-A were used to assess immediate and delayed auditory memory. For Logical Memory I, participants listen to two different stories and are asked to retell each story immediately after hearing it. Logical Memory II is administered 25 to 35 minutes after Logical Memory I and participants are asked to retell the stories from Logical memory I without hearing them again. Age-based normative tables are used to convert raw scores on the subtests to scaled scores with a mean of 10 and a standard deviation of 3 (Wechsler, 1999).

The Immediate Memory and Delayed Memory scales of the RCFT were used to assess visuospatial memory. The RCFT is frequently used as a test of visuospatial constructional ability and visuospatial memory (Meyers & Meyers, 1995). Administration of the RCFT involves a Copy trial in which respondents are presented with a stimulus card and instructed to copy the figure onto a blank sheet. The amount of time it takes to copy the figure is recorded. Following this trial is a 3-minute interval after which the respondent is asked to draw the figure from memory (Immediate Recall). The Delayed Recall trial is administered 30 minutes after the Immediate Recall trail and respondents are again asked to draw the figure from memory.

All trials (Copy, Immediate Memory, and Delayed Memory) are scored for accuracy using a standardized approach. The Immediate Recall and Delayed Recall raw scores are converted to *t*-scores with a mean of 50 and standard deviation of 10 (Meyers & Meyers, 1995) and the Copy score is converted to a percentile range using the appropriate normative tables provided in the RCFT manual.

The Digit Span subtest of the Wechsler Intelligence Scales is commonly used as an indicator of immediate memory and attention (Kemtes & Allen, 2008). It is a supplementary subtest of the Verbal Scale of the Wechsler Intelligence Scales that taps into working memory and attention. Individuals are given sets of digits to repeat initially forwards then backwards to test immediate auditory attention. The Digit Span subtest raw scores are converted to scaled scores with a mean of 10 and SD of 3 using normative tables.

General Intellectual Ability. General intellectual ability was assessed using the Wechsler Abbreviated Scale of Intelligence (WASI), an individually administered brief measure of intellectual ability (PsychCorp, 1999). This measure includes a Verbal IQ (VIQ) and a Performance IQ (PIQ)

score. The VIQ measures acquired knowledge, verbal reasoning, and attention to verbal information and is composed of (use either "comprises" or "composed of") the Vocabulary and Similarities subtests. The PIQ measures fluid reasoning, spatial processing, attentiveness to detail, and visuo-motor integration and comprises the Block Design and Matrix Reasoning subtests. Administration of all four subtests takes about 30 minutes and IQ scores are calculated by summing the age-corrected *t*-scores of the appropriate subtests and then converting the *t*-scores to scaled scores with a mean of 100 and a standard deviation of 15 (PsychCorp, 1999).

Language. The WASI VIQ scale was also used as an approximation of language. As previously mentioned, two subtests, Vocabulary and Similarities, make up this scale. The Vocabulary subtest is a 42-item task measuring participants' expressive vocabulary, verbal knowledge, and fund of information. The subtest has picture items, which participants are required to name, as well as orally and visually presented words, which participants are required to orally define. The Vocabulary subtest is a measure of crystallized intelligence and general intelligence. Crystallized intelligence refers to the ability to use experience, knowledge, and skills that have been acquired (Horn & Cattell, 1966). The Vocabulary subtest also taps into other cognitive abilities such as memory, learning ability, and concept and language development.

The Similarities subtest is a measure of verbal concept formation, abstract verbal reasoning, and general intellectual ability. The subtest contains picture items and verbal items. For the picture items participants are shown three common objects and four response options. The participant responds by pointing to the response option that was similar to the three target objects. For the verbal items, participants are presented orally with pairs of words and are asked to explain the similarity between the common objects or concepts.

Academic Achievement. Academic achievement was assessed using the Wechsler Individual Achievement Test – Second Edition Abbreviated (WIAT-II-A). The WIAT-II-A is a brief individually administered test for assessing achievement in individuals age 6 through 85 (The Psychological Corporation, 2001). The WIAT-II-A has three subtests: Word Reading, Numerical Operations, and Spelling. Word Reading assesses phonological awareness and letter identification skills 85 (The Psychological Corporation, 2001). The Numerical Operations subtest assesses early math calculation skills, such as number recognition and counting, as well as higher math calculation skills, such as solution of equations with one and two unknowns 85 (The Psychological Corporation, 2001). The Spelling subtest assesses early spelling concepts and spelling items that vary in spelling-phoneme predictability, high-frequency homonyms, and contractions 85 (The Psychological Corporation, 2001). Administration time for all three subtests varies depending on age, skill level, and motivation of the individual being examined with total administration time for adults being about 25-30 minutes (The Psychological Corporation, 2001).

Using the normative information provided in the WIAT-II-A manual, raw scores on each subtest (Word Reading, Numerical Operations, and Spelling) are converted to standard scores with a mean of 100 and standard deviation of 15 (The Psychological Corporation, 2001).

Adaptive Behaviour. The Adaptive Behaviour Assessment System – Second Edition (ABAS-II), a comprehensive norm-referenced assessment of adaptive skills (Harrison & Oakland, 2003) was

used to assess adaptive behaviour. For the current study, participants responded to items that assess adaptive behaviour in ten separate adaptive skill areas. The ABAS-II provides three domain scores (Conceptual, Social, and Practical), which are derived from the sum of scaled scores of skill areas applicable to those domains. The Generalized Adaptive Composite (GAC), used as the adaptive behaviour indicator for the current study, is an overall measure of adaptive behaviour. It is derived from the sum of scaled scores from the skill areas assessed. The scores on the three domains and the GAC have a mean of 100 and standard deviation of 15 (Harrison & Oakland, 2003).

Executive Functioning. Executive functioning was assessed by the Wisconsin Card Sorting Test (WCST) with a focus on two of the indices (Percent Perseverative Errors and Percent Conceptual Level Responses) and by the Comprehensive Trail Making Test (CTMT).

The WCST was developed to assess abstract reasoning ability and the ability to shift cognitive strategies in response to changing environmental contingencies (Heaton, Chelune, Talley, Kay & Curtiss, 1993). The WCST requires strategic planning, organized searching, using environmental feedback to shift cognitive sets, directing behaviour to achieving a goal, and adapting impulse responding (Heaton et al., 2003). The test consists of four stimulus cards and 128 response cards, of varying colours and stimulus shapes. The participants are required to match the response cards to one of the four stimulus cards and is only given the feedback of whether they are correct or not.

The Percent Conceptual Level Responses score reflects the proportion of conceptual level responses to total number of trials and is a reflection of insight into correct sorting principles (Heaton et al., 2003). Conceptual level responses are defined as consecutive correct responses occurring in runs of three or more. It is thought that some insight into sorting categories is needed to be able to make three consecutive correct responses (Heaton et al., 2003). The second measure used from the WCST is Percent Perseverative Errors. Perseverative errors are ones in which the participant continues to sort the cards in the same way even after receiving feedback that it is incorrect. Percent Perseverative Errors is the concentration of perseverative errors relative to overall test performance. Standard scores are derived from raw scores for both measures. Standard scores are converted to *t*-scores with a mean of 50 and a standard deviation of 10.

Trial 5 of the CTMT was used as another measure of executive functioning. The CTMT is made up of a set of five standardized visual search and sequencing tasks. These tasks were heavily influenced by attention, concentration, resistance to distraction, and cognitive flexibility (Reynolds, 2002). It has been standardized for use with individuals from 11 to 74 years and administration takes less than 10 minutes. The basic task of the CTMT is to connect a series of stimuli in a specified order as quickly as possible. Each trial is similar to the other but each differs in some significant way. The raw scores for each trial is the time it takes (in seconds) to complete the task. The raw scores are converted to standardized *t*-scores with a mean of 50 and a standard deviation of 10 using normative tables provided in the CTMT manual. The scores from the five trials of the CTMT provide a Composite Index. For the current study, only the score from Trail 5 score was used in assessing executive functioning. Completion of trial 5 requires set-shifting and cognitive flexibility.

The RCFT Copy score (previously described), is a measure of visuospatial constructional ability (Meyers & Meyers, 1995), and was also used to examine executive functioning of study

participants by assessing the strategy used by the participants in copying the figure.

      Attention. Attention was assessed using the Conners' Continuous Performance Task (CPT-II). The CPT-II is a useful measure of sustained attention (Conners, 2004). It takes 14 minutes to complete and requires participants react to target letters on the screen. Specifically, the Omissions errors and Commission errors scores were used as the CPT-II attention measures. Omission errors are errors in which the individual does not respond to the target stimulus and commission errors are errors in which the individual responds to incorrect stimuli (Conners, 2004). Both the Omission Errors score and the Commission Errors score are converted to *t*-scores with a mean of 50 and standard deviation of 10 so individual scores can be represented relative to the population average.

      The Digit Span subtest of the Wechsler scales was also used as an indicator of attention.

      For all neuropsychological measures, significant impairment was defined as scores that fell two or more standard deviations below the norm and mild to moderate impairment was defined as scores between one and two standard deviations below the norm. All of the assessments used have been validated and normed in an adult population.

Appendix J: Additional Analyses

Table 24
Collateral responses to BSC Behavioural Items showing mean scores and percentage of missing data.

	Collateral Type [*]									
	Parole Officer (n=16)[1]		Mother (N=45)		Family (n=83)		Friend (n=30)		Professional (n=5)[2]	
Behavioural Items[3]	Item Mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know
1. Impulsive	1.57	22.9	1.11	2.22	1.43	3.61	1.43	0.00	2.00	0.00
2. Trouble following directions	1.05	58.3	0.73	0.00	0.71	2.41	0.73	0.00	1.60	0.00
3. Restless	1.20	68.8	0.97	0.00	1.30	3.61	1.26	0.00	1.80	0.00
4. Problem with spelling	1.33	79.2	0.83	4.44	0.98	26.51	1.2	0.00	1.20	0.00
5. Poor judgement	1.84	14.6	0.93	0.00	1.26	1.20	0.9	0.00	1.80	0.00
6. Easily distracted	1.27	64.6	1.06	2.22	1.27	2.41	1.03	3.33	1.80	0.00
7. Temper tantrums	1.29	70.8	0.62	0.00	0.97	12.05	0.96	0.00	2.00	0.00
8. Strong mood swings	1.42	73.6	0.69	0.00	1.04	13.25	0.93	3.33	2.00	0.00
9. Hyperactive	1.22	75.7	0.73	0.00	0.83	4.82	0.73	0.00	1.80	0.00
10. Problem budgeting or handling money	1.24	62.5	1.09	4.44	1.28	13.25	1.11	6.67	2.00	0.00
11. Unaware consequences	0.69	29.2	0.62	4.44	1.12	6.02	0.86	0.00	2.00	0.00
12. Problem with arithmetic	1.00	81.9	0.70	4.44	0.77	30.12	0.50	13.33	1.00	20.00
13. Interrupts during conversation	0.27	32.6	0.33	0.00	0.64	2.41	0.63	0.00	1.50	20.00
14. Agitated	0.82	61.1	0.69	4.44	0.93	7.43	0.82	6.67	2.00	0.00

Continued on next page

111

	Collateral Type [*]									
	Parole Officer (n=16)[1]		Mother (N=45)		Family (n=83)		Friend (n=30)		Professional (n=5)[2]	
Behavioural Items[3]	Item Mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know
15. Forgetful everyday things	0.41	88.2	0.38	2.22	0.51	6.02	0.33	0.00	1.00	0.00
16. Talks a lot but says little	0.23	47.2	0.49	0.00	0.85	1.20	0.65	3.33	1.60	0.00
17. Poor memory	0.67	77.1	0.40	0.00	0.51	4.82	0.31	3.33	0.50	20.00
18. Problem with reading	0.87	77.1	0.69	0.00	0.73	19.28	0.34	3.33	1.20	0.00
19. Easily victimized	0.83	66.7	0.86	4.44	1.01	10.84	0.65	3.33	1.80	0.00
20. Strongly opinionated	1.21	76.4	1.29	6.67	1.34	9.64	1.74	3.33	1.40	0.00
21. trouble completing tasks	1.04	65.3	0.75	2.22	0.94	6.02	0.65	3.33	1.40	0.00
22. Poor attention span	0.86	69.4	0.69	0.00	1.05	9.64	0.67	0.00	1.80	0.00
23. Few friends	1.09	67.4	0.60	4.44	0.54	3.61	0.32	6.67	1.00	0.00
24. Easily manipulated	1.11	57.6	0.92	6.67	1.16	4.82	6.67	0.00	2.00	0.00
25. Disorganized	0.95	84.0	0.81	2.22	0.77	9.64	0.53	0.00	1.60	0.00
26. Trouble staying on topic	0.28	53.4	0.34	4.44	0.64	7.23	0.57	0.00	1.60	0.00
27. Stubborn	1.61	80.6	1.41	2.22	1.66	3.61	1.56	0.00	1.80	0.00
28. Poor social skills	0.89	56.9	0.52	2.22	0.62	4.82	0.55	3.33	1.40	0.00

*Note: 'Family' consisted of adopted parent, aunt/uncle, father, grandparents, cousins, siblings and step-parents. 'Friend' consisted of common law spouse or friend. 'Professional' consisted of foster-parent, social worker, and child, youth and family case worker. 'Parole officer' consisted of two community parole officers conducting preliminary interviews with newly sentenced offenders, and agents of social organizations that are contracted by CSC to conduct a post-sentence community assessment with a collateral in the community.
1. The 16 parole officers conducted 144 interviews with offenders and collaterals.
2. Only one participant had professionals as collateral contact.
3. Responses were coded 0, 1,2, therefore each item maximum total score was 2.

Table 25

Collateral responses to BSC Historical Items showing mean scores and percentage of missing data.

	Collateral Type *									
	Parole Officer (n=16)[1]		Mother (N=45)		Family (n=83)		Friend (n=30)		Professional (n=5)[2]	
Historical Items[3]	Item Mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know
Adopted	0.01	0.70	0.00	0.00	0.05	3.61	0.00	0.00	0.00	0.00
Foster care	0.28	3.50	0.27	0.00	0.30	6.02	0.30	10.00	1.00	0.00
In foster care more than 3 times*	0.56	8.39	0.17	0.00	0.38	7.23	0.67	16.67	1.00	0.00
Problems with school	0.38	20.28	0.48	2.22	0.61	10.84	0.65	13.33	1.00	0.00
Mental health treatment	0.19	0.0	0.21	4.44	0.17	12.05	0.19	10.00	0.75	20.00
In treatment more than once*	0.20	20.28	0.14	8.89	0.17	20.48	0.50	20.00	0.33	20.00
Developmental disabilities	0.01	29.37	0.05	2.22	0.01	19.28	0.03	13.33	0.00	20.00
Sibling diagnosed with FASD*	0.00	0.70	0.04	0.00	0.01	15.66	0.00	10.00	0.33	20.00
Offender ever been told might have FASD*	0.33	0.70	0.02	6.67	0.02	30.12	0.07	20.00	0.50	0.00

*These variables also contained a 'not applicable' option; responses reflect the percentage of respondents who answered the preceeding question.. In many cases, 'not applicable' contained the highest percentage of missing values.

*Note: 'Family' consisted of adopted parent, aunt/uncle, father, grandparents, cousins, siblings and step-parents.

'Friend' consisted of common law spouse or friend.

'Professional' consisted of foster-parent, social worker, and child, youth and family case worker.

'Parole officer' consisted of two community parole officers conducting preliminary interviews with newly sentenced offenders, and agents of community organizations that are contracted by CSC to conduct a post-sentence community assessment with a collateral in the community.

1. The 16 parole officers conducted 144 interviews with offenders and collaterals.
2. Only one participant had professionals as collateral contact.
3. Items were coded 0, 1, therefore each item maximum total score was 1.

Table 26
Collateral responses to BSC Maternal Items showing mean scores and percentage of missing data.

	Collateral Type*							
	Mother (n=45)		Family (n=74)		Friend (n=13)		Professional (n=3)	
Maternal Items[3]	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know
Drink when offender was young	0.58	0.0	0.75	2.70	0.85	0.0	1.0	0.0
Drink once a month or less*	0.18	2.22	0.45	12.16	0.33	30.77	1.0	33.33
Drink 2-4 times per month	0.18	2.22	0.45	12.16	0.33	30.77	1.0	33.33
Drink 2-3 times per week	0.02	2.22	0.17	12.16	0.33	30.77	1.0	33.33
Drink four or more times per week	0.02	2.22	0.09	12.16	0.22	30.77	0.50	33.33
One drink per occasion	0.56	4.44	0.67	25.68	0.78	30.77	1.0	66.67
2-4 drinks per occasion	0.49	4.44	0.58	25.68	0.78	30.77	1.0	66.67
Five or more drinks per occasion	0.23	4.44	0.40	25.68	0.44	30.77	1.0	66.67
Drink when mother was pregnant	0.18	0.00	0.28	21.62	0.25	69.23	1.0	0.00
Drink during first trimester (first 43 days)	0.18	0.00	0.28	20.27	0.00	69.23	1.0	66.67
Drink during part of pregnancy	0.14	0.00	0.14	20.27	0.00	69.23	1.0	66.67
Drink during full pregnancy	0.02	0.00	0.25	20.27	0.00	69.23	1.0	66.67
Drank less than once per month	0.17	0.00	0.18	22.97	0.00	76.92	-	100.00
Drank once per month	0.07	0.00	0.14	22.97	0.00	76.92	-	100.00
Drank 2-4 times a month	0.07	0.00	0.09	22.97	0.00	76.92	-	100.00

Table continues on next page

	Collateral Type*							
	Mother (n=45)		Family (n=74)		Friend (n=13)		Professional (n=3)	
Maternal Items[3]	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know	Item mean	% do not know
Drank 4 or more times per week	0.00	0.00	0.00	22.97	0.00	76.92	-	100.00
Drank 2-4 times per week	0.00	0.00	0.09	22.97	0.00	76.92	-	100.00
Drank one drink per occasion	0.16	2.22	0.22	25.68	0.00	76.92	--	100.00
Drank 2-4 drinks per occasion	0.11	2.22	0.19	25.68	0.00	76.92	-	100.00
Five or more drinks per occasion	0.04	2.22	0.15	25.68	0.00	76.92	-	100.00
Binge drinking during pregnancy	0.09	4.44	0.19	25.68	0.00	69.23	-	100.00
Binge less than once per month	0.09	4.44	0.19	25.68	0.00	69.23	-	100.00
Binge at least once per month	0.07	4.44	0.15	25.68	0.00	69.23	-	100.00
Binge at least once per week	0.05	4.44	0.07	25.68	0.00	69.23	-	100.00
Binge four or more times per week	0.02	4.44	0.04	25.68	0.00	69.23	-	100.00
Other drug use while pregnant[1]	0.59	0.00	0.57	0.00	0.54	0.00	0.67	0.00

*Note: 'Family' consisted of adopted parent, aunt/uncle, father, grandparents, cousins, siblings and step-parents.
'Friend' consisted of common law spouse or friend.
'Professional' consisted of foster-parent, social worker, and child, youth and family case worker.
1. The 16 parole officers were not asked the maternal drinking questions.
2. Collaterals who did not feel they had enough information to answer maternal drinking questions were not administered this section of the BSC. Therefore, the n's in this table differ from the Behavioural and Historical tables above.
3. Items were coded 0, 1, therefore each item maximum total score was 1.

Figure 12. Mean Z score on each neuropsychological assessment measure by outcome
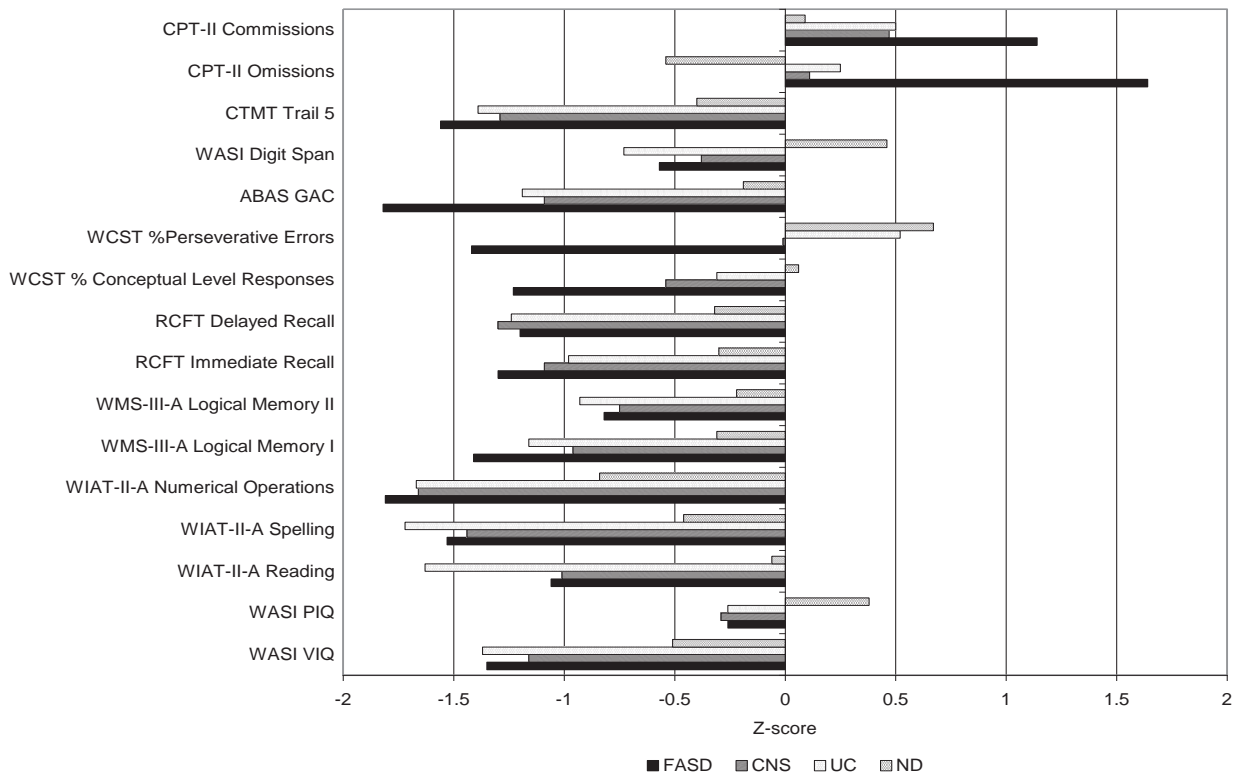
Figure 13. Distribution of percentile rankings of RCFT Copy score by study group

116
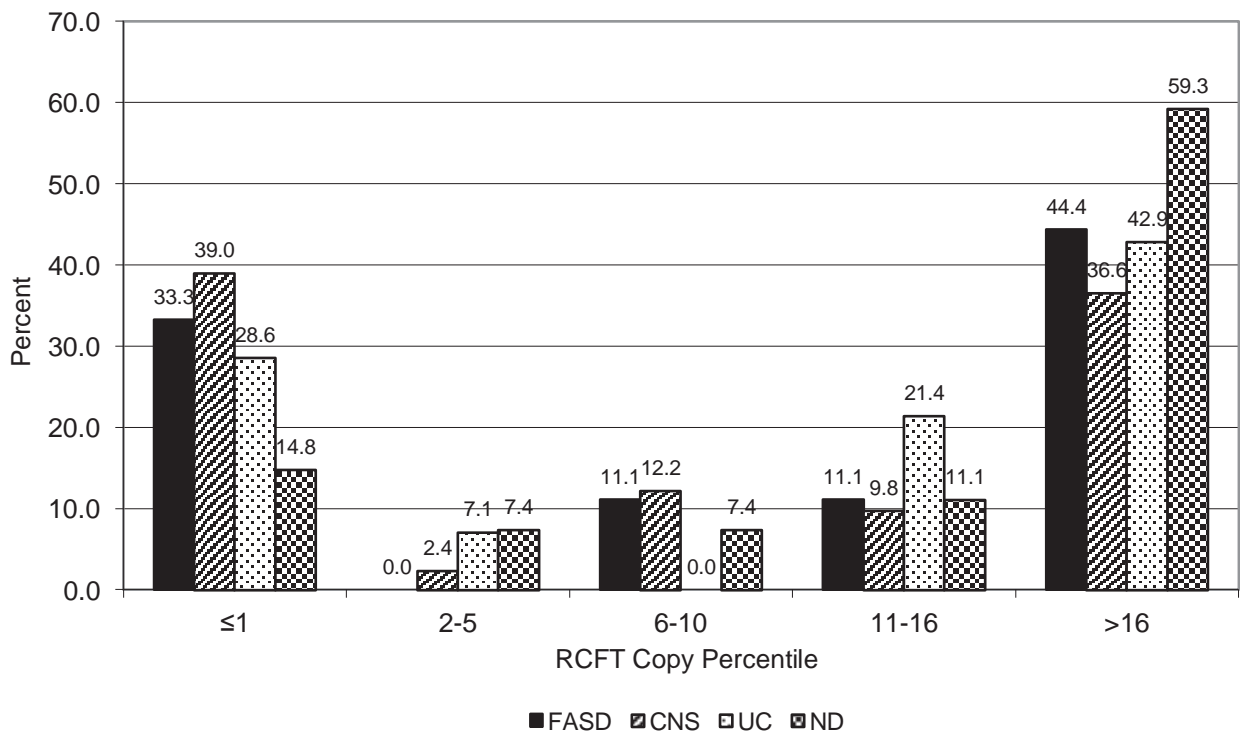
Table 27

Neuropsychological Assessment Results (Z-Scores) by Study Outcome Group

	Study Outcome				
	FASD (n = 9)	CNS (n = 41)	UC (n = 14)	ND (n = 27)	
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*F*
WASI					
Verbal IQ[a]	-1.35 (.55)	-1.16 (.85)	-1.37 (.70)	-0.51 (.72)	6.14***
Performance IQ	-0.26 (.51)	-0.29 (.85)	-0.26 (.95)	0.38 (.69)	4.33**
WIAT-II-A					
Reading	-1.06 (.86)	-1.01 (1.12)	-1.63 (.97)	-0.06 (.67)	9.60***
Spelling	-1.53 (1.07)	-1.44 (1.11)	-1.72 (.87)	-0.46 (.87)	7.15***
Numerical Operations[b]	-1.81 (.55)	-1.66 (.75)	-1.67 (.79)	-0.84 (1.15)	5.45**
WMS-III-A					
Logical Memory I	-1.41 (1.17)	-0.96 (.99)	-1.16 (.71)	-0.31 (.75)	5.03**
Logical Memory II[c]	-0.82 (1.80)	-0.75 (1.00)	-0.93 (.57)	-0.22 (.63)	2.44
RCFT					
Immediate Recall	-1.30 (1.54)	-1.09 (1.57)	-0.98 (1.46)	-0.30 (1.25)	1.98
Delayed Recall[c]	-1.20 (1.57)	-1.30 (1.48)	-1.24 (1.38)	-0.32 (1.29)	2.85*
Copy Raw Score[cd]	32.83 (3.30)	31.63 (3.39)	30.64 (5.59)	33.76 (1.90)	3.22*
WCST					
% Conceptual Level Responses	-1.23 (1.09)	-0.54 (1.17)	-0.31 (1.57)	0.06 (1.22)	2.79*
% Perseverative Errors[b]	-1.42 (1.31)	-0.01 (1.79)	0.52 (2.12)	0.67 (1.52)	3.89*
ABAS					
GAC	-1.82 (.73)	-1.09 (.97)	-1.19 (.89)	-0.19 (.82)	9.84***
Digit Span					
Digit Span[e]	-0.57 (.52)	-0.38 (.75)	-0.73 (.84)	0.46 (.86)	9.37***
CTMT[f]					
Trail 5	-1.56 (.54)	-1.29 (.80)	-1.39 (1.13)	-0.40 (.86)	6.56***
CPT-II[g]					
Omissions[c]	1.64 (1.91)	0.11 (1.08)	0.25 (1.39)	-0.54 (.32)	7.93***
Commissions	1.14 (1.22)	0.47 (1.14)	0.50 (.72)	0.09 (.83)	2.16

[a]Log transformation used to correct ANOVA assumption violation.
[b]Square root transformation used to correct ANOVA assumption violations.
[c]Transformations not able to correct violated assumptions; used original data.
[d]Raw RFCT Copy scores were used in all analyses.
[e]Digit Span scores were available for 86 participants (FASD *n* = 9; CNS *n* = 38; UC *n* = 14; ND *n* = 25).
[f]CTMT was introduced after the study start and was administered to 75 participants (FASD *n* = 8; CNS *n* = 37; UC *n* = 9; ND *n* = 21).
[g]CPT-II was introduced after the study start and was administered to 77 participants. One test was deemed invalid and not included in the analyses (FASD *n* = 9; CNS *n* = 37; UC *n* = 10; ND *n* = 20).
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 28

Neuropsychological test scores by race

	Group			
	Aboriginal (n = 60)	Caucasian (n = 23)	Other (n = 8)	
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*
WASI				
Verbal IQ	-1.20 (.71)	-0.72 (1.00)	-0.51 (.75)	4.87*
Performance IQ	-0.08 (.82)	-0.17 (.92)	0.21 (.75)	0.63
WIAT-II-A				
Reading	-1.02 (1.05)	-0.77 (1.10)	0.40 (.04)	6.80**
Spelling	-1.40 (1.13)	-1.03 (1.00)	-0.26 (.65)	4.45*
Numerical Operations[a]	-1.65 (.80)	-1.16 (.98)	-0.60 (1.28)	5.75**
WMS-III-A				
Logical Memory I	-1.00 (1.00)	-0.71 (.87)	-0.03 (.39)	4.15*
Logical Memory II	-0.76(1.04)	-0.53 (.87)	0.10 (.40)	2.98
RCFT				
Immediate Recall[b]	-0.74 (1.50)	-1.07 (1.53)	-1.18 (1.28)	0.60
Delayed Recall[b]	-0.84 (1.53)	-1.20 (1.34)	-1.44 (1.25)	0.92
Copy Raw Score[bc]	31.86 (3.79)	32.54 (3.39)	34.13 (1.81)	1.54
WCST				
%ConceptualLevel Responses[a]	-0.49(1.34)	-0.46 (1.15)	0.53 (.92)	2.47
% Perseverative Errors	0.02 (1.86)	-0.02 (1.72)	1.45 (1.39	2.41
ABAS				
GAC[b]	-1.01 (.89)	-0.83 (1.32)	-0.37 (.91)	1.55
DS[d]				
Digit Span	-0.39 (.82)	-0.06 (.89)	.59 (.94)	5.22**
CTMT[e]				
Trail 5	-1.29 (.91)	-0.71 (.82)	-0.82 (1.09)	3.36*
CPT-II[f]				
Omissions[b]	0.35 (1.40)	-0.18 (.98)	-0.40 (.53)	1.96
Commissions	0.65 (1.10)	0.15 (.90)	-0.03 (.90)	2.49

[a]Square root transformation used to correct ANOVA assumption violation.
[b]Transformations unable to correct ANOVA assumption violations; Original data was used in the analysis.
[c]Raw RFCT Copy scores were used in all analyses.
[c]Digit Span scores were available for 86 participants (Aboriginal *n* = 55; Caucasian *n* = 23; Other *n* = 8).
[d]CTMT was introduced after the study start and was administered to 75 participants (Aboriginal *n* = 47; Caucasian *n* = 22; Other *n* = 6).
[e]CPT-II was introduced after the study start and was administered to 77 participants. One test was deemed invalid and not included in the analyses (Aboriginal *n* = 48; Caucasian *n* = 22; Other *n* = 6).
*p<.05; **p<.01

Table 29

Neuropsychological test scores by prenatal alcohol exposure

	Alcohol Exposure			
	Confirmed (n = 17)	Absent (n = 49)	Unconfirmed (n = 25)	
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*
WASI				
Verbal IQ[a]	-1.30 (.69)	-0.86 (.87)	-1.15 (.79)	2.25
Performance IQ	0.01 (.69)	0.05 (.81)	-0.40 (.94)	2.67
WIAT-II-A				
Reading[b]	-1.10 (.87)	-0.67 (1.07)	-0.96 (1.24)	1.25
Spelling	-1.40 (.92)	-1.10 (1.11)	-1.27 (1.22)	0.54
Numerical Operations[a]	-1.66 (.59)	-1.20 (1.03)	-1.73 (.90)	3.35*
WMS-III-A				
Logical Memory I	-1.24 (.99)	-0.71 (1.03)	-0.83 (.76)	1.99
Logical Memory II	-0.80 (1.32)	-0.54 (.95)	-0.68 (.79)	0.49
RCFT				
Immediate Recall	-0.66 (1.49)	-0.69 (1.41)	-1.32 (1.59)	1.69
Delayed Recall[b]	-0.75 (1.47)	-0.77 (1.47)	-1.58 (1.33)	2.92
Copy Raw Score[bc]	33.29 (2.88)	32.82 (2.86)	30.36 (4.62)	5.23**
WCST				
% Conceptual Level Responses	-0.55 (1.58)	-0.36 (1.26)	-0.35 (1.15)	0.16
% Perseverative Errors[b]	-0.26 (2.15)	0.23 (1.71)	0.20 (1.78)	0.49
ABAS				
GAC	-1.44 (.91)	-0.75 (.96)	-0.87 (1.13)	3.03*
DS[d]				
Digit Span	-0.47 (.60)	0.01 (.96)	-0.45 (.84)	3.13*
CTMT[e]				
Trail 5	-1.33 (1.01)	-0.91 (.94)	-1.31 (.79)	1.82
CPT-II[e]				
Omissions	1.09 (1.79)	-0.17 (.94)	0.06 (1.08)	6.32**
Commissions	0.99 (1.01)	0.06 (1.08)	0.42 (1.05)	2.63

[a] Log transformation used to correct ANOVA assumption violation.
[b] Transformations unable to correct ANOVA assumption violations; Original data was used in the analysis.
[c] Raw RFCT Copy scores were used in all analyses.
[d] Digit Span scores were available for 86 participants (Confirmed *n* = 17; Absent *n* = 45; Unconfirmed *n* = 24).
[e] CTMT was introduced after the study start and was administered to 75 participants (Confirmed *n* = 13; Absent *n* = 43; Unconfirmed *n* = 19).
[f] CPT-II was introduced after the study start and was administered to 77 participants. One test was deemed invalid and not included in the analyses (Confirmed *n* = 15; Absent *n* = 42; Unconfirmed *n* = 19).
*p<.05; **p<.01

Table 30

Neuropsychological test scores by study outcome for Aboriginal participants only

	FASD (n = 9)	CNS (n = 26)	UC (n = 11)	ND (n = 14)	
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*
WASI					
Verbal IQ	-1.35 *(.55)*	-1.26 (.80)	-1.55 (.48)	-0.74 (.59)	3.41*
Performance IQ	-0.24 (.51)	-0.35 (.81)	-0.03 (.90)	0.46 (.75)	3.45*
WIAT-II-A					
Reading	-1.06 (.86)	-1.18 (1.14)	-1.63 (.91)	-0.23 (.65)	4.86**
Spelling	-1.53 (1.07)	-1.66 (1.18)	-1.65 (.91)	-0.61 (.94)	3.30*
Numerical Operations	-1.81 (.55)	-1.88 (.71)	-1.57 (.65)	-1.18 (1.04)	2.68
WMS-III-A					
Logical Memory I	-1.41 (1.18)	-1.08 (1.05)	-1.10 (.74)	-0.53 (.90)	1.69
Logical Memory II[a]	-0.82 (1.80)	-0.186 (1.01)	-0.93 (.64)	-0.41 (.65)	0.71
RCFT					
Immediate Recall	-1.30(1.54)	-0.97 (1.67)	-0.67 (1.46)	0.01 (.92)	1.86
Delayed Recall	-1.20 (1.57)	-1.15 (1.56)	-1.00 (1.42)	0.09 (1.30)	2.45
Copy Raw Score[ab]	32.83 (3.30)	31.21 (3.70)	30.82 (5.53)	33.25 (2.03)	1.38
WCST					
% Conceptual Level Responses	-1.23 (1.09)	-0.71 (1.21)	-0.02 (1.65)	0.00 (1.24)	2.39
% Perseverative Errors	-1.42 (1.31)	-0.11 (1.73)	0.80 (2.34)	0.55 (1.56)	3.20*
ABAS					
GAC	-1.82 (.73)	-0.99 (.81)	-1.18 (.82)	-0.41 (.76)	6.05**
DS[c]					
Digit Span	-0.57 (.52)	-0.48 (.76)	-0.83 (.75)	0.29 (.83)	4.88**
CTMT[d]					
Trail 5[a]	-1.56 (.54)	-1.50 (.70)	-1.58 (1.37)	-0.51 (.88)	4.26*
CPT-II[e]					
Omissions[a]	1.64 (1.91)	0.24 (1.21)	0.14 (1.27)	-0.43 (.35)	4.48**
Commissions	1.14 (1.22)	0.70 (1.19)	0.58 (.62)	0.16 (.95)	1.32

[a]Transformations unable to correct ANOVA assumption violations; Original data was used in the analysis.
[b]Raw RFCT Copy scores were used in all analyses. Continued on next page
[c]Digit Span scores were available for 55 Aboriginal participants (FASD *n* = 9; CNS *n* = 23; UC *n* = 11; ND *n* = 12).
[d]CTMT was introduced after the study start and was administered to 47 Aboriginal participants (FASD *n* = 8; CNS *n* = 22; UC *n* = 6; ND *n* = 11).
[e]CPT-II was introduced after the study start and was administered to 48 Aboriginal participants. One test was deemed invalid and not included in the analyses (FASD *n* = 9; CNS *n* = 22; UC *n* = 7; ND *n* = 10).
*p<.05; **p<.01

Table 31

Results of the Tukey-Kramer Test for Neuropsychological Measures

	Outcome	*t*	*p*
WASI			
Verbal IQ[a]	ND > FASD	2.81	.031
	ND > CNS	3.53	.004
	ND > UC	3.45	.005
Performance IQ	ND > CNS	3.41	.005
WIAT-II-A			
Reading	ND > FASD	2.69	.041
	ND > CNS	3.98	<.001
	ND > UC	4.94	<.001
Spelling	ND > FASD	2.75	.036
	ND > CNS	3.90	.001
	ND > UC	3.80	.002
Numerical Operations[b]	ND > FASD	2.72	.039
	ND > CNS	3.63	.003
	ND > UC	2.78	.034
WMS-III-A			
Logical Memory I	ND > FASD	3.14	.012
	ND > CNS	2.85	.027
	ND > ND	2.84	.028
RCFT			
Delayed Recall[c]	ND > CNS	2.77	.034
Copy[c]	ND > UC	2.73	.038
WCST			
% Conceptual Level Responses	ND > FASD	2.70	.040
% Perseverative Errors[b]	ND > FASD	3.30	.008
ABAS			
General Adaptive Composite	ND > FASD	4.72	<.001
		Table continues on next page	
	ND > CNS	4.02	<.001
	ND > UC	3.37	.006
DS			
Digit Span	ND > FASD	3.37	.006
	ND > CNS	4.17	<.001
	ND > UC	4.55	<.001
CTMT			
Trail 5	ND > FASD	3.30	.008
	ND > CNS	3.85	.001
	ND > UC	2.94	.022
CPT-II			
Omissions[c]	FASD > CNS	3.69	.002
	FASD > ND	4.87	<.001
	FASD > UC	2.72	.040

Note: Tukey-Kramer test for multiple comparisons was used for post-hoc analyses.
[a]Log transformation used to correct ANOVA assumption violation.
[b]Square root transformation used to correct ANOVA assumption violation.
[c]Transformations unable to correct assumption violations; used original data.

121

Table 32

Percentage of participants positively endorsing items on the Medical Intake Interview

	Do not know	FASD	UC	CNS	ND	*p*
		(9)	(14)	(41)	(27)	
Hearing or vision concerns	0.0	67.0	42.9	46.3	37.0	.5086
Chronic illnesses	1.1	33.3	21.4	35.0	33.3	.8565
Hospitalizations or surgeries	0.0	100.0	85.7	85.4	88.9	.8340
Problems with language skills	0.0	33.3	28.6	24.4	11.1	.3150
Problems with self-control skills	2.2	100.0	53.8	57.5	29.6	.0015
Problems with self-concept	2.2	66.7	28.6	28.5	11.5	.0172
Problems with bed wetting	1.1	22.2	14.3	4.9	7.7	.2248
Accident prone	4.4	12.5	14.3	26.3	33.3	.5323
Fearless	5.5	62.5	64.3	46.2	52.0	.6432
Problems relating consequences	0.0	22.2	21.4	19.5	18.5	1.0000
Father suffered from depression	24.2	16.7	33.3	6.7	14.3	.1457
Mother suffered from depression	16.5	50.0	54.6	21.6	18.2	.0656
Sibling suffered from depression	13.2	33.3	30.8	14.7	4.6	.0850

Table 33

Individual indicators of interest from DFIA portion of the OIA process

OIA Indicator	FASD (n=9)%	UC (n=14)%	CNS (n=41)%	ND (n=27)%	X^2
Employment					
Less than grade 8 education	66.7	28.6	17.1	3.7	17.74****
Less than grade 10 education	100.0	78.6	70.7	40.7	13.70***
No high school diploma	100.0	92.9	90.2	66.7	10.05**
Learning difficulty	66.7	42.9	31.7	7.4	13.56****
Learning disability	14.3	21.4	7.3	-	6.27*
Memory Problems	66.7	14.3	17.1	-	21.85****
Concentration Problems	66.7	42.9	21.9	3.7	17.81****
Unemployed 90% or more	77.8	64.3	41.5	33.3	7.62*
Marital/Family					
Childhood lacks family ties	100.0	50.0	29.2	29.6	17.31****
Absent mother or equivalent	88.9	50.0	19.5	22.2	19.63****
Absent father or equivalent	88.9	78.6	43.9	44.4	10.49**
Maternal relationship poor	66.7	64.3	14.6	18.5	20.39****
Paternal relationship poor	88.9	64.3	34.2	33.3	12.56**
Dysfunctional parents	88.9	64.3	41.5	40.7	8.69**
Other relatives relationship poor	33.3	28.6	4.9	-	14.89***
Associates/Social Interaction					
Socially isolated	33.3	14.3	26.8	3.7	7.23**
Has many criminal acquaintances	100.0	64.3	80.5	51.9	10.67**
Substance abuse					
Combines alcohol and drugs	100.0	57.1	48.7	48.1	8.54**
Community functioning					
Unstable accommodations	66.7	50.0	34.1	18.5	8.56**
Finance: no bank account	88.9	57.1	46.3	40.7	6.86
Finance: no collateral	88.9	64.3	68.3	48.2	5.67
Finance: no credit	100.0	64.3	68.3	59.3	5.28
No organized activities	77.8	57.1	46.3	33.3	6.02
Prior use of support	77.8	64.3	48.7	51.8	3.12
Personal/Emotional orientation					
Self concept: family problem	77.8	46.1	31.7	22.2	10.0**

Continued on next page

OIA Indicator	FASD (n=9)%	UC (n=14)%	CNS (n=41)%	ND (n=27)%	X^2
Problem recognition poor	88.9	71.4	43.9	59.2	7.85*
Difficulties with problem solving	100.0	85.7	63.4	44.4	12.15***
Unable to generate choices	100.0	78.6	73.2	55.6	7.34*
Unaware of consequences	88.9	64.3	56.1	37.0	8.20**
Poor conflict resolution	100.0	78.5	61.0	55.6	7.38**
Low frustration tolerance	88.9	57.1	26.8	40.7	13.35***
Worries unreasonably	55.6	21.4	29.2	11.1	7.69*
Prior mental health diagnosis	22.2	-	2.4	3.7	7.85*
Current mental health diagnosis	22.2	-	2.4	3.7	7.85*
Current mental health prescription	44.4	-	7.3	7.4	14.10***
Attitude					
Lifestyle lacks direction	100.00	78.6	80.5	51.85	10.98**
Poor attitude toward personal property	55.6	64.3	36.6	22.2	8.12*

Table 34
Psychometric properties for participant BSC behavioural item total score

Score	Se	Sp	PPV	NPV	True positive	True negative	False positive	False Negative
0	1.00	0.00	0.12	-	9	0	68	0
1	1.00	0.16	0.14	1.00	9	11	57	0
2	1.00	0.31	0.16	1.00	9	21	47	0
6	0.89	0.56	0.21	0.97	8	38	30	1
7	0.98	0.60	0.23	0.98	8	41	27	1
8	0.78	0.65	0.23	0.96	7	44	24	2
9	0.78	0.68	0.24	0.96	7	46	22	2
10	0.78	0.81	0.35	0.96	7	55	13	2
11	0.56	0.87	0.36	0.94	5	59	9	4
12	0.44	0.91	0.40	0.93	4	62	6	5
13	0.44	0.94	0.50	0.93	4	64	4	5
14	0.44	0.96	0.57	0.93	4	65	3	5

Table 35
Psychometric properties from collateral BSC behavioural indicator total score

Score	True Positive	True Negative	False Positive	False Negative	Se	PPV	NPV	Sp	Agree
0	7	0	59	0	1.00	0.11		0.00	0.11
1	7	10	49	0	1.00	0.13	1.00	0.17	0.26
8	7	39	20	0	1.00	0.26	1.00	0.66	0.70
9	7	43	16	0	1.00	0.30	1.00	0.73	0.76
10	7	46	13	0	1.00	0.35	1.00	0.78	0.80
11	7	48	11	0	1.00	0.39	1.00	0.81	0.83
12	5	50	9	2	0.71	0.36	0.96	0.85	0.83
16	1	56	3	6	0.14	0.25	0.90	0.95	0.86
17	0	56	3	7	0.00	0.00	0.89	0.95	0.85

Table 36
Psychometric properties of participant risk history scores

Score	True positive	True negative	False positive	False negative	Se	PPV	NPV	Sp	Agree
0	5	68	0	4	0.56	1	0.94	1	0.95
1	6	63	5	3	0.67	0.55	0.95	0.93	0.90
2	7	52	16	2	0.78	0.30	0.96	0.76	0.77
3	8	30	38	1	0.89	0.17	0.97	0.44	0.49
4	9	0	68	0	1	0.12		0	0.12

Table 37
Psychometric properties of collateral risk history scores

Score	True positive	True negative	False positive	False negative	Se	PPV	NPV	Sp	Agree
0	7	0	59	2	1.00	0.11	-	0.00	0.11
1	7	24	35	0	1.00	0.17	1.00	0.41	0.47
2	6	43	16	1	0.86	0.27	0.98	0.73	0.74
3	5	54	5	2	0.71	0.27	0.96	0.92	0.89

Fetal Alcohol Spectrum Disorder

Brief Screen Checklist - Revised

Participant

Instructions:

The checklist should be completed by the staff during the consent interview with the participant.

All questions on the checklist should be completed. If respondent does not know the answer to one or more questions, please circle "do not know" or "unknown". For questions that do not apply, check off "Not Applicable" or "Did not Drink/Use". Do not leave any questions blank.

Client (name):_____

Case ID:_____

FPS: _____

Date: _____

Fetal Alcohol Spectrum Disorder
Brief Screen Checklist –Revised

Case ID:_____

Date: _____

Part 1
Behavioural Indicators

The first set of questions is about your behavior and abilities.

Directions: Please rate yourself on the following questions. There are no right or wrong answers. I will begin asking you the first set of questions now.

Would you say you are someone who:	Yes	No
1. Acts impulsively.	1	0
2. Has trouble following directions.	1	0
3. Is restless.	1	0
4. Has a problem with spelling.	1	0
5. Shows poor judgment.	1	0
6. Is easily distracted.	1	0
7. Has temper tantrums.	1	0
8. Has strong mood swings.	1	0
9. Is hyperactive.	1	0
10. Has a problem with money	1	0
11. Seems unaware of the consequences of your actions.	1	0
12. Has a problem with maths.	1	0
13. Interrupts a lot during conversation.	1	0
14. Is agitated.	1	0
15. Is very forgetful of everyday things.	1	0
16. Talks a lot but says little.	1	0
17. Has a poor memory.	1	0
18. Has a problem with reading.	1	0
19. Is easily victimized.	1	0
20. Has trouble completing tasks.	1	0
21. Has a poor attention span.	1	0
22. Has few friends.	1	0
23. Is easily manipulated.	1	0
24. Is disorganized.	1	0
25. Has trouble staying on topic.	1	0
26. Has poor social skills.	1	0

Score on behavioural items _____ (Maximum 26)

☐ **0-9=low risk**

☐ **10 or more=moderate to high risk**

Part 2

Historical Information

The second set of questions is about your history.

Directions: Please answer the following questions to the best of your ability. There are no right or wrong

answers. I will begin asking you the second set of questions now.

27.	Were you adopted?	Yes	No	Do Not Know	
28.	How many times have you been in foster care?	Never	1-2 times	3 or more	Do not know
30.	Have you had problems with school from an early age?	Yes	No	Do Not Know	
31.	How many times have you been in mental health treatment?	Never	1-2 times	3 or more	Do not know

Score on historical items _____ (Maximum 6)

Scoring :

☐ **0-1=low risk**

☐

☐ **2 or more= moderate to high risk**

> **Part 3**
> **Maternal Indicators**

The final set of questions is about your mother's use of alcohol when you were young and during the time she was pregnant with you.

Directions: Please answer the questions to the best of your ability. There are no right or wrong answers, just do the best you can. I will begin asking you the last set of questions now.

32.

Did your mother drink alcohol when you were young? **Yes** **No** **Do Not Know**

(if answer is 'no' or 'do not know' go to question 35)

---

33. If yes: how often did your mother drink?

☐ **Once monthly or less**   ☐ **Do Not Know**

☐ **2-4 times per month**   ☐ **Not Applicable**

☐ **At least 2 times per week** *(high risk)*

---

34. How many drinks of alcohol did she usually have on a typical drinking occasion?

One standard drink is defined as:
- *12 oz (341 ml, standard bottle) of regular beer*
- *5 oz (142 ml, regular size wine glass) of table wine,*
- *3 oz (85 ml) of fortified wine (sherry, port, vermouth),*
- *1.5 oz (43 ml, single shot) of spirits (whiskey, rum, gin)*

☐ **One to three**   ☐ **Do Not Know**

☐ **Four or more** *(high risk)*   ☐ **Not Applicable**

("At least twice a week" and /or "four or more drinks" = high risk)

---

35. Did your mother drink alcohol when she was pregnant with you?   **Yes**   **No**   **Do not know**

(If no or do not know, go to 37)

---

36 Who told you about your mother's drinking during pregnancy?

☐ **Mother**   ☐ **Health Professional**

☐ **Other Relatives**   ☐ **Elder**

☐ **Friends**   ☐ **Other:_____**

☐ **Foster/adopted parent**

Table continues on next page

37.

Did your mother use any other drugs during pregnancy?

☐ **Tobacco**

☐ **Prescription – from a doctor**

☐ **Prescription – used without a doctor's order**

Which   drugs   did   she   use?

_____

☐ **Illegal drugs**
(eg.marijuhana, hashish, cocaine, heroin)

☐ **Do not know**

☐ **Did not use**

That is the end of the questions. Thank you for answering.

NOTE TO INTERVIEWER: Please provide any other details discussed during the interview regarding the participant's behaviour, family history or mother's use of alcohol.

_____

_____

_____

_____

REFERRAL FOR FOLLOW UP ASSESSMENT

Need Behavioural, Historical and one Maternal criteria:

☐ **Behavioural Items   Score of 10 or more (*required*)**

☐ **Historical Items   Score of 2 or more (*required*)**

One or both of the following required:

☐ **Maternal Items   Response of "At least twice a week" during childhood
And/Or**

☐ **Maternal Items Response of "four or more drinks per occasion" during childhood**

Offender Final Assessment

☐ **Risk of Fetal Alcohol Spectrum Disorder   (follow up required)**

☐ **No risk of Fetal Alcohol Spectrum Disorder**