Summary of 2014 FASD Articles

Public Health:

• Method: Reviewed all patients in Alberta health database of inpatients, outpatients, and practitioner claims from 2003 to 2012
• Based on ICD codes for FAS - also counted a certain percentage of people with other ICD codes that people with FASD commonly have (such as LD, MR, nervous system defects).
• Incidence = number of new cases per 1000 births; prevalence = the number of cases per 1000 population in 2012
• Annually, 739 to 1884 people born with FASD = incidence of 14.2 to 43.8 per 1000 births
• 46 000 people living with FASD in 2012 (6000 FAS, 40 000 FASD-related) = prevalence of 11.7 per 1000 population
• Male and younger outnumbered female and older
• Conclusion: incidence and prevalence higher than commonly used 1%

• Overall estimates of 3-11% FASD prevalence in care
• Annual cost ranges from 57.9 million to 198.3 million in Canada
  o Basic maintenance - funds required for the everyday costs of providing for children in care (e.g., food, utilities, child care replacement clothing)
  o Special rate/special needs - costs that exceed or were not intended to be covered by basic maintenance (e.g., fees for service, therapy, medical expenses)
  o Exceptional circumstances - above and beyond those required for normal care (e.g., support services, criminal legal fees, renovations required to the foster home for a disabled child)
• Highest numbers of children with FASD in care are: Ontario, Quebec, Alberta
• Highest cost for 11-15 year olds, then 16-18, then 6-10, then 0-5

• Prevalence of FASD among first grade students in Midwest US
  70.5% of all first graders consented. Selected from that 70.5% were: 1) children below 25th percentile in height, weight, and head circumference and 2) randomly selected control candidates
• Assessed: growth, development, dysmorphology, cognition, behaviour. Mothers were interviewed to assess maternal risk.
• FAS: 6 to 9/1000 children; pFAS: 11 to 17/1000; total FASD: 24 to 48/1000

• Population-based meconium testing (fatty acid ethyl esters produced through ethanol metabolism, indicative of “frequent PAE during last 2 trimesters”)
• 1307 babies in PEI collected - 1271 were analyzable - 3.1% had positive results
• Estimates of 1.3% will have FASD

- **Purpose:** to compare the prevalence of PAE as reported via maternal self-reports with the results of meconium testing, and to quantify the disparity between these two methods
- The pooled prevalence of PAE as measured by meconium testing was 4.26 (95% CI: 1.34-13.57) times the pooled prevalence of PAE as measured by maternal self-reports
- If maternal self-reports are the sole information source upon which health care professionals rely, a number of infants with PAE are not being recognized as such

Andrew, G. (2014). To test or not to test and that is the question. *The Journal of Neurological Sciences, 41*(1), 1-2.

- Commentary on article about ethical and social challenges of meconium testing
- Argues that meconium testing is an excellent tool for population estimate of PAE in the second and third trimester and is a proxy measure for effectiveness of primary prevention programs
- The question of using it to inform individual case exposure with consent is still in legal debate
- Argues that we need longitudinal follow-up of infants who screen positive to determine the % who do meet criteria for an FASD diagnosis
- Programs to support birth mothers and infants that screen positive will need to be provided
- Removing the infant to the child welfare system is not the solution


- 2011 Stats Canada data
- **Morbidity** - “the diseased state of an individual” - Assumptions made on the level of impairment that would affect the ability of individuals with FASD to participate in the workforce or reduce their productivity were based on data obtained from the current epidemiological literature and experts' opinions
- About 0.03% of the Canadian workforce experiences a loss of productivity because of FASD-attributable morbidity, which translates to aggregate losses ranging from $418 million Canadian dollars (CND) to $1.08 billion CND annually


- Review of reports published related to ASD, CP, and FASD with Aboriginal children
- 52 published since 1981 → 51 were focused exclusively on FASD
- near-complete failure to acknowledge community involvement in research decisions or dissemination of results in any of the publications


- Since the four basic ethical principles (autonomy, beneficence, nonmaleficence, and justice) may conflict with one another in different situations that require healthcare decisions, clinicians must weigh each principle against the other three in each case.
• The principle of “autonomy” involves self-determination when making healthcare decisions. Adults are generally considered as being capable of such decisions, but persons with alcohol addiction or dependence (certainly minor children) may be considered to have limited capabilities in this regard.
• For example, pregnant women are generally free to make autonomous decisions about their body but this may conflict with the principles of beneficence and nonmaleficence when the mother drinks alcohol during pregnancy, therefore exposing the fetus to its harmful effects.
• “Beneficence” is the principle that asks healthcare clinicians to seek the benefit of another, and to look out for his/her interest while “nonmaleficence” is the principle that seeks to “do no harm.” The principle of beneficence is exercised by healthcare clinicians when they promote the health of both the mother and the fetus and when they provide “skilled and compassionate care for persons born with an FASD.” Limiting the mother’s access to alcohol would conflict with the principle of autonomy but would be in keeping with the principle of “nonmaleficence” toward the fetus. “Justice” refers to the fair, equitable, and appropriate treatment based on what is due to persons, and this is compromised when unfair rules and restrictions are imposed upon women who are pregnant.

• Estimates of the prevalence of FASD primarily depend on the diagnostic criteria currently available.
• A critical analysis of the diagnostic criteria from the Institute of Medicine, Hoyme, 4-Digit Diagnostic Code and Canadian guidelines
• The Canadian guidelines represent the only guidelines that have pushed for a uniform diagnostic capacity through harmonizing the IoM and 4-Digit Diagnostic Code criteria.

Prevention:

• Patients are asking doctors about drinking these beverages during pregnancy
• Apparently non-alcoholic beer may actually contain higher ethanol levels than what is labeled
• Conclusion: do not drink them/”briefly” delay breastfeeding

• 1035 college students in northwestern universities
• Findings = adequate knowledge about FASD (85% accuracy on questionnaire)

• South Africa has one of the world’s highest rates of FASD and interpersonal trauma
• N = 66 women
• Trauma - past (childhood) and recent (intimate partner violence)
• Pregnant women with no trauma showed same drinking patterns before and after pregnancy recognition – pregnant women with trauma drank more after pregnancy recognition
• Our results suggest that women with traumatic experiences are more likely to exhibit risky alcohol consumption when they become pregnant, regardless of prior risk.

• Prenatal alcohol and drug abuse a factor in approximately 15% of cases investigated by child welfare system and in 25% of cases with substantiated maltreatment
• Longitudinal study - whether loss of an index child due to substance abuse is associated with risk of a subsequent alcohol/drug exposed birth
• 795 substance-using mothers enrolled in Washington PCAP
• At program exit, ⅕ of the women had a subsequent birth after the birth of their index child
• Over ½ used alcohol and/or drugs in subsequent pregnancy
• Odd were two-fold for having a subsequent child; and three-fold for having a substance-exposed subsequent child

• Looked at demographic, psychological, and social maternal risk factors. 738 references identified, 15 met criteria to be reviewed
• Mothers of children with FASD tend to be: older at the time of birth of affected child; lower educational level; other family relatives with alcohol abuse; have other children with FASD; pattern of little prenatal care and a distinguishing pattern of alcohol consumption (alcohol use before and after pregnancy, failure to reduce alcohol use during pregnancy, frequent episodes of binge drinking).

• Threat appeal, positive appeal promoting a self-efficacy message, concept combining the two
• Perth Australia
• Concepts containing threat appeal significantly more effective at increasing women’s intentions to abstain from alcohol during pregnancy than the self-efficacy message and the control
• Combined method is recommended - good persuasive potential, balance of positive and negative emotional responses, and is unlikely to result in defensive or unintended consequences

• Pregnancy and Risk Assessment Monitoring System (PRAMS) dataset of 311,428 women
• ~50% drank alcohol before pregnancy
• ~87% quit drinking during pregnancy
• ~6.6% reduced and 6.4% reported no reduction
• Older women and women with higher education more likely to reduce than to quit
• Women who were black or hispanic, overweight, or multiparas were more likely to quit than reduce
• Abuse during pregnancy increased risk of not quitting or not reducing during last trimester


• Evaluate and validate through surveys and focus groups - obstacles and challenges that shape efficacious implementation of the BAI at two Illinois health department
• BAI implementation is facilitated by staff perceptions of its benefits, readiness to implement the intervention, and organizational support for it
• Brief motivational intervention - original study by Floyd 2007 (Preventing alcohol-exposed pregnancies - A randomized controlled trial)


• Participants - pregnant women who drank any amount of ETOH in the previous year (n = 122)
• MI at baseline, 30 day post-baseline, and 30 day post-partum follow-ups
• MI was not found effective in decreasing alcohol use, but low levels of reported alcohol use by the women at baseline left little room for improvement due to the intervention


• 1 hour training session on alcohol screening, brief intervention, diagnoses and treatment for nurses and nursing students
• Pre-post, participants were more likely to know what constitutes binge drinking, facial abnormalities, and criteria for diagnosis.
• More confident in education about effects of PAE, identifying FASD, and utilizing resources

**Assessment/Diagnosis:**


• There is an extended time for FAS characteristics to become apparent in infants and young children, and there are often delays in syndrome recognition and documentation
• Study analyzes the age at case ascertainment in a large surveillance program
• The average age at abstraction for confirmed/probable FAS cases (n = 422) was 48.3 (619.5) months with a range of 0 to 94 months
• FAS surveillance efforts should screen records of children who are much older than is typical in birth defects surveillance
• Implement staggered end dates allowing all births to be followed for up to 8 years of age


• Developed a 10-item neurobehavioural screening tool (NST) based on the CBCL
The NST is highly discriminative between FASD and healthy controls groups and that certain combinations of items differentiate children with FASD from unexposed children with ADHD and ODD/CD.


- NST was derived from 10 questions from the Child Behaviour Checklist
- Official screening tool in the PHAC FASD toolkit - high sensitivity and specificity for identifying neurobehavioural pattern in children with FASD
- Must be careful with interpretation - what about the influence of maternal depression on the neurobehavioural presentation of children diagnosed with FASD? Are they screening positive on the NST? Important because maternal depression is the most common comorbid issue among mothers who consume alcohol during pregnancy
- Method: Compared endorsement rates on NST between: 1) children diagnosed with FASD from 3 previous studies; 2) control children from those studies; 3) children born to mothers with clinical depression (prospective)
- Results: None of the children born to mothers with depression screened positive, but many of these kids were reported hyperactive. Depression correlated with child’s conduct - lying/cheating, disobedience in the home.
- Conclusion: Maternal depression doesn’t affect specificity and sensitivity of NST; however items re: impulse control, oppositional behaviours, and conduct may be endorsed


- Goal: to assess the predictive accuracy of the NST among children with FASD, PAE but no FASD, typically developing controls
- Children aged 6 to 17
- N = 48 FASD, 22 PAE, 32 typically developing controls
- 62.5% sensitivity for participants with FASD
- 50% for PAE
- Specificity values were 100% with no typically developing control scoring positive
- Higher sensitivity among adolescents with FASD aged 12 to 17 (70.8%) compared with children aged 6 to 11 years (54.2%), p = 0.23


- n = 40 children with FASD
- The method of computer-assisted measurement tends to underestimate the true length and, hence, over-diagnose short palpebral fissure, especially in children under four years old


- Accurate assessment of sensory-motor deficits in FASD is difficult
- Robotic technology is a new approach that brings better objectivity and accuracy
152 typically developing versus 31 FASD b/w ages 5 and 18
FASD group significantly impaired on most of parameters measured, with greatest
difficulty on initial movement direction error
95% of TD group failed fewer than 3 parameters versus 69% FASD group
Results more pronounced in younger children

Deficit Hyperactivity, Fetal Alcohol Spectrum Disorder, or Something Else: The Broad
Differential of Kindergarten Suspension. *Journal of Developmental and Behavioral
Pediatrics, 35*(5), 344-346.

- Case of 5 year old boy w/ severe behaviour problems and delayed language.
- Parents deny PAE, there is no facial dysmorphology, but the case presents the question of
pursuing an FASD diagnosis.

criteria for specialist diagnostic assessment in Australia. *Bmc Pediatrics, 14*, 178. doi:
10.1186/1471-2431-14-178

- 23 statements describing referral criteria in North America were sent to 139 health
professionals with expertise in FASD screening/diagnosis
- 90/139 health professionals responded
- 80% agreed that referral for evaluation should occur when there is evidence of sig PAE
defined as: 7 or more standard drinks per week and at least 3 standard drinks on any one
day
- Workshop participants recommended 5 criteria for referral: 1) confirmed PAE; 2)
microcephaly and PAE; 3) 2 or more CNS abnormalities and confirmed PAE; 4) 3 of the FAS
facial phenotype characteristics; 5) 1 facial feature, growth deficit, and 1 or more CNS
abnormalities

Giving Voice': Evaluation of an Integrated Telehealth Community Care Model by Parents/
Guardians of Children Diagnosed with Fetal Alcohol Spectrum Disorder in Manitoba.
- Since 2000, Manitoba has been providing telehealth services for FASD assessment,
diagnosis, follow-up
- Expanded to education and support for families caring for someone with FASD
- Objectives → to explore the experience of families with the telehealth process and to
examine the use of telehealth in diagnostic assessment as well as follow-up post-clinical
assessment.
- 16 semi structured interviews - families who had participated in at least one diagnostic
ax and/or individual or group follow-up via telehealth
- Majority were overall happy with their experience
- Two themes: 1) the value of telehealth use for families with children living with FASD, 2)
various needs of this client group.

Psychological/Health:

Burd, L., Peterson, L., & Kobrinsky, N. (2014). Fetal Alcohol Spectrum Disorders and
Childhood Cancer: A Concise Review of Case Reports and Future Research
- 12 cases identified of comorbid cancer and FASD - higher rates of neuroblastomas (46%)
than in the pediatric cancer population (10%)

• 13 patients with FASD and epilepsy or seizures were identified retrospectively from the databases of seven Italian pediatric neurology divisions

• 11 children were affected by epilepsy, and two had at least one documented seizure


• Systematic review → 24 studies

• Complex fine motor skills, such as visual-motor integration, were more frequently impaired than basic fine motor skills, such as grip strength

• Assessment tools that specifically assessed fine motor skills more consistently identified impairments than those which assessed fine motor skills as part of a generalized neurodevelopmental assessment.

• Fine motor impairments were associated with “moderate” to “high” PAE levels. Few studies reported fine motor skills of children with “low” PAE levels


• Objective: to characterize GM impairment in children with FASD or “moderate” to “heavy” maternal alcohol intake

• Children 3 days to 13 years

• 14 articles met criteria

• Significant association between a diagnosis of FASD or moderate to heavy PAE and GM impairment (balance, coordination, and ball skills)

• Insufficient data to determine prevalence


• 265 African American youth from Detroit Longitudinal study

• Salivary samples at 14 years

• Findings: higher testosterone for males and females, no diffs in pubertal stage or age at menarche


• Looked at BMI in 445 with FASD, 117 no-FASD, aged 2 to 19

• 34% with ANY FASD were obese/overweight (BMI > 85th percentile), same as no-FASD and general US population

• FAS - 17% underweight

• pFAS - 40% overweight/obese

• Adolescents - 42% overweight/obese

• Adolescent females - 50% overweight/obese (3X higher than state prevalence)

- Moms of children with FASD and moms of typically developing controls
- More than 50% of all mothers were below the Estimated Average Requirement for vitamins A, D, E, and C, thiamin, riboflavin, vitamin B-6, folate, calcium, magnesium, iron, and zinc
- Mothers of children with FASD reported significantly lower intake of calcium, docosapentaenoic acid (DPA), riboflavin, and choline than controls.
- Lower intake of multiple key nutrients correlates significantly with heavy drinking


- Physical exams and caregiver questionnaire to identify possible abnormalities in food and eating behaviours
- 19 children, mean age 9.6 years
- 50% girls overweight (4/8) overweight or obese
- 37% boys (4/11) were short, underweight or low BMI for age
- Problems identified: constant snacking, lack of satiety, picky eating/poor appetite, constipation, excessive sugar consumption (140 to 190% of recommended in 57% of participants)
- Below recommended daily amount for many vitamins/minerals
- Conclusion: lack of satiety may be linked to altered self-regulation


- 3 groups: PAE, no-PAE ADHD, controls
- Parent-reported hyperactivity and inattention were same for PAE and ADHD, and both higher than in the control group
- Lab measures: both PAE and ADHD were higher on objective inattention (CPT) but ADHD was higher than PAE on activity (actigraph)
- PAE and control were the same on actigraph - Hyperactivity was a less prominent feature in the PAE group
- Differences in behavioral profiles may be clinically useful in differential diagnosis


- Comparison of Vineland scores between 4 groups of children: 1) PAE with comorbid ADHD; 2) PAE without ADHD; 3) ADHD only; 4) control (no PAE no ADHD)
- Looked at Communication, Daily Living Skills, Socialization domain scores
- Significant main effect of AE and ADHD on all domains
- PAE children lower than non-PAE children; ADHD lower scores than those without ADHD
- PAE and comorbid ADHD causes greatest impairment on communication domain; no PAExADHD interaction effect on Daily living skills or Socialization
• 4 groups: PAE+ADHD, PAE no ADHD, ADHD, Control
• Follow-up analyses demonstrated no difference between PAE+ and PAE- groups on these measures.
• No difference between PAE+ versus PAE- on WISC-IV, D-KEFS and CANTAB subtests (Design Fluency, Verbal Fluency, Trail Making, Spatial Working Memory)
• The combined AE+/- group demonstrated more severe impairment than the ADHD group on VCI and PRI, but there were no other differences between clinical groups
• These results support a combined AE+/- group for neuropsychological research

• PAE and ADHD result in behavioral issues related to poor executive function (EF)
• This study: do parent ratings of EF (BRIEF) aid in differential diagnosis?
• Children 8-16 years, PAE + ADHD (80), PAE no ADHD (36), ADHD - PAE (93), controls (167)
• Results: BRIEF accurately classifies groups
• Parent-report was not correlated with neuropsychological performance in the clinical groups → may provide unique info about neurobehaviour

• Premise: Intellectual disability (ID) is attributable to either genes, or the environment, or the interaction of the two = challenging to assess etiology
• Mouse model of PAE on memory and learning indicating FASD associated with epigenetic changes (for both binge and continuous drinking)
• Argue that epigenetic changes can be reversed postnatally via drugs, chemicals, and environment (maternal care)
• Antipsychotic drugs that are used to treat ID could work because they function via changes in DNA methylation, a major epigenetic mark that is affected in FASD
• Enriched environment improved the pups’ cognition while negative and maternal separation stress worsened it
• Epigenetic manipulation may work in treatment of FASD and related disorders implicated in ID

Jacobson, S. W., & Jacobson, J. L. (2014). The risk of low-to-moderate prenatal alcohol exposure on child academic underachievement and behaviour may be difficult to measure and should not be underestimated. *Evidence-Based Medicine, 19*(2), e7-e7. doi: 10.1136/eb-2013-101535
• Commentary on O’Leary and the Swedish study findings of no adverse effects from low-mod drinking

• Children with FASD demonstrated difficulties with attentional control/switching
• They outperformed the typically developing children on a test assessing selective attention.

- 50 young offenders with FASD, 50 young offenders with no PAE
- Understanding and appreciation of Miranda rights, knowledge of criminal procedure, appreciation of the nature and object of the proceedings, ability to participate in a defense and communicate with counsel
- 90% of young offenders with FASD showed impairment in at least one psycholegal ability
- Rates of impairment were significantly higher than the comparison group
- IQ and reading comprehension - robust predictors of participants' psycholegal abilities


- Children 5-17 years with FASD (n = 71), PAE but no diagnosis (n=20), and typically developing controls (n = 111)
- These data suggest that psychometric tests and eye movement control tasks may assess similar domains of cognitive function, and these assessment tools may be measuring overlapping brain regions damaged due to prenatal alcohol exposure


- Kids aged 5 to 17, FASD (72), PAE-no diagnosis (21), typically developing controls (139)
- NEPSY + saccadic eye movements
- Response inhibition deficits in children with FASD/PAE are associated with difficulty controlling saccadic eye movements
- May point to overlapping brain regions damaged by PAE
- Eye movement control tasks may therefore help with early identification of children who would benefit from a multidisciplinary diagnostic assessment


- Investigate relationship between response inhibition during the performance of saccadic eye movement tasks and DTI measures of the corpus callosum in children with or without FASD
- Children aged 7-18, 43 with FASD, 35 typically developing controls at 3 sites across Canada
- Children with FASD made more eye movement errors, indicates a deficit in response inhibition
- Certain types of errors in the eye movement task were correlated in the control, but not FASD group → Alterations in connectivity between the two hemispheres of the brain may contribute to inhibition deficits in children with FASD


- 15 kids with known PAE, 15 kids w/o known PAE - Grade 1
• “Test of Playfulness”
• Children with PAE had a significantly lower mean overall playfulness score, and on 5/12 items related to social play
• Children with PAE may experience poorer overall quality of play, particularly in social play

• N = 85 infants at 6.5 months
• PAE was associated with increased infant emotional withdrawal and decreased activity

• Prospective population based study
• Binge drinking during pregnancy and child’s mental health and academic ability at age 11
• Adjusted for pre- and postnatal risk factors
• Binge drinking associated with higher hyperactivity/impulsivity in girls via parent report and both genders via teacher report. Also lower academic scores in both genders.

Intervention:

• 5 individualized programs adapted from the MILE program
• Goal to improve metacognitive skills - targeted plan, organize, shift, and evaluative problem solving strategies
• 4/5 showed clinically significant gains with scores increasing from borderline or low average range to the average range on measures of nonverbal reasoning and reading
• Show promise in remediating learning problems of children with PAE in a community setting

• Foster and adoptive parents of 71 children with FAS report on developmental and behavioural characteristics, family stress, coping resources, and satisfaction with support
• Despite positive individual and social resources, they feel a high level of caregiver stress
• 30% rate support they receive from pediatric, therapeutic or educational services as lower than expected
• Lacking early information on the diagnosis, professional knowledge and support for the special challenges of education and managing behavioural problems

• This study focuses on systems-level barriers that contribute to secondary conditions and interfere with prevention and treatment.
Semi-structured interviews and focus groups were conducted with parents of children with FASD and service providers. Participants emphasized the pervasive lack of knowledge of FASD throughout multiple systems → leads to multi-system barriers including delayed diagnosis, unavailability of services, and difficulty qualifying for, implementing, and maintaining services.


What do caregivers and service providers say are the characteristics of intervention programs that prevent secondary disabilities?

25 parents of children with FASD and 18 service providers - focus groups/individual interviews

5 primary characteristics: 1) available to individuals across the lifespan; 2) have a prevention focus; 3) be individualized; 4) be comprehensive; 5) be coordinated across systems and developmental stages

Authors suggest that these characteristics are consistent with positive behaviour support framework.


Review of current knowledge along with benefits and challenges of stem cell therapy for FASD

Emerging evidence has demonstrated the benefit of NSC in neurodegenerative diseases, traumatic brain injury, as well as stroke and can possibly reverse neurogenesis dysfunction seen in FASD. Current studies have shown that memory, cognitive, and behavioral abnormalities were corrected in FASD rat models after NSC transplantation (Shirasaka et al., 2011). Furthermore, it has been shown that NSCs have a regenerative capacity and are able to migrate to damaged areas of the brain in FASD rat models (Yoshinaga et al., 2007). However, it should be noted that FASD is a diverse set of disorders, thus tailoring stem cell therapy for specific FASD subtypes will likely be required in order to recognize clinically relevant outcomes with this treatment.


Optimal maternal nutrition is of utmost importance for proper fetal development, yet is often altered with alcohol consumption

What is the role of nutrients and prenatal nutrition interventions for FASD?

Paper reviews different nutrients that may prevent or alleviate the development of FASD

Based on nutrition supplementation studies in animal models

More research needed to determine optimal amounts, and to investigate collective effects of multiple-nutrient supplementation.

• Disproportionate number of children and youth with FASD who have speech-language disorder
• Study looked at cost of 1-to-1 speech-language interventions in 2011
• Estimated annual cost → 72.5 million to 144.1 million

• Evaluation of the Youth Outreach Program (YOP) - 46 males, 41 females in program
• Data collected with: 31 youth program participants, 18 community partners/service providers, 2 family members of the program participants, 7 program team members and/or managers of the sponsoring organization
• A three-year intensive outreach and support program intended for at-risk Aboriginal youth, 13 to 18, with characteristics and/or behaviors associated with FASD
• Results: Multiple sources of data revealed that the YOP led to a number of positive outcomes for youth in areas of safety, relationships, school attendance, sexual health, substance use, and knowledge and use of community resources

Animal:

• Wheel running (WR) improves hippocampus-associated learning and memory and increases the genesis and survival of newly generated neurons in the hippocampal dentate gyrus.
• Past research → Wheel running significantly increases proliferation of newly generated hippocampal cells in alcohol-exposed (AE) and control rats, but only control rats show an increased number of surviving cells thirty days after WR
• Present studies → can proliferation-promoting WR followed by survival-enhancing environmental complexity (EC) during adolescence increase survival of new neurons in AE rats?
• Post-weaning environmental manipulations promote cell survival and reverse learning deficits in rats that were exposed to alcohol during development.
• These manipulations may provide a basis for developing interventions that ameliorate learning impairments associated with human fetal alcohol spectrum disorders

• Factors being examined in animal research: cell death, changes in cell cycle and proliferation, cell migration, cell morphogenesis, gene expression, free radical damage, interference w/ cell signaling

Neuroscience:

• MRI scan of 36 ARND versus 52 TDC at 8 to 16
• Conclusion: In ARND, volume decreases were observed with global surface area reductions in bilateral frontal and temporal as well as occipital regions. Local reductions in surface area observed in the right superior temporal gyrus and the right occipital-temporal region.

- n = 24 9-yo children with FASD, 16 age matched controls
- Increasing PAE related to reduced cortical folding complexity, even among children with normal brain size
- Reduction of buried cortical surface
- Fold opening → strongest anatomical correlate of prenatal alcohol intake, indicating a widening of sulci in all regions that were examined.


- 11 children with FASD versus 21 controls scanned twice, 2 to 4 years apart to assess changes in cortical thinning. Age 6 to 15.
- FASD group had less developmental thinning than controls across medial frontal, parietal and limbic areas - areas commonly associated with higher-level aspects of cognition such as emotional regulation and executive functioning
- Abnormal cortical thinning during critical periods of childhood and adolescence may underlie deficits in behavior and cognition that are commonly observed in those with PAE.
- [Note: Cortical thickness is thought to be an indicator of the number of neurons per cortical column (groups of neurons which connect the six horizontal layers of the neocortex vertically) as well as glial support and dendritic arborization [13]. From early childhood to adolescence, decrease of cortical thickness co-occurs with the pruning of dispensable neurons and synapses [14]. This process leads to more efficient synaptic connections and increases myelination. The normal developmental cortical thinning does not occur simultaneously over the whole cortex. Findings concerning synaptic density, which is indirectly related to cortical thickness, suggest that during the course of development a synaptic loss occurs first in primary sensory and motor regions and later in multimodal association areas]


- 37 children with heavy PAE, 17 non- or minimally exposed children (Cape Town S Africa)
- Numerous MRS differences in the cerebellum in exposed children, even after controlling for confounders
- May reflect impaired neuronal integrity in the deep cerebellar nuclei


- Individuals diagnosed with alcohol-related neurodevelopmental disorder (ARND) exhibit difficulty on hippocampally-mediated memory tasks and show reduced hippocampal size
- Recent research → anterior and posterior segments support distinct memory functions
- 18 youth with ARND, 17 typically developing controls → memory tests and structural MRIs
- Left and right hippocampal volumes and posterior segments were smaller in the ARND group
• These findings are the first to suggest that posterior hippocampal development may be compromised in youth with ARND


• N = 103 (49 with FASD, 54 controls) aged 6-17
• Looked at white matter development related to cognitive functioning
• Individuals with FASD consistently showed a positive relationship between improved cognitive function and increased white matter volume over time, while no such relationships were seen in controls.
• Suggest that better cognitive outcomes could be possible for FASD subjects through interventions that enhance white matter plasticity

BPD and Bipolar Disorder in FASD


• 23 children with PAE, age 5-13 years
• Approximately 87% of the sample met criteria for a psychiatric disorder
  o 61% were assigned a mood disorder diagnosis
  o 26% were diagnosed with major depressive disorder or adjustment disorder with depressed mood
  o 35% met criteria for bipolar disorder


• Etiological pathways to borderline personality disorder (BPD)
• Community sample of 6050 mothers and their children between 1991 and 1992
• During pregnancy (18 and 32 weeks gestation), measured...
  o Maternal anxiety/depression
  o Maternal alcohol/tobacco consumption
• During early childhood, measured postnatal risks...
  o Maladaptive parenting (suboptimal parenting and parent conflict)
  o Family adversity
  o Maternal anxiety and depression
  o Maternal alcohol and tobacco consumption
• Late childhood, measured...
  o Internalizing and externalizing symptoms
• Findings
  o All prenatal risks associated with BPD, BEFORE adjustment
  o After adjustment, only prenatal anxiety at 18 weeks and depression at 18 and 32 weeks were related to BPD


• Case study of 35 year old Japanese woman with mental retardation, schizophrenic symptoms, attention deficit hyperactivity disorder, learning disorder, trichotillomania, bipolar disorder, and impulsive behavior
• This patient showed many symptoms of FASD, and was difficult to treat because of these symptoms.

- 25 FAS or FAE, 18+ years, IQ>70
- 72% of the had received psychiatric treatments
  - Most common axis I disorders: Alcohol or drug dependence (60%), Depression (44%), Psychotic disorders (40%)
  - Most common axis II disorders: Avoidant (24%), Antisocial (16%), Dependent (12%)