Interventions for School-Aged Children with FASD

Formed Families Forward Webinar

Molly N. Millians, D.Ed Emory Neurodevelopmental Exposure Clinic 31 January 2024

Center for Maternal Substance Abuse and Child Development





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Objectives

- Examine the perspectives toward interventions for individuals with FASD.
- Review a framework when considering interventions.
- Examine evidenced-based interventions specifically developed for school-aged children with FASD as well as those from other interventions

Perspectives or Approaches for Interventions



Impact of PAE and Burden of Care

What is the best approach to treatment in FASD?

- O Focus on the functional problems in the individual using strategies that are used with others with similar problems?
- Identify the etiology, and use an expected phenotype to structure the approach to intervention?
- Use "standard" intervention that are commonly used in other individuals (e.g., stimulants for ADHD-like symptoms)?
- o Design specific interventions for FASD?
- Adapt successful methods to the special needs of individuals affected by alcohol?



o All of the above?

The National Institute on Alcohol Abuse and Alcoholism/NIH Interventions for FASD

- There are various approaches that may help reduce the symptoms of FASD and lessen the impact on affected individuals and their families.
- These include education and behavioral interventions for individuals with FASD and their caretakers as well as medications, social support, case management, and other services for children and adults with FASD.^{13,14}
- New interventions are currently being developed and evaluated. These treatments include:
- Prenatal nutritional supplements for pregnant women and postnatal supplements for their children
- > Learning and behavioral interventions aimed at improving cognition, daily life skills, and impulsive behavior
- School-based approaches focused on specialized teaching strategies and computer-based games
- Mobile health apps and other interventions that support families and caregivers to assist them in caring for children with FASD

https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/understanding-fetal-alcoholspectrum-disorders

Barriers and Different Perspectives

- Often misdiagnosed or over-looked
- Individuals with FASD have variable presentation (no single behavioral or cognitive phenotype)
- Stigma and misperceptions
- Few professionals trained to diagnose and provide interventions
- Some believe there is no need for a separate diagnosis characteristics not specific enough to be separated from ADHD or learning disabilities
- Belief that behavior problems seen in children with FASD cannot be separated from environmental factors

Neurobehavioral Traits Associated with Prenatal Alcohol Exposure (PAE)

Neurobehavioral Traits

Neurocognition

- Global cognitive impairments (IQ scores <70) <u>or</u>
- Specific cognitive deficits in executive functioning, working memory, visuospatial abilities, memory, and processing speed

Self-Regulation

- Emotional/behavioral regulation
- Attention deficits
- Poor impulse control

Adaptive Functioning

- Functional language or social communication deficits
- Social interactions
- Daily living skills
- Motor skills

Effects of Prenatal Exposure and Adverse Childhood Experiences (ACES) on Behavior Problems in Children with Prenatal Exposures

- Total 308 children
- Ages were 1 to 18 years with 60%, 5 years or less.
- Mean ACES score= 3.90 (SD=2.39)

Understanding effects of prenatal exposures need to consider the impact of other environmental events.



Bowers, PT, Kable, JA, Millians, M, & Coles, CD. Behavioral impact of childhood traumatic stress in children with prenatal substance exposure. <u>Child Welfare</u>, 2023.

Collaborative Approach for Care



Explaining Needs for Interventions

Perspectives from the Field of Developmental Disabilities

- Shifting the focus from deficits to a focus of building skills, strengths, self-advocacy, and improving quality of life.
- Interventions target functioning and participation
- Moving away from the focus or basis of the diagnostic labels

Carmichael Olsen & Sparrow, 2020; Benson & Oakland, 2011

World Health Organization International Classification of Functioning, Disability and Health-Children and Youth (ICF-CY)

- Uses a common language to talk about "ability" and "disability"
- "Ability" refers to engagement and participation in an activity
- "Disability" refers to impairments that restrict participation
- Environment may be a source of support or barrier
- Overall goal to improve quality of life

https://www.whofic.nl/en/family-of-international-classifications/derived-classifications/icf-cy

Intervention Planning for Children with FASD Adapted from the ICF-CY



Adapted from the International Classification of Functioning, Disability, and Health, Children and Youth Version (ICF-CY), World Health Organization (2007) <u>https://iris.who.int/bitstream/handle/10665/43737/9789241547321_eng.pdf?sequence=1</u>; Benson & Oakland, 2011 Hilly et al., 2023

Tools to Aid in Describing Intervention Needs

• Families Moving Forward: Reframing



https://familiesmovingforwardprogram.org/

Functional Abilities Classification Tool

Benjamin Klein & Olaf Kraus de Camargo, 2018

Interventions Designed for School-Aged Children with FASD

Categories of Interventions for Children with FASD

Domain	Туре
Medical	Medication
	Nutritional Supplement (Choline)
Therapeutic	Behavioral interventions
	Attention and arousal regulation training
	Adaptive Functioning; motor skills (Balance)
	Substance Use Prevention/Treatment
Educational	Early Intervention
	Academic and learning readiness
Family	Caregiver training
	Caregiver support

Self-Regulation and Behavior

Self-Regulation and Observed Behavior

- Moodiness
- Negative affect or irritability
- Frequent behavioral outbursts
- Difficulties encoding new information
- Difficulties shifting attention
- Difficulties sustaining mental effort
- Impaired impulse control

Behavioral Regulation Training and FASD

Incorporates typical behavioral management training principles into the context of dealing with the neurodevelopmental damage associated with prenatal alcohol exposure that interferes with learning and compliance

A key component of BRT training is learning how to teach the child affective regulation.



AROUSAL LEVEL



Coles et al., 2015;Kable et al., 2016 Coles et al., 2018

GoFar

Purpose - to improve behavioral regulation and adaptive functioning.

Intervention is provided through -

- A serious computer game
- Behavior analog sessions with child, parent, and therapist



Metacognitive Training with FAR



"Frontal lobe exercises" to improve self-regulation

Significant Decreases in **Disruptive Behavior** Index of Disruptive Behavior 2.8 2.6 2.4 2.2 2 1.8 1.6 1.4 1.2 1 GOFAR FACELAND CONTROLS ■ Mid-trt ■ Post-trt Pretest

Significant Decreases in Negative Emotions/Affectivity



Changes in TOVA Performance

	GOFAR		FACE	LAND	CONTROLS		
TOVA Variable	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	
API Index	-3.48*	-0.81	-5.11*	-3.67	-3.15	-2.90	
Response Time	-0.74*	0.07	-1.65	-1.11	-0.82	-0.68	
Response Time Variability	-2.38*	-1.10	-3.30*	-3.18	-2.47	-2.31	
D-Prime	-2.12	-1.57	-2.86	-2.33	-2.74	-2.13	

Attention Performance Index

-10

The Attention Performance Index of -2.26 is in the range of individuals independently diagnosed with ADHD.

Note: This finding alone is not sufficient to establish a diagnosis of ADHD. The clinician needs to consider additional sources of information, such as Comparison to the Normative Sample (see above), as well as history and collateral information (such as behavior rating scales).

Summary of GoFAR

Learning to use FAR

- Decreases in parent reports of children's disruptive behavior
- Reduction in children's irritability or display of negative affect
- Improvements in children's sustained attention
- Improvements in children's daily living skills



For information about obtaining the GoFAR materials, please email fasclinic@emory.edu

Alert Program and Self-Regulation with FASD

• Several studies in the US, Canada, and in Australia have examined the Alert Program to improve self-regulation and executive functioning in children with FASD.

• Studies indicated that children with FASD, showed improvements with inhibitory control, and behavioral and emotional regulation.



Link for Alert Program

Alert Program



Information about the program is https://www.alertprogram.com/

Wells et al., 2012; Soh et al., 2015; Wagner et al., 2017

Metacognitive Training for Children with FASD

Benefits

- Children who use metacognitive techniques have fewer behavior problems and experience a sense of accomplishment and greater control.
- Most children can learn to use these "metacognitive" techniques
- The FAR technique and others like it can be applied to many different situations.

Draw Backs

- It takes direct instruction and follow through to use the techniques.
- It is more effective when the techniques are practiced across settings.

Some Other Evidence-Based Interventions to Improve Arousal Regulation, Attention, & Working Memory

Author	Skill	Sample	Treatment	Result
Kable, Coles, & Taddeo, 2007 & Coles, Kable, & Taddeo, 2009	Behavior and math functioning using metacognitive training techniques	61 US Children between, 3- 10 years	Socio-cognitive habilitation using the MILE (Math Interactive Learning Experience) and the FAR Metacognitive Strategy.	Improved behavior and math knowledge
Kerns et al, 2010, 2016	Attentional control; Attention and working memory (WM); Metacognition	10 Canadian children between 6-15 years 17 Canadian children(10 FASD) Mean age 9.85yrs	Computerized Attentional Control Training- CPAT	Improved sustained attention and selective attention Improved WM
Makela et al., 2019	Metacognitive Strategies	7 children with FASD	Serious Computer Game (Caribbean Quest; Cognitive Carnival) Strategy training 12 weeks 2-3x each week	Improved spontaneous strategy use
Loomes et al., 2008	Working Memory	33 children, 4-11 years with FASD Treatment/Control groups	Verbal rehearsal	Increases in recall of concrete memory.

Building Academic Skills for Children with FASD

Math Interactive Learning Experience (MILE)

MILE was designed for children ages 3-10 with FASD

Goals of study

- To support, educate and empower caregivers
- To improve learning readiness (behavior/arousal regulation)
- To improve achievement in math, a known area of deficit associated with FASD



Instructional Approaches Used in MILE

Area of Deficit	Instructional Approach
Speed of Processing	Individualized pacing and rate of instruction
Visuospatial Processing	Manipulatives to support mental representation with limited interference; Strategies to align problem formats or computation
Numerical Processing	Activities to improve numeracy. This include number recognition, magnitude, comparison, computation
Working Memory	Interactive exchanges; Multiple exposures to the information; Strategies to encode and retrieve information
Visual-motor Integration	Number writing using "Handwriting without Tears" (Olsen and Knapton, 2008)
Attentional Control	Direct instruction to identify relevant information
Executive Functioning, Metacognitive Skills	Metacogntive Training (Focus/Plan, Act, Reflect-FAR)

Table 4. Percentages of Participants With a Clinically Significant Gain^a by Group Status

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Socio-cognitive Habilitation Using the Math Interactive Learning Experience Program for Alcohol-Affected Children

ALCOHOLISM: CLINICAL AND EXPERIMENTAL RESEARCH

Julie A. Kable, Claire D. Coles, and Elles Taddeo

	Groups	
Gain status	Psychoeducational contrast (n = 26) (%)	Math (n = 29) (%)
No gain Gain	76.9 23.1	41.4 58.6

^eA clinically significant gain was defined as a gain of >1 standard deviation from pretest to posttest performance on any of the 4 math outcome measures used in the study.

Math Performance and Behavior Problems in Children Affected by Prenatal Alcohol Exposure: Intervention and Follow-Up

Claire D. Coles, PhD,*†‡ Julie A. Kable, PhD,*‡ Elles Taddeo, EdD*†

Variable	м	ath	Psychoe Cor	ducational ntrast
	Pretest	Post-Test 2	Pretest	Post-Test 2
Supplemental matha	8.3 (3.1)	15.3 (2.5)	8.0 (2.1)	11.8 (4.7)
Math subtests of Bracken	66.8 (6.0)	80.8 (4.9)	60.4 (6.2)	71.0 (5.1)
Test of Early Mathematics	23.0 (14.6)	30.1 (13.4)	20.7 (17.2)	27.2 (17.5)
Keymath ^b	32.9 (18.6)	48.9 (26.2)	31.1 (25.7)	46.7 (32.7)
Number Writing Task	24.2 (11.8)	28.3 (9.4)	22.1 (11.4)	23.8 (10.9)

Table 2.	Raw	Scores	on	the	Various	Math	Outcome	Measures	by	Group	and	Time
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"Four participants from the math group and 6 participants from the psychoeducational contrast group received the Supplemental Math measure. "Twenty-one participants from the math group and 16 participants from the psychoeducational contrast group received the KeyMath measure."

Math Performance and Behavior Problems in Children Affected by Prenatal Alcohol Exposure: Intervention and Follow-Up

Claire D. Coles, PhD,*†‡ Julie A. Kable, PhD,*‡ Elles Taddeo, EdD*†

Variable	Pres	Preschool		School-Age		All Ages	
	Pretest	Post-Test 2	Pretest	Post-Test 2	Pretest	Post-Test 2	
CBCL ^a -total problems	64.0 (10.2)	57.4 (10.9)	68.2 (7.7)	64.2 (7.6)	66.1 (9.2)	60.8 (9.9)	
CBCL ^a -internalizing problems	61.0 (11.3)	54.6 (11.7)	60.4 (10.7)	57.6 (10.2)	60.7 (10.9)	56.1 (10.9)	
CBCL ^a –externalizing problems	64.1 (11.7)	56.5 (11.1)	67.0 (6.9)	62.7 (8.0)	65.6 (9.6)	59.6 (10.1)	
TRF ^b -total problems ^c	61.3 (8.9)	56.3 (7.8)	63.1 (9.4)	62.7 (10.7)	62.6 (9.2)	60.7 (10.3)	
TRF ^b –internalizing problems ^c	59.0 (9.7)	51.2 (10.1)	54.2 (12.3)	53.2 (12.0)	55.7 (11.7)	52.6 (11.4)	
TRF ^b –externalizing problems ^c	61.7 (7.1)	57.4 (7.9)	60.7 (10.4)	60.7 (11.0)	61.0 (9.4)	59.7 (10.1)	

Table 3. Outcomes: Comparison of Parent/Caregiver and Teacher Responses at Pre and Post Test 2

TRF, Teacher Report Form; CBCL, Child Behavior Checklist. *Average T-scores from the Parent Report Form of the Achenbach Child Behavior Checklist.^{32,33} ^bAverage T-scores from the Teacher Report Form (TRF) of the Achenbach Child Behavior Checklist.^{27,54} ^cNote the percentage of teachers responding for the Math group (72%) and the Contrast Group (75%).

Research in Developmental Disabilities 78 (2018) 55-65



Mathematics intervention for children with fetal alcohol spectrum disorder: A replication and extension of the math interactive learning experience (MILE) program

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- 28 Participants, 4-10 years of age
- History of PAE or FASD
- Two groups: Intervention group and Contrast
- Math Intervention mad more gains than contrast group
- Children who were older, lower functioning, had PAE (but not an FASD diagnosis) greater changes in mathematics achievement

Summary: MILE Results

Instruction devised to increase active learning, address cognitive deficits, and improve cognitive control

- Improved learning readiness
- Resulted caregiver and teacher reports of decreases in behavioral disturbance
- Improved mathematical skills

For materials and information about MILE, please email <u>molly.n.millians@emory.edu</u>





Psychology & Neuroscience, 2014, 7, 2, 163 - 173 DOI: 10.3922/j.psns.2014.02.02

Case study: Saturday cognitive habilitation program for children with prenatal alcohol exposure

Molly N. Millians and Claire D. Coles

Emory University School of Medicine, Atlanta, Georgia, United States

Table 3. Pre-test and post-test Scores for Child #1

Test	Pre-test	Post-test
MAT: EF	100	100
WIAT-II		
Math composite	84	91
Numerical operations	92	91
Math reasoning	83	99

Table 4. Pre-test and post-test Scores for Child #2

Test	Pre-test	Post-test
MAT: EF	79	82
TORC-3		
Reading comprehension quotient	75	
WIAT-II		
Reading composite		94
Word reading		87
Pseudoword reading		99
Reading comprehension		101

Table 5. Pre-test and post-test Scores for Child #3

Test	Pre-test	Post-test
MAT: EF	71	90
WIAT-II		
Reading composite	72	83
Word reading	69	79
Pseudoword reading	75	75
Reading comprehension	80	102

Table 6. Pre-test and post-test Scores for Child #4

Test	Pre-test	Post-test
MAT: EF	80	94
TORC-3		
Reading Comprehension Quotient	52	
TOWRE		
Total Word Reading Efficiency	56	
Sight Word	66	
Phonemic Decoding	61	
WIAT-II		
Reading Composite		51
Word Reading		50
Pseudoword Reading		68
Reading Comprehension		59

Table 7. Pre-test and post-test Scores for Child #5

Test	Pre-test	Post-test
MAT: EF	90	95
GORT-4		
Oral Reading Quotient	58	
WIAT-II		
Reading Composite		69
Word Reading		61
Pseudoword Reading		79
Reading Comprehension		75



Table 1. Plan-Do-Review Questions

Phase	Questions
Plan	Do I know what to do? What looks familiar? Do I need to ask for more information?
Do	How am I doing? Is my strategy working? Do I need to change my strategy?
Review	How did I do? What do I need to remember for next time?

Building Academic Skills

Author	Skill	Sample	Treatment	Result
Adnams in Riley et al., 2007	Language and literacy	65 Children, 9 years of Age, South Africa (Groups of PAE compared to non- exposed)	SLP 30 min 2x a week for 38 hours. Total 19 hrs of language therapy alternating phonological awareness training for reading	Improved phonological awareness skills. No changes on measures of achievement
Gryiec et al., 2004	Spelling	Case Study, 7- year-old with FASD	Strategy using "Cover, copy, and compare"	Increased number of words spelled correctly
Johnson & Lapadat, 2000	Reading and Spelling	Case Study, Adolescent with FASD	One-on-one tutoring	Improved academic achievement scores in reading and spelling
Copeland et al., 2021	Task Completion	1 child, 9 years of Age FASD, Australia	Home-based intervention to improve homework completion and behavior	Change in task completion; reduction in intensity of behavior; but increase in # of problematic behaviors

Elements of Academic Interventions

- Carefully considered the impact of neurodevelopmental deficits and cognitive functioning to determine the appropriateness of the intervention
- Focused on building skills (explicit instruction) within a task or activity context
- Maintained realistic and attainable expectations (appropriate learning level)
- Incorporated metacognitive training
- Provided frequent review to practice and apply skills

Adaptive Functioning and Social Skills

Social Skills, Motor Skills, and Adaptive Functioning

Authors	Skill	Sample	Treatment	Result
OʻConnor et al., 2006; Keli et al., 2010	Social Skills	100 children in US 6-12 years of age	Bruin Buddies (aka. Best Buddies) social skills training (<u>www.bestbuddies.org</u>)	Parent report - improved social skills/reduced problem behavior, less hostile attributions in social settings
O'Connor et al, 2012	Social Skills	85 children in US 6-12 years of age	Children's Friendship Training	Parent reported improved social skills. More use of prosocial behaviors
Katz et al., 2020, reported in Flannigan et al, 2020	Emotional and well being	113 School-aged children, 52% identified as having FASD	School-based mental health using the 1. "Brain Unit" mental health literacy program, 2. DBT behavioral skill-building	Intervention group made gains with emotional regulation, interpersonal interactions, tolerating distress and coping

Links for Programs

Best Buddies International <u>https://www.bestbuddies.org/us-programs/</u>



Children's Friendship Program at UCLA

https://www.semel.ucla.edu/socialskills/research/childrens-friendship-program

Social Skills, Motor Skills, and Adaptive Functioning

Authors	Skill	Sample	Treatment	Results
Jirikowic et al., 2016	Motor Skills	21 children with FASD; 8 controls, 8-15 years	Virtual reality game and training to improve balance. Sessions were 1-2 times a week for 30-35 minutes each session. The intervention was for 1 month.	There were improvements on scores of balance and total movement scores. There were no difference scores on measures 1 month post intervention.
Coles, et al., 2007	Street and fire safety	32 Children, 4-10 years of age, with FASD	Serious virtual reality game direct transfer of skills learned in the analog setting	Children were able to use the street and fire safety skills immediately after the intervention. Use of fire safety skills were maintained one-week after post-test.
Gleichmann et al., 2022	Music training (Pilot Study)	20 children with FASD . Randomly assigned to control group or intervention group.	5- week piano training on a portable keyboard	Pre-post change in attention (measured by changes in EEG). Trend improvement in reaction time in those receiving piano training

FASD, Caregiver Training, and Support





https://familiesmovingforwardprogram.org/





The app is in development

Training and Family Support

Author	Skill	Sample	Treatment	Results
Kable & Coles, 2012	FAS Caregiver Advocacy and Behavioral regulation	Caregivers of children with FASD; education/training on FASD via in-person or on-line.	Comparison of parent training via workshop or on-line program	Both methods were adequate: better behavioral change with workshops
Leenaars, et al (2012)	Individualized family goal-based mentoring	FASD, ages 0-23	Coaching Families: Pre-Post Changes on targeted outcomes	Satisfactory to families

Current Knowledge Gaps in FASD Intervention

- Almost everything! There are between 20 and 40 studies with adequate empirical basis, and some are very limited in scope.
- Behavioral studies seem hopeful but there is much more work to be done.
- Much larger clinical trials are needed to validate previous finding that are often pilot studies.
- There are few studies of children 0 to 3. There is need to validate early identification/intervention.
- There is one (1) intervention study on motor function.
- There has been little focus on Mental Health and Substance Use.
- Though there are academic studies, few specific interventions, especially for students in middle and high school.



Interventions for other Developmental or Learning Disabilities

Other Interventions: Attention, Executive Functioning, Self-Regulation

Domain	Intervention
Self-Regulation/Executive Functioning	Harvard Center on Developing Child, Executive Functioning https://developingchild.harvard.edu/science/key-concepts/executive- function
	Kuypers, L M (2011) Zones of Regulation: Curriculum Designed To Foster Self- Regulation and Emotional Control, Santa Clara, CA, Social Thinking Press
	Coping Cat for children ages 7-13 https://www.workbookpublishing.com/anxiety.html

Other Interventions: Behavior

Domain	Intervention
Positive Behavioral Interventions	Center on Positive Behavioral Intervention and Supports https://www.pbis.org/
Parent Child Interaction Therapy Geared for younger children	PCIT https://www.parentchildinteractiontherapy.com/what-is-pcit
Applied Behavioral Analysis	ABA <u>https://www.bhcoe.org/parent-autism-quality-aba-providers/</u>

Other Interventions: Learning and Academics

Domain	Intervention
Problem Solving /Thinking Habits	University of Kansas, Strategic Instruction Model https://sim.ku.edu/learning-strategies
Spelling	Word Mapping and other strategies from <u>https://www.readingrockets.org/reading-101/reading-and-writing-basics/sight-words-and-orthographic-mapping</u>
Mathematics	Strategic Math Series (from the University of Kansas Center for Research on Learning; part of the Strategic Instruction Model (follows the Concrete-Representational-Abstract approach) <u>https://sim.ku.edu/</u>
Reading	University of Florida Literacy Institute https://ufli.education.ufl.edu/resources/

Summary: Elements for Successful Interventions for FASD

- Moves away of matching to a diagnostic label. The diagnosis is the starting point to understand the disability
- Focus on building and applying skill
- Developmentally appropriate with reasonable expectations
- Encourages caregiver involvement to support their children
- Incorporate training to improve self-determination and independence
- Collaborative
- Often need to be life-long but changed or adjusted as the individual develops

With appropriate interventions and supports, Individuals affected by PAE can live fulfilling lives



Reviews and Articles on Interventions for FASD

- Betts, JL, Eggins, E, Chandler-Mather, N., Shelton, D, Till, H, Harnett, P, Dawe, S. (2022) Interventions for improving executive functions in children with foetal alcohol spectrum disorder (FASD): A systematic review. <u>Campbell Systematic Reviews</u>, 2022.
- Flannigan, K, Coons-Harding, KD, Anderson, T, Wolfson, L, Campbell, A, Mela, M, & Pei, J (2020) A systematic review of interventions to improve mental health and substance use outcomes for individuals with prenatal alcohol exposure and fetal alcohol spectrum disorder. <u>Alcoholism: Clinical and Experimental Research</u>, <u>44</u>, 2401-2430.
- Hilly, C, Wilson, PH, Lucas, B, McGuckian, TB, Swanton, R, & Froude, EH (2023) Effectiveness of interventions for school-aged children and adolesents with fetal alcohol spectrum disorders: A systematic review and meta-analysis. Disability and Rehabilitation.
- Ordenewitz, LK, et al. (2021) Evidence-based interventions for children and adolescents with fetal alcohol spectrum disorders-A systematic review. European Journal of Paediatric Neurology, 33, 50-60.
- Petrenko, CLM & Alto, ME (2017) Interventions in fetal alcohol spectrum disorders: An international perspective. European Journal of Medical Genetics, 60, 79-91.
- Reid, N, Dawe, S, Shelton, D, Harnett, P, Warner, J, Armstrong, E, Le Gros, K, & O'Callaghan, F (2015) Systematic review of fetal alcohol spectrum disorder interventions across the life span. Alcoholism: Clinical and Experimental Research, 39, 2283-2295
- Ritfeld, GJ, Kable, JA, Holton, JE, & Coles, CD (2022) Psychopharmacological treatments in children with Fetal Alcohol Spectrum Disorders: A Review. <u>Child Psychiatry</u> and Human <u>Development</u>, <u>53</u>, 268-277.

Young, JK, Giesbrecht, HE, Eskin, M, N, Aliani, M, & Suh, M (2014) Nutritional implications for fetal alcohol spectrum disorder. Advances in Nutrition, 5, 675-692