

Creating Posters

The good, the bad, the ugly (and the avant-garde)

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November 3, 2025



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Overview

1. Why posters?
2. How to create a clear, visually appealing poster.
3. How to give a clear, succinct and engaging presentation.

Caveats:

You won't have data

Beauty is in the eye of the beholder

I won't describe abstract writing

Why Posters?

They are popular and accessible method to communicate research.



The purpose of a poster

- Tell (distill) a (science) story – knowledge mobilization
- Attract colleagues
- Build your CV
- Early peer review

How?

- A visually appealing story
- A clear, succinct, and engaging presentation

Title:
Subtitle

PRESENTER: **Leeroy** Jenkins

INTRO:

- **Who cares?** Explain why your study matters in the fastest, most brutal way possible (feel free to add graphics!).

METHODS

1. How did you find this?
2. Collected [what] from [population]
3. How you tested it.
4. **Illustrate your methods if you can!**

RESULTS

- Graph/table with **essential results only**.
- All the other correlations in the ammo bar.

The story is the focus!



Take a picture to
download the full paper

AMMO BAR

Delete this and replace it with your...

- Extra Graphs
- Extra Correlation tables
- Extra Figures
- Extra nuance that you're worried about leaving out.
- **Keep it messy!** This section is just for you.

Leeroy Jenkins, author2, author3, author4, author5, author6, author7, author42



To focus on the story, tell a story like your grandma would, not your supervisor!

- An engaging title
- Only the essential characters
- Only the primary plot
- Link it all together.

} DISTILL!



PARENTING IN THE DARK:

Does the 'cry-it-out' sleep training method harm attachment?

Aisha Lillywhite¹, Lianne Tomfohr-Madsen¹, Nicole Letourneau^{2,3}, & Gerry Giesbrecht^{1,3}.

Department of Psychology¹, Faculty of Nursing² and Department of Pediatrics³, University of Calgary, Alberta

INTRODUCTION

- Infant sleep problems affect 30% of families. New parents rate sleep problems as one of the most stressful health concerns [1].
- Disturbed infant sleep is associated with significant behavioral and cognitive developmental effects in infants and negatively impacts parental health [2].
- Cry-it-out (CIO) sleep training method effectively reduces infant sleep problems [1], but critics argue CIO undermines secure parent-infant attachment [3].

Current Study

- *The aim was to determine if the use of CIO harms the parent-infant attachment relationship.*

PARTICIPANTS

- 222 mother-infant pairs from the Alberta Pregnancy Outcomes and Nutrition (APrON) study, recruited from the community prior to 22 weeks gestation.

Demographics

- Mothers: 80.2% Caucasian, 91.4% education level of technical trade or higher, 93.3% middle-to high family income (>\$40,000), mean age = 31.6 (3.6)yr.
- Infant: 48.9% male, 14 born preterm, mean age attachments assessment = 22.1 (4.5)mo.

METHOD

- Infant sleep and CIO use was assessed via the Crying Patterns Questionnaire and the Brief Infant Sleep Questionnaire at 3-, 6- and 12-mo. postpartum.
- Security attachment was assessed at 18-mo. postpartum via the gold standard strange situation procedure (SSP).

DATA ANALYSIS

- Infants were classified as secure/insecure using standard A, B, C coding scheme (SSP).
- A chi-squared test with covariates (PLUM procedure in SPSS) was used to test the relationship between CIO use and infant attachment security after accounting for covariates: maternal depression, maternal stress, preterm infant birth, and caregiver sensitivity.

RESULTS

Table 1. Descriptive statistics

	CIO non-user	CIO user
Total users, n(%)	152 (38.5)	95 (61.5)
Secure Attachment, n(%)	52 (37.4)	55 (66.3)
Total Sleep in 24h period (minutes), M(SD)		
3-mo.	856 (151)	863 (153)
6-mo.	795 (124)	832 (110)
12-mo.	789 (82)	808 (95)
Number of waking's per night, M(SD)		
3-mo.	1.9 (1.2)	1.8 (1.1)
6-mo.	1.9 (1.2)	1.8 (1.2)
12-mo.	1.7 (1.5)	1.3 (1.2)

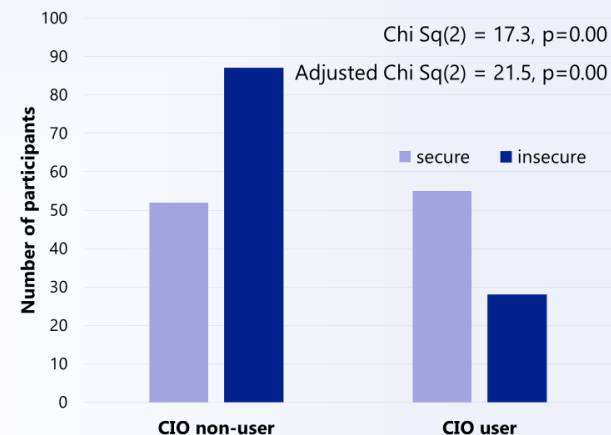


Figure 1. Contrary to the claim that CIO use harms attachment, CIO use was associated with greater attachment security.

DISCUSSION

- These findings are consistent with other studies showing no harm to infant attachment.
- This is the first study to show *better* attachment security when using CIO.
- It is not clear why CIO use would lead to better attachment. CIO was associated with better sleep, and we speculate that it enhances self-regulation – two reasons that might make these infants better interaction partners with mom.
- It is possible that measures of contingency would help to clarify this unexpected finding.

CONCLUSION

CIO does not harm attachment security.

Work Cited

1. Mindell JA, Kuhn B, Lewin DS, Meltzer LJ, Sadeh A. Behavioral treatment of bedtime problems and night wakings in infants and young children. *Sleep*. 2006 Oct;29(10):1263–76.
2. Sadeh A, Gruber R, Raviv A. Sleep, neurobehavioral functioning, and behavior problems in school-age children. *Child Dev*. 2002;73(2):405–17.
3. Blunden S, Thompson KR, Dawson D. Behavioural sleep treatments and night time crying in infants: Challenging the status quo. *Sleep Med Rev*. 2011;15(5):327–34.

The Process: Creating visual appeal

- Start with a template
 - https://www.makesigns.com/SciPosters_Templates.aspx
 - <https://derekcrowe.net/butterposter>
 - <https://www.ucalgary.ca/brand/download-logos-and-templates>
- Arrange the elements using gridlines – poor alignment is distracting
- Create a focal point (image)

The Process: Creating visual appeal

Programs:

Powerpoint

Adobe

Canva

Overleaf

Mind the Graph

Scaling up the TreeFam resource in Ensembl

Matheus Patrício¹, Matthieu Muffato², Uma Maheswari¹, Nishadi De Silva¹, Paul Kersay¹, Bronwen Aken, Paul Flicek^{1,2}



¹ European Bioinformatics Institute, Wellcome Genome Campus, Hinxton, Cambridge, CB22 3DQ, United Kingdom
² Wellcome Trust Genome Campus, Wellcome Genome Campus, Hinxton, Cambridge, CB22 3DQ, United Kingdom



INTRODUCTION

The Ensembl and Ensembl Genomes projects generate and distribute large scale genome annotations for a wide range of genomes, including model organisms and several different mouse strains, allowing free access to genomic data annotation. The rapidly increasing number of publicly available genomes offers a great opportunity to better understand the evolution of species across the different kingdoms of life. We provide an automated method [1] to infer phylogenetic trees and homologies that has been regularly used across all Ensembl websites. We are currently expanding the TreeFam method, initially focused on Metazoa, to reach the different divisions of the tree of life available on Ensembl Genomes (fungi, metazoa, plants and protists) and unify them under a common resource.

Here we describe the effort undertaken to build a comprehensive library of HMM profiles representing gene families for protein coding genes across all eukaryotes (Figure 1). Alongside with the quality control checks to evaluate the gene-families based on their presence across the tree of life, properties of their multiple-sequence alignment and of their phylogenetic tree.

[1] Ensembl comparative genomics resources. Senter-Peterson, M. et al. Database (Oxford), 35(2): 263, 2010.

METHODS

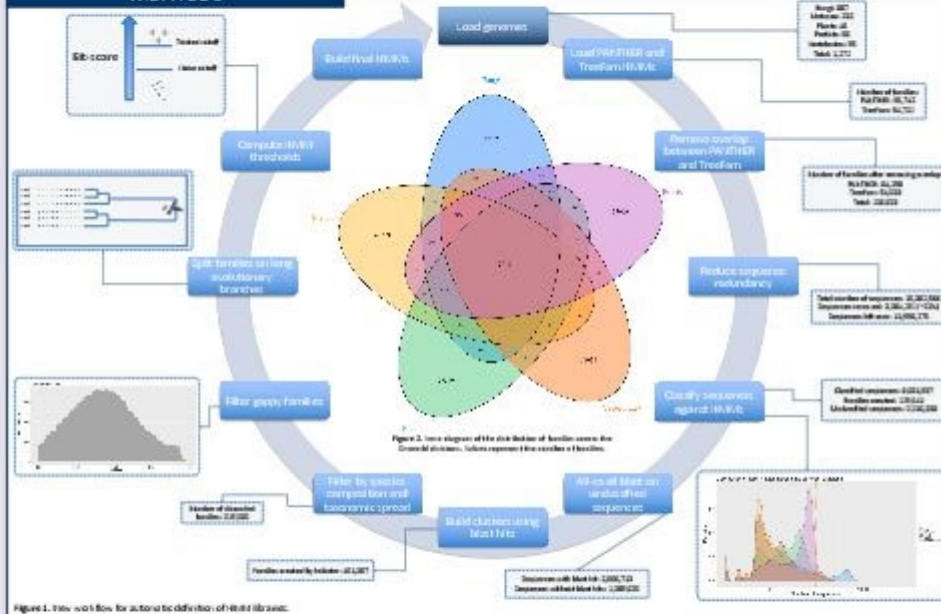


Figure 1. Flow chart for automated definition of model libraries.

QUALITY CONTROLS AND ASSESSMENTS

We mapped the new families to the current classification (based on all-vs-all blast). For each pair of families we computed the Jaccard index, which measures the similarity between two sets. It ranges from 0 to 1, with 1 meaning that both sets are identical. Figure 2 shows the distribution of Jaccard index across all sequences. The comparison was restricted to the vertebrate genomes.

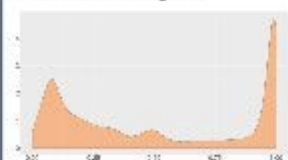


Figure 2. Jaccard index distribution.

The Gini coefficient is a measure of statistical dispersion. It measures the inequality among values of a frequency distribution (here: the family size). It ranges from 0 to 1 (or 100%), 0 meaning "perfect equality" (all the families have the same size), 1 meaning "perfect inequality". For vertebrates, the HMM-based classification performed slightly better than the all-vs-all blast for vertebrates (99.27% vs 72.65%) of the Lanes curve (Figure 4).

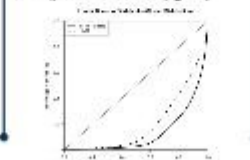


Figure 4. Lanes curve for the HMM-based classification.

We also evaluated that the resulting gene-families and homologies still exist at the same quality as the existing Ensembl method in terms of proportion of orthology predictions (table 1).

Genome	Ensembl	Ensembl	Ensembl	Ensembl
Genome	Ensembl	Ensembl	Ensembl	Ensembl
Genome	Ensembl	Ensembl	Ensembl	Ensembl
Genome	Ensembl	Ensembl	Ensembl	Ensembl
Genome	Ensembl	Ensembl	Ensembl	Ensembl

Table 1. Proportion of orthology predictions for the HMM-based classification.



Figure 3. Histogram of family sizes for the HMM-based classification.

DISCUSSION

Ensembl releases major updates from the Wellcome Trust Genome Campus (Hinxton, Cambridge) and the European Bioinformatics Institute (Hinxton, Cambridge). The Ensembl Genomes project is a major effort to expand the Ensembl Genomes project to include all eukaryotic genomes. The Ensembl Genomes project is a major effort to expand the Ensembl Genomes project to include all eukaryotic genomes.



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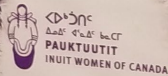
amaamak LACTATION

anaana's heartbeat begins baby's dance through life

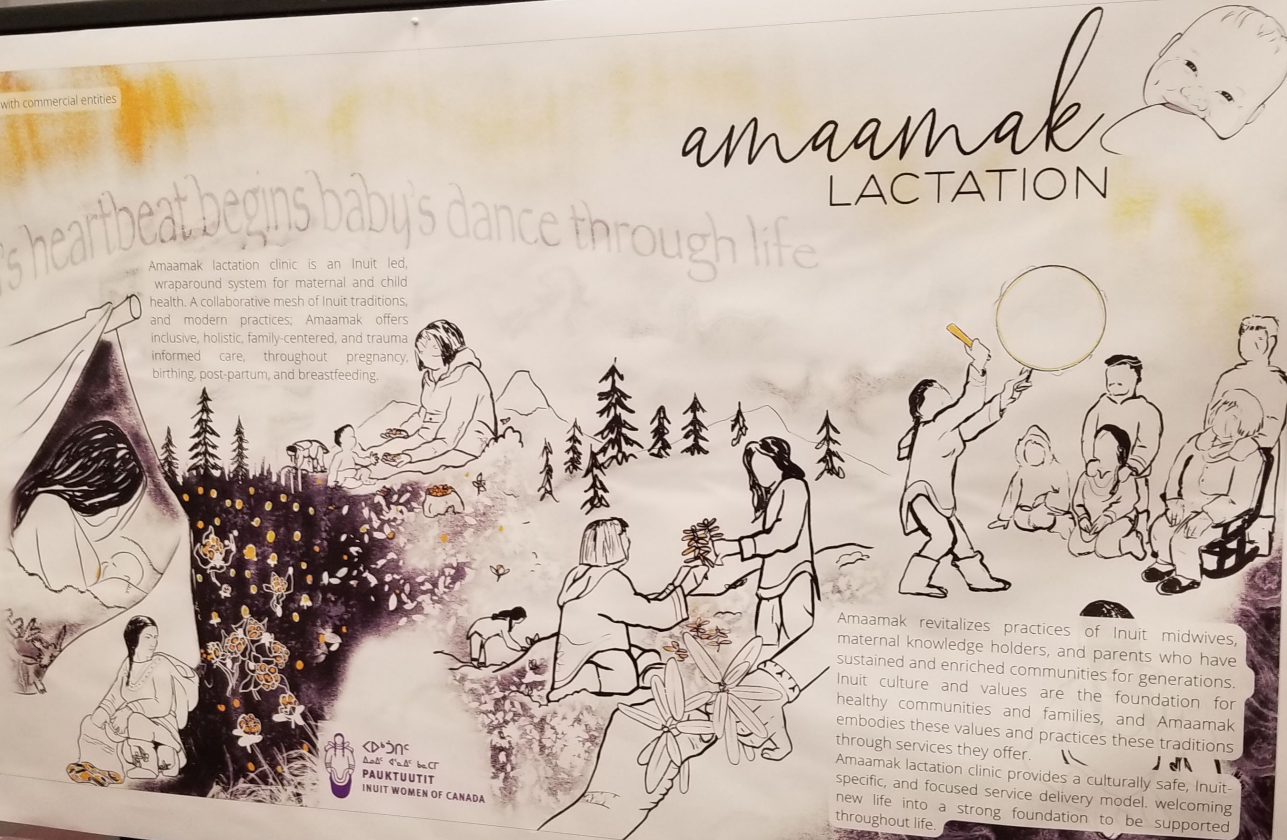
The Canadian healthcare system is a colonial institution that is plagued with anti-Indigenous racism that perpetuates and exacerbates power imbalances, creates barriers, and guarantees inequitable outcomes for Inuit.

Efforts to adjust healthcare practices and disparities have been created for Inuit, rather than by Inuit. The Truth and Reconciliation Commission identifies self-determination and maternal, infant and child health as priority gaps in healthcare. An Inuit-led approach grounded in Inuit knowledge, values, and ways of knowing is required for transformative change in Inuit health.

#004602022
@amaamaklactation
@pauktuutit



Amaamak revitalizes practices of Inuit midwives, maternal knowledge holders, and parents who have sustained and enriched communities for generations. Inuit culture and values are the foundation for healthy communities and families, and Amaamak embodies these values and practices these traditions through services they offer. Amaamak lactation clinic provides a culturally safe, Inuit-specific, and focused service delivery model, welcoming new life into a strong foundation to be supported throughout life.



Quality of maternal-infant interaction influences infant stress physiology

Katherine Gibbard, Nicole Letourneau, Gerry Giesbrecht
Department of Paediatrics

Background

- A well-regulated stress response system is a key physiological building block for healthy, well regulated development.
- Cortisol reactivity and recovery are key measures of the stress response system.
- Mother-infant dyads are typically the first social experience for infants: the quality of interaction between mother and child is critical for developmental outcomes and serves as a model for future interactions.
- Attunement is the synchrony of response across persons and is present specifically in physiological responses.
- The NCAST is an assessment tool that evaluates a teaching interaction between mother and children ages 0 – 4, assigning scores on subscales for both mother and child which can be combined in a score representing quality of dyadic interaction.

Questions

Does quality of dyadic interaction:

1. Impact attunement between mother and infant cortisol patterns?
2. Impact infant cortisol reactivity?

Methods

Participants: Mothers and their 6 month old infants. N = 272 pairs.

Appointment Design:

- The first saliva cortisol sample was taken from each dyad.
- The infants underwent a series of challenge tasks:
 - Task 1: toy retraction - performed three times in succession.
 - Task 2: the toy was placed behind a clear barrier - performed three times.
 - Task 3: a restraint task where the mother restrained the child, preventing them from playing with the toy - performed twice.
- The quality of maternal-infant interaction was assessed (NCAST protocol).
- A second saliva cortisol sample was taken from each dyad.

Data analysis: Descriptive analysis and Hierarchical Linear Modeling to test for multi-level covariates. Significance at $p < 0.05$. SPSS and HLM software.

Results

Two-level Hierarchical Linear Regression Model

Level-1 Model

$$\text{Log Infant Cortisol} = P_0 + P_1 * (\text{Log Maternal Cortisol}) + P_2 * (\text{Time of Day}) + P_3 * (\text{Time}) + e$$

Level-2 Model

$$P_0 = B_{00} + B_{01} * (\text{Gestational Age at Birth}) + B_{02} * (\text{Quality of Interaction}) + r_0$$

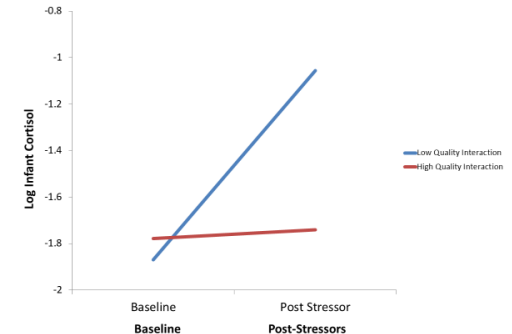
$$P_1 = B_{10} + B_{11} * (\text{Quality of Interaction})$$

$$P_2 = B_{20}$$

$$P_3 = B_{30} + B_{31} * (\text{Quality of Interaction})$$

- There was significant physiologic synchrony: mother's cortisol slope predicted child's cortisol slope, $B_{10} = 0.183$, $t(244) = -2.66$, $p = .008$.
- Strength of synchrony was not effected by quality of maternal-infant interaction, $B_{11} = -.006$, $t(244) = -.71$, $p = .478$.
- As displayed in Figure 1., infant cortisol increased significantly over the challenge tasks, $B_{30} = -.004$, $t(244) = 4.21$, $p < .001$, and was significantly higher for infants with lowest quality maternal-infant interactions, $B_{31} = -.000$, $t(244) = -2.87$, $p = .004$.

Figure 1. Infant Cortisol Reactivity for High Quality and Low Quality Quartiles of Maternal-Infant Interaction



References

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1991). Infant-mother attachment and social development: 'Socialization' as a product of reciprocal responsiveness to signals.
Oxford, M. L. & Findlay, D. M. (2013). NCAST Caregiver/Parent-Child Interaction Teaching Manual, Seattle: NCAST Programs, University of Washington, School of Nursing.
Sethre-Hofstad, L., Stansbury, K., & Rice, M. A. (2002). Attunement of maternal and child adrenocortical response to child challenge. *Psychoneuroendocrinology*, 27(6), 731-747.

Conclusion

- There was attunement present between the mothers and infants cortisol patterns but the quality of maternal-infant interaction was not a predictor of this attunement.
- The high quality maternal-child interaction quartile showed an unreactive cortisol slope across the challenge. As high quality relationships like those that would be found in the highest scoring quartile have good developmental outcomes, this lack of reactivity is likely adaptive and a well-adjusted response.
- The pattern of cortisol reactivity does challenge typical ideas about stress-reactivity. The infants in the upper quartile may have found that the cost of responding is not necessary when their energy could be better put towards developmental gains. Additionally, high quality interactions with their mothers may buffer the potentially stressful effects of the challenge tasks.
- Further research should factor in cortisol recovery and explore other factors that promote dyadic physiological synchrony beyond high interaction quality.

Neighborhood SES Buffers the Effects of Prenatal Psychological Distress on Infant Temperament

Gerry Giesbrecht, Jagroop Chhina & the APrON Study Team
University of Calgary, Alberta, Canada

BACKGROUND

Neighborhood SES influences infant development, and such influences may operate even before birth.¹

Women living in low SES neighborhoods tend to have greater psychological distress.²

The role that neighbourhood factors play in buffering or exacerbating the effects of psychological distress on infant development is not known.

Infant temperament can be used to assess the effects of prenatal exposures on neurobehavioral development.

RESEARCH QUESTION

Does neighbourhood SES interact with maternal psychological distress during pregnancy to predict infant temperament, even after accounting for postnatal distress and individual-level SES?

METHODS

1829 pregnant women in the Alberta Pregnancy Outcomes and Nutrition (APrON) Study completed pre- and postnatal questionnaires about psychological distress and infant temperament (3 months of age).

156 neighborhoods were evaluated with at least 2 or more participants with an average of 10 participants per neighborhood.

MEASURES

- Edinburgh Depression Scale
- Symptom Checklist-90R Anxiety Scale
- Infant Behavior Questionnaire-R
- Neighbourhood SES – VANDIX

DATA ANALYSIS

Multilevel Models – to account for nesting of individuals within neighbourhoods.

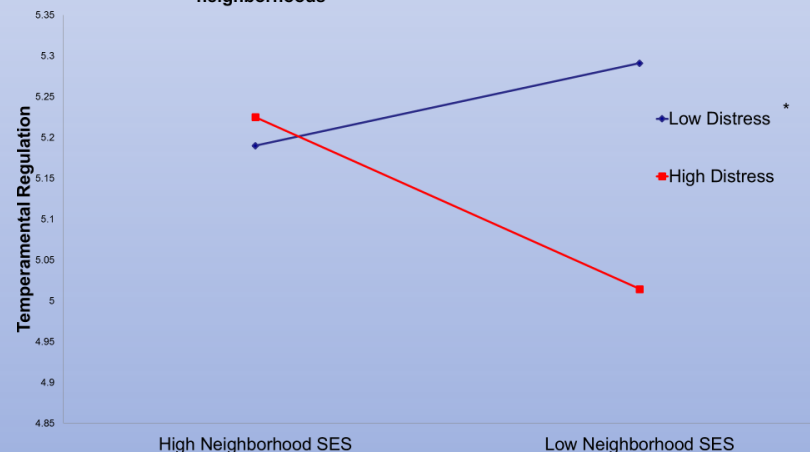
Covariates: postnatal psychological distress, social support, individual-level SES.

RESULTS

Figure 1. Infants exposed to higher prenatal psychological distress have greater temperamental negativity when they live in low SES neighborhoods



Figure 2. Infants exposed to higher prenatal psychological distress have lower temperamental regulation when they live in low SES neighborhoods



DISCUSSION

Exposure to psychological distress during gestation was associated with infant temperament.

Infants exposed to greater prenatal psychological distress displayed more temperamental negativity and lower temperamental regulation.

This association was much stronger in low SES neighborhoods.

The moderating effect of neighborhood SES was present even after adjusting for postnatal psychological distress and individual level SES.

Infants may be more vulnerable to maternal psychological distress when they live in low SES neighborhoods.

Women in low SES neighborhoods with low levels of psychological distress may be more resilient and somehow pass this resilience on to their babies.

CONCLUSION

The effects of prenatal exposure to psychological distress on infant temperament depend on the neighborhood in which the mother lives during pregnancy.

REFERENCES

1. Jansen, P. W., Raat, H., Mackenbach, J. P., Jaddoe, V. W., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2009). Socioeconomic inequalities in infant temperament. *Social Psychiatry and Psychiatric Epidemiology*, 44(2), 87-95.
2. Zhang, S., Eamon, M. K., & Zhan, M. (2015). Neighborhood disorder, perceptions of neighborhood social capital, and maternal stress: Exploration of a mediating mechanism. *Journal of Community Psychology*, 43(3), 278-295.

* Note that neighborhood SES and prenatal psychological distress are continuous variables but for illustration are displayed at the mean of the upper and lower quartiles.

Developmental Origins of Infant Sleep: Can Maternal Sleep Behaviour During Pregnancy Organize Infant Sleep Behaviour?

Gerry Giesbrecht, Umair Sajid, Tiffany Haig, Nicole Letourneau & Tavis Campbell

Background

- Maternal sleep disturbance is common during pregnancy but little is known about its effects on fetal development.
- Pre- and postnatal stress are associated with adverse infant outcomes.
- Because sleep disturbance and stress are strongly linked, it is not clear to what extent sleep disturbance during pregnancy may be responsible for adverse infant outcomes.

Hypothesis

Maternal sleep during pregnancy organizes patterns of postnatal infant sleep.

Methods

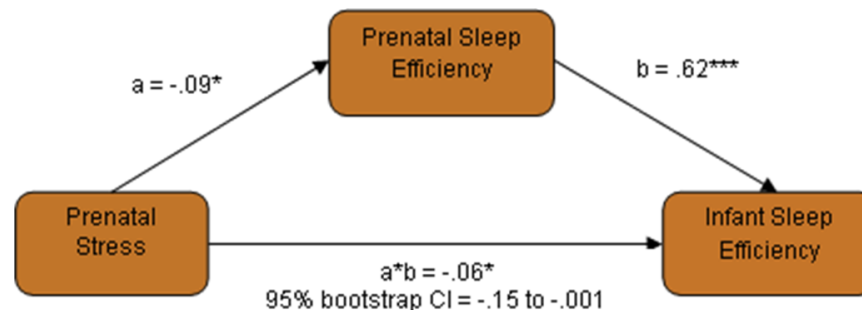
- Women's ($n = 69$) sleep (diary) and stress (self-report & cortisol) were assessed during pregnancy using ecological momentary assessment.
- At 3 months postpartum, mothers reported their infant's sleep patterns (Brief Infant Sleep Questionnaire).
- Postnatal depression (Edinburg Postnatal Depression Scale) and anxiety (Symptom Checklist 90) were assessed at 3 months and included as control variables.

Results

Heirarchical Regression Analysis

	Maternal Predictor Variables	Infant Nighttime Sleep			Infant Sleep Interruptions			Infant Sleep Efficiency		
		β	R Square Change	F for Model	β	R Square Change	F for Model	β	R Square Change	F for Model
STEP 1	Postnatal Anxiety	8.06			8.51			.97		
	Postnatal Depression	1.47	.01	.20	-2.67*	.12*	3.82*	.44	.07	2.17
STEP 2	Prenatal Alpha Amylase	-.021			.015			-.01		
	Prenatal Cortisol	-8.93			-6.97*			.27		
STEP 3	Prenatal Stress	-.44	.05	.69	1.01***	.24***	6.02***	-.21***	.21**	4.29**
	Prenatal Sleep Efficiency	6.00**			-1.27			.50*		
	Prenatal Total Sleep Time	.03			-.14			.02		
	Prenatal Sleep Interruptions	-8.45	.19**	2.17*	-.30	.12*	5.74***	.20	.16**	5.18***

Mediator Analysis



* Only final models shown. B is unstandardized coefficient

Summary

- Maternal sleep during pregnancy was associated with postnatal infant sleep.
- Maternal sleep efficiency was the 'best' predictor.
- Maternal sleep efficiency partially mediated the effects of prenatal stress on infant sleep.

Conclusions

- Patterns of maternal sleep during pregnancy help shape postnatal infant sleep patterns. These effects are independent of both pre- and postnatal stress.
- Prenatal stress and sleep disturbance may 'work together' as shown by the indirect effect of prenatal stress on infant sleep via maternal sleep.

Limitations

Shared genetics and postnatal influences of maternal sleep may influence these results.



Example posters without results (yet).

The Effect of In-utero Exposure to Monoclonal Antibody Biological (MAB) Agents on Infants' Developing Immune System and the Safety of Live Rotavirus (RV) Vaccine

Khaled Alsager, MD¹ *et al* , Supervisor: Cora Constantinescu, MD¹

¹University of Calgary, Alberta Children's Hospital, Calgary, Alberta, Canada



Background

- MAB agents have revolutionized the management of systemic inflammatory autoimmune diseases and their use during pregnancy is on the rise.
- MAB agents cross the placenta with no clear data on their effect on the infants' developing immune system.
- Currently live vaccine, including RV vaccine are contraindicated in the first 12 months of age: potentially putting these infants at risk

Objectives

1. Assess immunophenotyping in infants exposed in-utero to MAB agents by measuring T cell and B cell subsets, Immunoglobulins, Severe combined immunodeficiency (SCID) newborn metabolic screen, complete blood count (CBC) and Mitogen stimulation assay.
2. To determine the incidence of RV vaccine adverse events (severe vomiting and/or diarrhea events and intussusception) in the same population.

References

1. Kattah et al. Anti-TNF and thiopurine therapy in pregnant IBD patients does not significantly alter a panel of B-cell and T-cell subsets in 1-year-old infants.
2. Beaulieu D, Ananthakrishnan A, Martin C, et al. Use of biologic therapy by pregnant women with inflammatory bowel disease does not affect infant response to vaccines.
3. Mahadevan U, Martin CF, Sandler RS, et al. PIANO: a 1000 patient prospective registry of pregnancy outcomes in women with IBD exposed to immunomodulators and biologic therapy.

Methods

Setting: Special immunization clinic (SIC) at Alberta Children's Hospital (ACH).

Study design: Retrospective & Prospective Observational Study.

Sample Size:

- Current enrollment to date 40 participants

Recruitment

Infant <15 weeks of age with in-utero MAB agent exposure referred to SIC clinic



Clinical assessment by pediatric infectious disease physician



Immunophenotyping result are reviewed by an immunologist



Liaising with public health whether to proceed or not with RV vaccine series



Call participants after completion of series to address AEFI's at nine month of age

Measured Variables

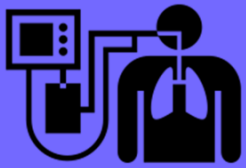
1. Patient demographics, growth parameters, recurrent infections, antibiotics use
2. MAB agent characteristics (Type, dose, route, date of last dose).
3. Follow up after RV vaccine series completion, adverse events
4. Blood work results (CBC and differential, IgA, IgG, and IgM levels, B-Cell and T-cell subset enumeration, and mitogen stimulation assay).

Anticipated Results

- Table 1: Patient demographics
- Table 2 : Immunophenotyping organized by each MAB agent (T cell subsets, B cell subsets, mitogen assay results, Immunoglobulin levels, type of MBA, and MBA agent level)
- Table 3: Age at first Rotavirus vaccine dose, age at completion, incidence of diarrhea, and incidence of intussusception.

Limitations and Implications for the Future

- The small sample size limits the safety study of the RV vaccine
- This is the largest cohort of infants exposed to MAB agents in utero in whom immunophenotyping was assessed in the setting of RV vaccine safety
- The results can fuel a bigger multi-center or national level studies to assess safety of RV vaccine in this population and to help redefine guidelines in this population

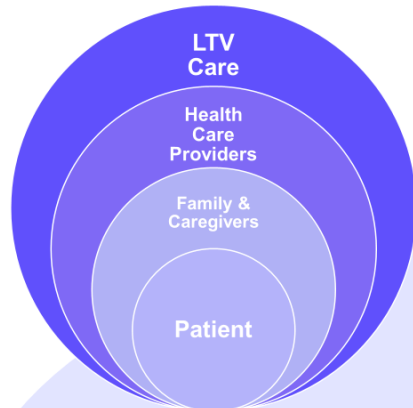


Outpatient care for children using long-term ventilation – a national survey

Susan Telencoe, MD; Jody Platt, BSc. BN, MD, FRCPC; Glenda Bendiak, MD, MSc, FRCPC; Ian Mitchell, MA, MB, FRCPC

Background

- Long-term ventilation (LTV) is provided by:
- Invasive modalities, eg: tracheostomies
 - Non-invasive modalities, eg. CPAP / BiPAP



Both the CTS and ATS recommend family-centered, multimodal care.

Comprehensive Care models significantly reduce mortality and hospital admissions

Objectives

Primary Objective:

Describe current existing structures for LTV outpatient care at each tertiary center in Canada.

Secondary Objectives

- 1) Describe **comprehensive care structure** measures
- 2) Report **physician perceptions** on current outpatient models

Methods

Study Design

- Qualitative exploratory cross-sectional design
- Series of **virtual interviews with physician leaders** at each tertiary pediatric center in Canada

Data Processing and Analysis

- Exclusively descriptive statistics
 - Mean and standard deviations
 - Proportion and percentages
 - Likert scale for physician perceptions

Framework



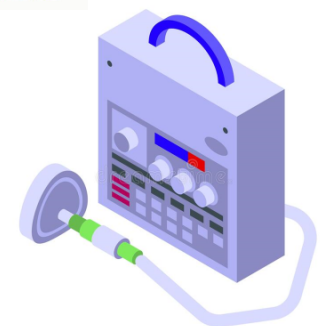
Interview	Initial Open-Ended Question	Specific probe-type questions
Provider Factors	Please describe your daily care practice with people on LTV.	What other activities do you carry out? Who is the primary care provider or case manager? Who provides inpatient support?
Patient Factors	Please describe your patient population	Please describe a concrete example of patient care process. How long are patients followed by the clinic? What are patient's primary indication for long-term ventilation?
Clinic & Administrative Factors	Describe how is interprofessional collaboration is organized?	What methods of communication do you use? Where do patient's receive care?

Limitations

- **Qualitative study**
 - No comparisons or inferences will be made between centres.
- **Physician perspectives only**
 - Reduce bias by developing survey with a multidisciplinary team
- **Some questions may not be accurately answered**
 - Screening prior to interview and optional follow-up interviews
- **Recruitment may be difficult**
 - Providing incentives & reminders
- **Interviewer will be a trainee**
 - potential power differential, mitigated by structured interview

Next Steps

- **Develop final survey questions**
- **Submit to Ethics**



A Novel Workplace Mental Health Curriculum and Burnout in the Emergency Department: A Pilot Randomized Controlled Trial

Nicholas Monfries MD, Kelly Millar MD MSc, Naminder Sandhu MD

University of Calgary | Department of Pediatrics | Division of Pediatric Emergency Medicine



Background

- Burnout is a syndrome consisting of heightened feelings of emotional exhaustion, depersonalization, and decreased professional satisfaction.^{1,2}
- Burnout is especially prevalent amongst healthcare professionals working in the Emergency Department⁴, including physicians⁴, residents⁵, nurses⁶, and social workers.⁷
- Burnout can lead to significant professional and personal consequences, including an increased rate of medical errors, increased patient mortality, and increased risk of mental health disorders and suicide in the professional.¹⁰
- There are a number of strategies to mitigate burnout that have been explored in the literature¹⁰, including mental health training in mindfulness¹¹, stress management¹², and resiliency.¹³

Objectives & Outcomes

- We propose a **pilot randomized controlled trial** to study the impact of a novel mental health curriculum, incorporating the use of a smartphone application, in reducing burnout amongst staff and physicians in the Emergency Department.

Primary Outcome

- Changes in the degree of burnout amongst participants, as measured by the Maslach Burnout Inventory

Secondary Outcomes

- Change in participant's resiliency, as measured by the Connor-Davidson Resiliency Scale
- Change in the participant's mindfulness skills, as measured by the Mindful Attention Awareness Scale
- Participant satisfaction with course content & delivery

Statistical Analysis & Sample Size

- There is significant variance in the prevalence of burnout reported in literature, as well as few randomized controlled trials on the impact of various interventions on the different subscales of burnout
- According to recent guidance on appropriate sample sizes for pilot studies, a **sample size of 25 participants per intervention would be appropriate to detect a small effect size (<0.2)**¹⁴
 - 50 participants in total
- For each measurement scale used, the change from baseline will be compared between the two groups using a **two-sample t-test**. Furthermore, within each group, the change in baseline will be compared using a paired t-test.

Methods

- Randomized controlled trial with a waitlist control group
- Participants will be selected from a convenience sample of staff and physicians working in a pediatric emergency department (ED)
- Participants will be eligible for inclusion into the study if they **work at least 4 shifts per month in the ED, have the ability to attend an in-person training session, and the device capability to support the headversity™ application.**
- Exclusion criteria includes **prior formal resiliency training (within the past 12 months) and prior use of the headversity™ application.**
- **Intervention:** Access to the headversity™ smartphone application following an introductory "Working Minds" course
- **Control:** Will have access to the headversity™ application following the conclusion of the study

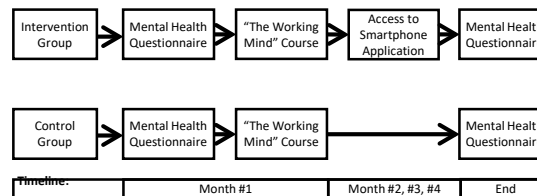
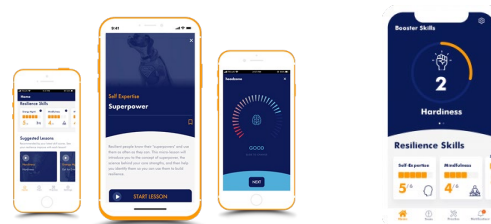


Figure 1: Study Protocol



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Mental Health
Commission
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Commission de
la santé mentale
du Canada

The Working Mind



Contact Information

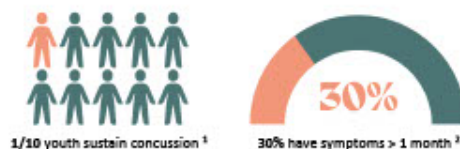
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MORE THAN JUST A PAIN IN THE NECK?

The impact of post-concussion cervicogenic headache on recovery

Maddie Wilton-Clark (MD), Chantel Debert (MD, MSc, FRCPC), Kathryn Schneider (PT, PhD)

BACKGROUND



- Concussion is defined as a mild traumatic brain injury³
- However, concurrent injury to the cervical spine is also a source of persistent symptoms, including headache³
- Cervicogenic headache (CGH) is caused by referred pain from the trigeminal and upper three cervical spinal nerves, to the head^{4,5}
- Differences in cervical muscle development, ligamentous laxity, head-body proportions, and c-spine mobility may place adolescents at increased risk of post-concussion CGH²

- CGH has 4 diagnostic physical exam maneuvers⁶
- Post-concussion headaches are managed according to the headache phenotype that they most closely resemble⁷
- Understanding the impact of CGH post-concussion is fundamental for appropriate treatment⁶

OBJECTIVES

1. Identify CGH in adolescents with post-concussion headache
2. Determine whether CGH is associated with more severe headache symptom burden
3. Determine whether CGH is associated with prolonged return to sport



Image from <https://www.drmattmiller.com/2018/04/11/cervicogenic-headache/>

HYPOTHESIS & IMPACT

A diagnosis of CGH in adolescents with sport-related concussion will be associated with increased headache symptom burden and longer length of time to return to sport



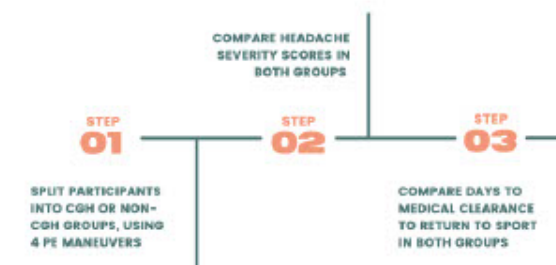
Improved understanding of post-concussion CGH can inform expectations for recovery and allow targeted treatment

OUTCOME MEASURES

- Headache severity scale: obtained from 7-point Likert symptom scale on the Sport Concussion Assessment Tool (SCAT)⁸, rated 0-6 at initial and follow-up visits
- Days to medical clearance to return to sport

METHODS

- DESIGN: Prospective cohort
- SETTING: Acute sport concussion clinic (ASCC) in Calgary, Alberta, Canada
- PARTICIPANTS: Approx. 150 adolescents with sport-related concussion
- PROCEDURES:



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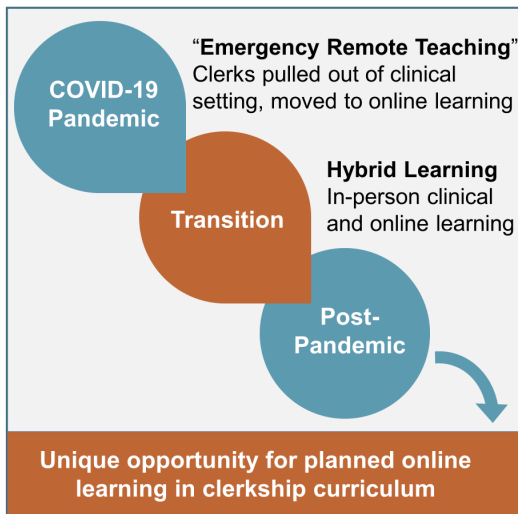


Online Learning in Medical Student Clerkship: Transitioning to the Post-Pandemic World

Rina Patel¹, Chris Novak² and Susan Bannister²

^{1,2}Department of Pediatrics, ²Section of Pediatric Hospital Medicine

BACKGROUND

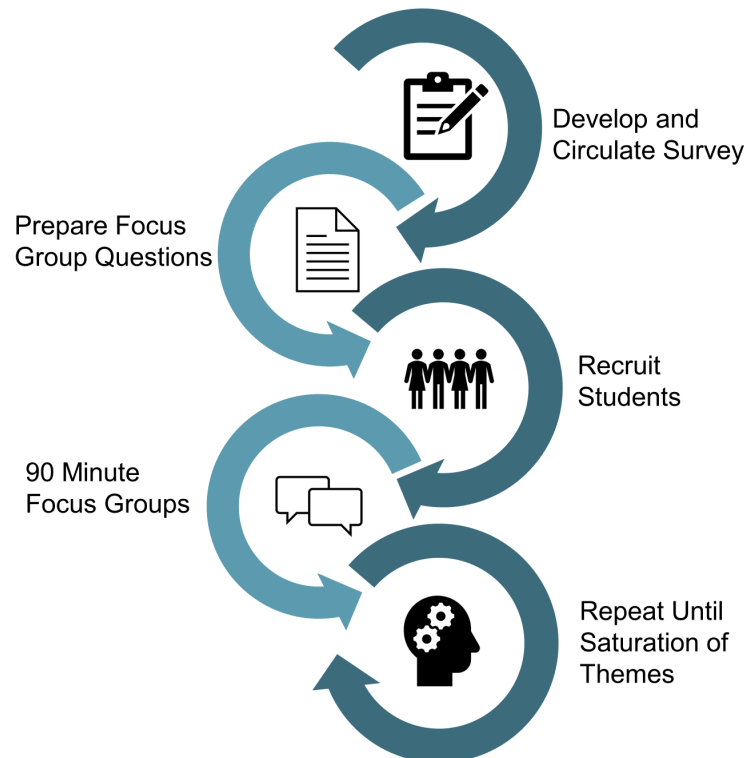


Evidence of Online Learning During the Pandemic

+	-
- Increased opportunity for interactivity - New teaching techniques - Ability for cross-institutional collaboration - Increased use of flipped classroom learning	- Decreased social interactions - Technology challenges - Burden to quickly learn new technologies "Video-conferencing fatigue"

METHODS

Mixed Methods: quan → QUAL



OBJECTIVES

- To describe **online learning strategies** that clinical clerks **perceive as most effective and valuable**
- To explore **additional online learning strategies** that clerkship students use that are **not formally provided** in medical school curriculum
- To **inform further curriculum development** for online learning in clerkship curriculums

ANTICIPATED DIFFICULTIES

- Unable to conduct in-person focus groups → secure virtual platform with audio-only recording
- Unable to get adequate sample size given short timeline for data collection → look at a smaller number of individual narratives deeper
- Curriculum changes between now and when focus groups are conducted → target interview questions to online clerkship learning experiences

ANALYSIS

Survey:
Descriptive Statistics

Focus Groups:
Thematic Analysis

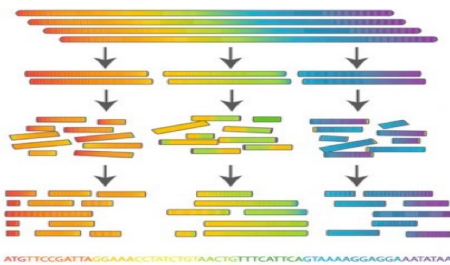
COVERING OUR BASES: Using Genetic Testing in Critically ill Children

Sanhan S., Khan A., Esser M., Chaput K., Truong T.

Dept of Pediatric Neurology, Dept of Medical Genetics; University of Calgary, Calgary, Alberta, Canada
Alberta Children's Hospital Research Institute; Calgary, Alberta, Canada

BACKGROUND

- Many children admitted to hospital critically ill because they are refractory to conventional therapy
- Global prevalence of monogenic disease at birth 10/1000¹
- Whole Exome Sequencing (WES) significantly improved the diagnostic rate in pediatric neurology patients from 25% to 48% (Nolan, Carlson 2016)²
- Potentially a valid tool for early use → precision medicine



OBJECTIVES

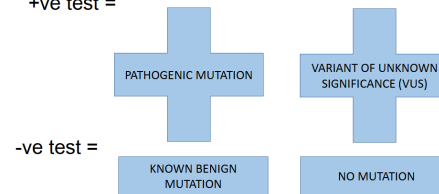
- Establish the prevalence of a positive genetic test in pediatric patients under Neurocritical Care (NCC) from July 1, 2016 to July 1, 2019 at the Alberta Children's Hospital (ACH).
- Describe how a positive genetic test impacted clinical outcomes

METHODS

Design: Retrospective cohort study

Participants: Pediatric patients referred to the Neurocritical Care (NCC) team at the Alberta Children's Hospital (ACH) between July 1, 2016 until July 1, 2019 who received WES.

Outcomes: 1) Prevalence of positive (+) test in NCC patients who received WES
+ve test =



2) With a + test result, what was the clinical impact?
case study analysis

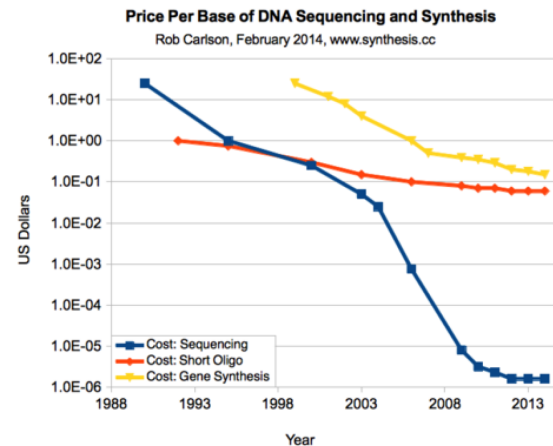
Procedures: Chart reviews on SCM and Metavision for patients referred to NCC through ICU or the wards.

Sample Size and Analysis: Assuming that 25% of the subjects in the population have the factor of interest, the study would require a sample size of 198 for estimating the expected proportion with 5% absolute precision and 89.5% confidence³. The +ve cases from the last 30 days of the sample period will be followed through and reported on their clinical course and outcomes.

Ethical Considerations: Anonymized patient data using a unique identifier, basic demographics of age and sex, and their genetic mutation. Data sets will be stored on a password protected Excel file. The unique identifier and the associated patient's MRN will be kept as a separate encrypted file on a separate AHS office computer. Consent will be obtained from individuals for case study evaluation. Ethical approval will be received from CHREB.

CHALLENGES

- Study pop. limited to those with brain at risk
- Difficulties in chart review to obtain data
- Differences in tests ordered and timing of results



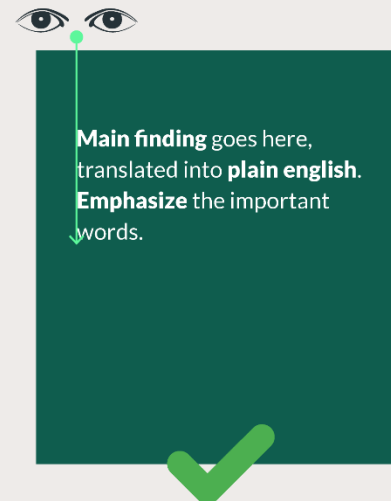
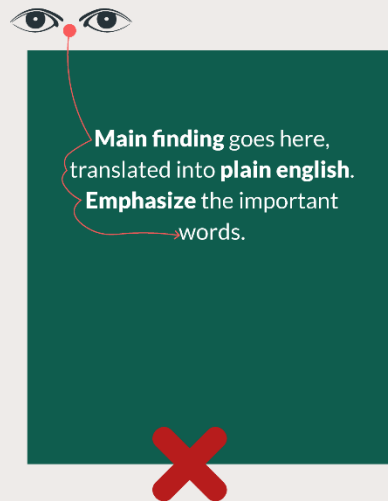
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Potential Section Headings

- Introduction
- Background
- Research goals
- Objectives
- Methods
- Measures
- Outcomes
- Recruitment
- Statistical analysis
- Sample size
- Anticipated results
- Limitations
- Next steps
- Anticipated challenges
- Future directions
- References

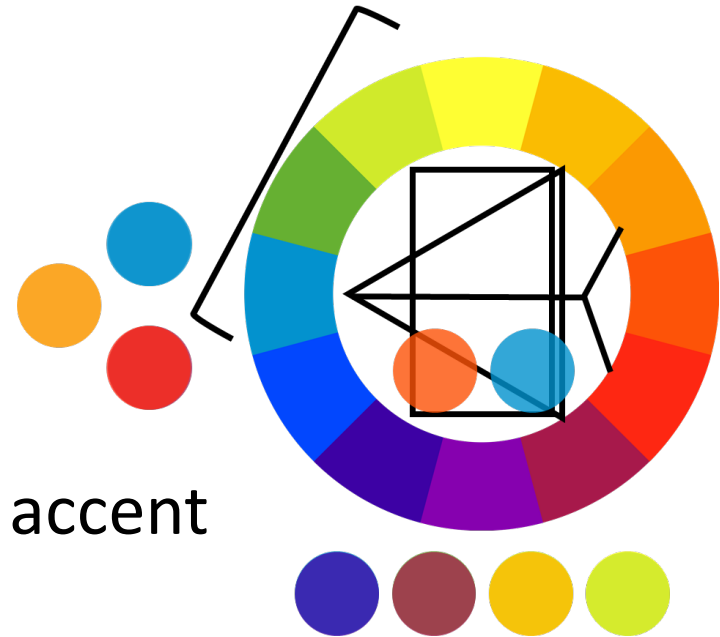
Creating visual appeal



If your punchline is **more than 2 lines**, don't **center it**. Centering makes your eyes do more work.

Creating visual appeal

- Use colour for visual interest and to highlight
- Complementary
- Triadic
- Square
- Analogous
- One or two main, one accent
- 60/30/10 rule



Reducing risk of social-emotional development and behaviour problems at age 2:



Results from the All Our Families (AOF) Pregnancy Cohort

Sheila W. McDonald¹, Heather L. Kehler, Suzanne C. Tough^{1,2}

¹Department of Paediatrics and ²Department of Community Health Sciences, Cumming School of Medicine, University of Calgary



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BACKGROUND

- » Social-emotional delays and behavioural problems at preschool age are associated with negative outcomes at school age including behaviour problems¹, psychiatric disorders² and poorer academic achievement³.
- » The development of social-emotional competencies leads to the ability to make friends, friendship maintenance and quality⁴ and social acceptance among peers.⁵

OBJECTIVE

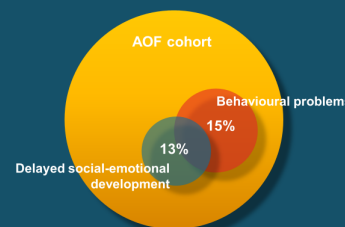
- » To identify risk factors for delayed social-emotional development and child behaviour problems at age 2 among a contemporary population-based cohort.

METHODS

- » The AOF study is a community-based pregnancy cohort in Calgary, Alberta. Women were recruited in 2008 and 76% (n=1595) completed five comprehensive questionnaires from mid-pregnancy to two years postpartum.
- » At age two, social-emotional competence and behavioural problems were measured using the Brief Infant-Toddler Social and Emotional Assessment (BITSEA).
- » Chi-square analysis and multivariable logistic regression modeling were used to identify risk factors for delayed social-emotional development and behaviour problems

AOF COHORT

Maternal participant characteristics	N (%)
Married/common law	1536 (96.24)
Education: high school or less	132 (8.33)
Household income: \$80,000 or more	894 (68.61)
Born in Canada	1276 (80.50)
Depression: Yes (CES-D≥16)	200 (12.53)
Anxiety: Yes (SAI≥40)	242 (15.36)



RESULTS

- » At age two, 13% (n=210) of children had delayed social-emotional development and 15% (n=236) had behavioural problems.
- » The probability of socio-emotional delay at age 2 is 65% for children exposed to all risk factors.
- » The probability of behaviour problems at age 2 is 88% if a child is exposed to all 6 risk factors.

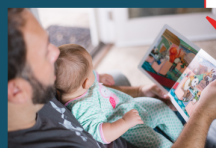
Risk factors for behaviour problems at age 2

Overall %		OR	95% CI
12.5%	lower maternal optimism	2.02	1.36-2.99
12.4%	maternal depression	2.19	1.46-3.27
11.7%	mother reported more difficulty balancing responsibilities	2.32	1.55-3.47
28.4%	child exposed to a second language	1.88	1.37-2.58
14.8%	child experiencing sleep onset delays	1.55	1.06-2.26
21.6%	child experiencing frequent night wakings	2.95	2.13-4.10
47.0%	child having daily screen time (≥ 1 hr)	1.85	1.34-2.54

Risk factors for delayed social-emotional development at age 2

Overall %		OR	95% CI
12.4%	maternal depression	2.46	1.63-3.72
4%	lower parenting self-efficacy	2.76	1.51-5.06
29%	no daily imitation play	1.73	1.02-1.99
40%	not attending informal play group	1.43	1.03-1.99
15%	child experiencing sleep onset delays	1.58	1.05-2.37

CONCLUSIONS



Strategies that enable parents of infants in

- » establishing healthy sleep habits,
- » engagement in daily play,
- » attending informal playgroups and
- » limiting screen time

show promise as preventative strategies to positively impact children's psychosocial development.

Strategies aimed at identifying and supporting mothers of young children experiencing poor mental health and coping may also improve children's development.



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The authors acknowledge the contribution and support of All Our Families participants and team members.

All Our Families was funded through Alberta Innovates Interdisciplinary Team Grant #200700595, and the Alberta Children's Hospital Foundation and other supporting organizations.



Systematic review of glucocorticoids in pregnancy and the child brain

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Background and Aim

- Glucocorticoids like cortisol are required for fetal organ development
- Elevated glucocorticoid levels during pregnancy, induced by stress or given through synthetic administration, are a proposed mechanism for adverse cognitive, behavioral, and neurological child outcomes
- Studies of neuroimaging and prenatal glucocorticoids exist, but a review of such associations does not
- To add clarity to this body of literature, **we aim to report empirical findings on the association between maternal prenatal glucocorticoids and child brain imaging outcomes**

Methods

- This review was carried out following PRISMA guidelines for systematic reviews
 - Question 1:** In healthy, uncomplicated, full-term singleton pregnancies, what is the association between maternal prenatal cortisol concentration and child brain imaging outcomes?
 - Question 2:** In singleton pregnancies where synthetic glucocorticoids were administered, what is the association between exposure to synthetic glucocorticoids and child brain imaging?
- Searches for human prospective observational studies published up until June 13, 2018 were run in MEDLINE, EMBASE, and PsycINFO
- Two independent reviewers assessed eligibility and study quality
- Results for endogenous cortisol and exogenous synthetic glucocorticoids are presented separately and subdivided by neuroimaging technique

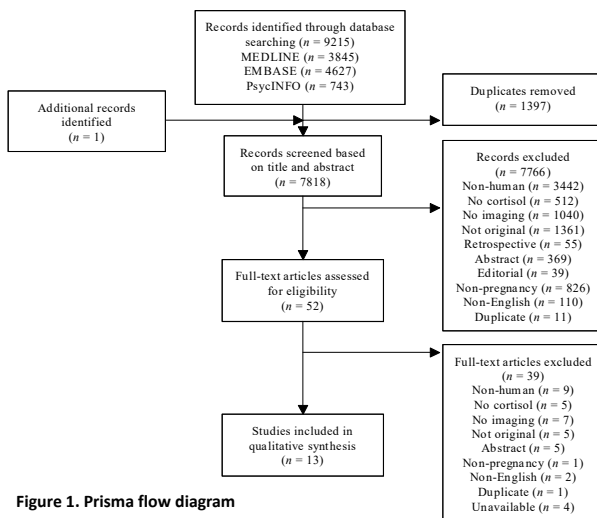


Figure 1. Prisma flow diagram

Results

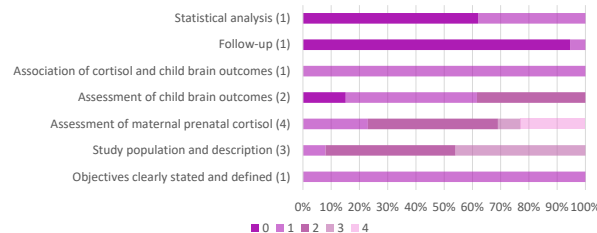


Figure 2. Quality Assessment
(bracketed numbers indicate maximum attainable score)

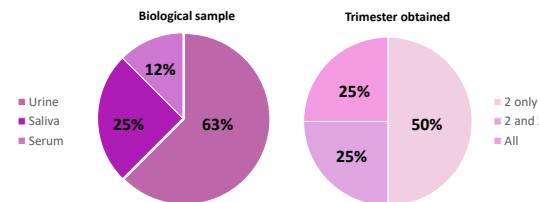


Figure 4. Maternal cortisol sampling methodology

Table 1. Characteristics of included studies
(* indicate significant results)

	Endogenous		Exogenous	
	Author (year)	Main Results	Author (year)	Main Results
Structural MRI	Buss (2012)*	Amygdala volume increase in females but not males; no association with hippocampal volume	Tam (2011)*	GC exposure associated with cerebellar growth
	Davis (2017)*	Cortical thickness increase	Davis (2013)*	Cortical thickness decrease
Functional MRI	Graham (2018)*	Interaction with infant sex associated with amygdala connectivity to sensory-related brain regions	Modi (2001)	GC-exposed infants had less complex cortical folding, but no difference in brain volume
	N/A	N/A	N/A	N/A
EEG	Field (2001, 2002, 2010)*	Frontal right EEG activation increase	Shany (2017)*	Positive correlation with theta frequency amplitude
	Field (2004)	No association with newborn frontal EEG asymmetry	Horvath (1984)	Equal number pathological EEG between GC-exposed and control
	Diego (2004)	Cortisol predicted 30.5% variance in frontal EEG asymmetry		

Acknowledgements and Contact Information

Special thanks to the University of Calgary PURE Awards for funding this research
For further information, please email : raha.bahador1@ucalgary.ca

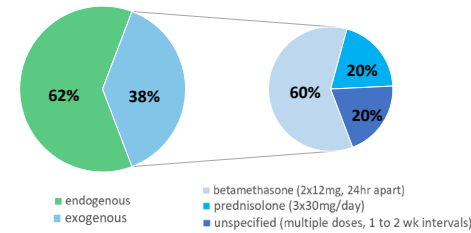


Figure 3. Glucocorticoid heterogeneity

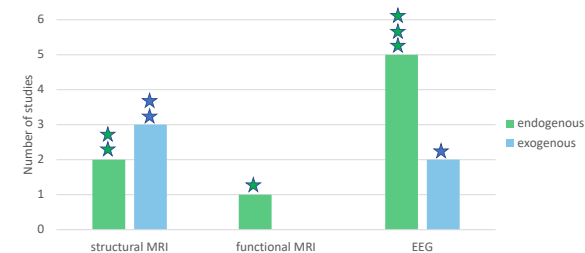


Figure 5. Distribution of neuroimaging techniques
(stars indicate number of studies with significant findings)

Discussion and Conclusion

- Meta-analysis could not be performed due to high heterogeneity between neuroimaging outcomes
- While exposure to endogenous cortisol is necessary for normal development of brain structure and function, **heightened levels of endogenous maternal cortisol may have adverse sequelae on the fetal brain** resulting in observable deleterious effects in the child
- Maternal treatment with synthetic glucocorticoids appears to associate with significant consequential effects on fetal neurodevelopment** with potential subsequent vulnerability to mental illness
- Although, MRI and EEG hold privileged positions in that they provide safe *in vivo* assessment of the brain, they are simply technologies, and no technology alone can generate valid and reproducible scientific findings
- Future studies should use neuroimaging techniques in combination with sound study designs that will produce more valid and generalizable findings to inform us about the effects of glucocorticoids during pregnancy on the child brain*



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CUMMING SCHOOL OF MEDICINE



Alberta Pregnancy
Outcomes and Nutrition



Some recommendations for colour

One or two main colours; one accent

Avoid blue on red – can you see why?

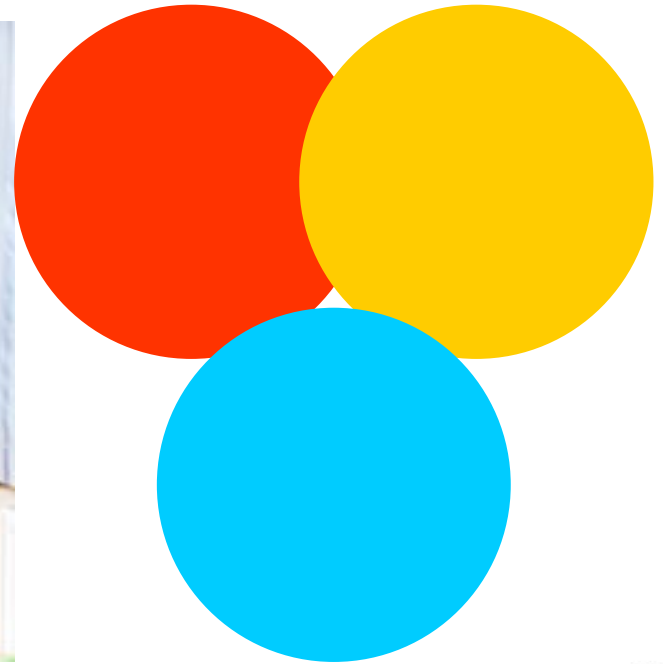
Yellow & other bright colours are hard to read.

Use black/dark on a light background.

Use white on a dark background.

Some recommendations for colour

- Pick an image and then select colours to match.



Creating visual appeal

Background

- Use one, light colour
- Avoid patterns

PARENTING IN THE DARK:

Does the 'cry-it-out' sleep training method harm attachment?

Aisha Lillywhite¹, Lianne Tomfohr-Madsen¹, Nicole Letourneau^{2,3}, & Gerry Giesbrecht^{1,3}.
Department of Psychology¹, Faculty of Nursing² and Department of Pediatrics³, University of Calgary, Alberta

INTRODUCTION

- Infant sleep problems affect 30% of families. New parents rate sleep problems as one of the most stressful health concerns [1].
- Disturbed infant sleep is associated with significant behavioral and cognitive developmental effects in infants and negatively impacts parental health [2].
- Cry-it-out (CIO) sleep training method effectively reduces infant sleep problems [1], but critics argue CIO undermines secure parent-infant attachment [3].

Current Study

- *The aim was to determine if the use of CIO harms the parent-infant attachment relationship.*

PARTICIPANTS

- 222 mother-infant pairs from the Alberta Pregnancy Outcomes and Nutrition (APrON) study, recruited from the community prior to 22 weeks gestation.

Demographics

- Mothers: 80.2% Caucasian, 91.4% education level of technical trade or higher, 93.3% middle-to high family income (>\$40,000), mean age = 31.6 (3.6)yr.
- Infant: 48.9% male, 14 born preterm, mean age attachments assessment = 22.1 (4.5)mo.

METHOD

- Infant sleep and CIO use was assessed via the Crying Patterns Questionnaire and the Brief Infant Sleep Questionnaire at 3-, 6- and 12-mo. postpartum.
- Security attachment was assessed at 18-mo. postpartum via the gold standard strange situation procedure (SSP).

DATA ANALYSIS

- Infants were classified as secure/insecure using standard A, B, C coding scheme (SSP).
- A chi-squared test with covariates (PLUM procedure in SPSS) was used to test the relationship between CIO use and infant attachment security after accounting for covariates: maternal depression, maternal stress, preterm infant birth, and caregiver sensitivity.

RESULTS

Table 1. Descriptive statistics

	CIO non-user	CIO user
Total users, n(%)	152 (38.5)	95 (61.5)
Secure Attachment, n(%)	52 (37.4)	55 (66.3)
Total Sleep in 24h period (minutes), M(SD)		
3-mo.	856 (151)	863 (153)
6-mo.	795 (124)	832 (110)
12-mo.	789 (82)	808 (95)
Number of waking's per night, M(SD)		
3-mo.	1.9 (1.2)	1.8 (1.1)
6-mo.	1.9 (1.2)	1.8 (1.2)
12-mo.	1.7 (1.5)	1.3 (1.2)

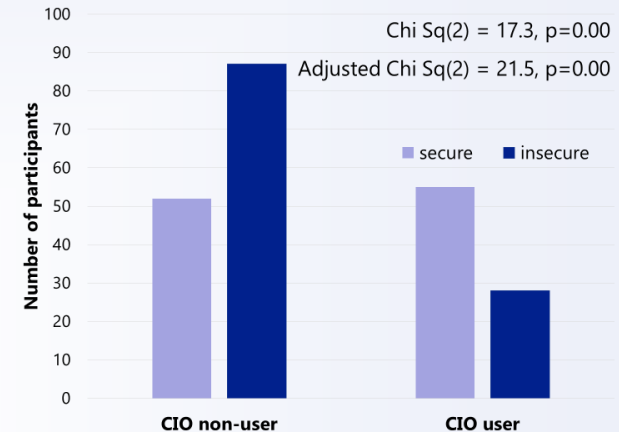


Figure 1. Contrary to the claim that CIO use harms attachment, CIO use was associated with greater attachment security.

DISCUSSION

- These findings are consistent with other studies showing no harm to infant attachment.
- This is the first study to show *better* attachment security when using CIO.
- It is not clear why CIO use would lead to better attachment. CIO was associated with better sleep, and we speculate that it enhances self-regulation – two reasons that might make these infants better interaction partners with mom.
- It is possible that measures of contingency would help to clarify this unexpected finding.

CONCLUSION

CIO does not harm attachment security.

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Developmental Origins of Infant Sleep: Can Maternal Sleep Behaviour During Pregnancy Organize Infant Sleep Behaviour?

Gerald F. Giesbrecht, Umair Sajid, Tiffany Haig, Nicole Letourneau & Tavis Campbell

Background

- Maternal sleep disturbance is common during pregnancy but little is known about its effects on fetal development.
- Sleep disturbance and stress are strongly linked and we know that both pre- and postnatal stress are associated with adverse infant outcomes.
- It is not clear to what extent sleep disturbance during pregnancy may contribute to adverse infant outcomes and to what extent these effects are independent of stress.

Hypothesis

Maternal sleep during pregnancy organizes patterns of postnatal infant sleep.

Methods

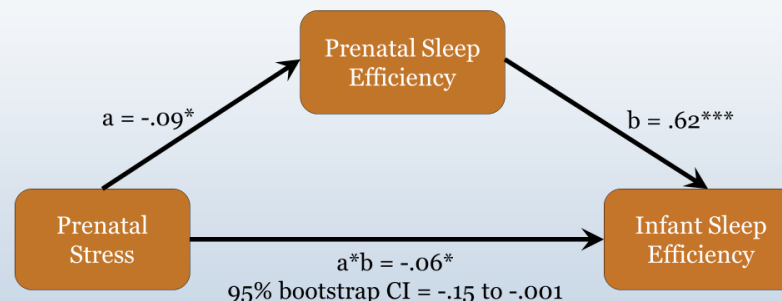
- Women's ($n = 69$) sleep (diary) and stress (self-report, cortisol & salivary alpha-amylase) were assessed during pregnancy using ecological momentary assessment.
- At 3 months postpartum, mothers reported their infant's sleep patterns (Brief Infant Sleep Questionnaire).
- Postnatal depression (Edinburg Postnatal Depression Scale) and anxiety (Symptom Checklist 90) were assessed at 3 months and included as control variables.

Results

Heirarchical Regression Analysis

	Maternal Predictor Variables	Infant Nighttime Sleep Minutes			Infant Sleep Interruptions			Infant Sleep Efficiency		
		β	R Square Change	F for Model	β	R Square Change	F for Model	β	R Square Change	F for Model
STEP 1	Postnatal Anxiety	8.06			8.51			.97		
	Postnatal Depression	1.47	.01	.20	-2.67*	.12*	3.82*	.44	.07	2.17
	Prenatal Alpha Amylase	-.021			.015			-.01		
STEP 2	Prenatal Cortisol	-8.93			-6.97*			.27		
	Prenatal Stress	-.44	.05	.69	1.01***	.24***	6.02***	-.21***	.21**	4.29**
	Prenatal Sleep Efficiency	6.00**			-1.27			.50*		
STEP 3	Prenatal Total Sleep Time	.03			-.14			.02		
	Prenatal Sleep Interruptions	-8.45	.19**	2.17*	-.30	.12*	5.74***	.20	.16**	5.18***

Mediator Analysis



Note. * $p < .05$; ** $p < .01$; *** $p < .001$. β is unstandardized coefficient.

Summary

- Maternal sleep during pregnancy was associated with postnatal infant sleep.
- Maternal sleep efficiency was the 'best' predictor.
- Maternal sleep efficiency partially mediated the effects of prenatal stress on infant sleep.

Conclusions

- Patterns of maternal sleep during pregnancy influence the development of postnatal infant sleep patterns. These effects are independent of both pre- and postnatal stress.
- Prenatal stress and sleep disturbance may 'work together' as shown by the indirect effect of prenatal stress on infant sleep via maternal sleep.

Limitations

Shared genetics and postnatal patterns of maternal sleep may influence these results.



Neighborhood SES Buffers the Effects of Prenatal Psychological Distress on Infant Temperament

Gerry Giesbrecht, Jagroop Chhina & the APron Study Team

University of Calgary, Alberta, Canada

BACKGROUND

Neighborhood SES influences infant development, and such influences may operate even before birth.¹

Women living in low SES neighborhoods tend to have greater psychological distress.²

The role that neighbourhood factors play in buffering or exacerbating the effects of psychological distress on infant development is not known.

Infant temperament can be used to assess the effects of prenatal exposures on neurobehavioral development.

RESEARCH QUESTION

Does neighbourhood SES interact with maternal psychological distress during pregnancy to predict infant temperament, even after accounting for postnatal distress and individual-level SES?

METHODS

1829 pregnant women in the Alberta Pregnancy Outcomes and Nutrition (APron) Study completed pre- and postnatal questionnaires about psychological distress and infant temperament (3 months of age).

156 neighborhoods were evaluated with at least 2 or more participants with an average of 10 participants per neighborhood.

MEASURES

- Edinburgh Depression Scale
- Symptom Checklist-90R Anxiety Scale
- Infant Behavior Questionnaire-R
- Neighbourhood SES – VANDIX

DATA ANALYSIS

Multilevel Models – to account for nesting of individuals within neighbourhoods.

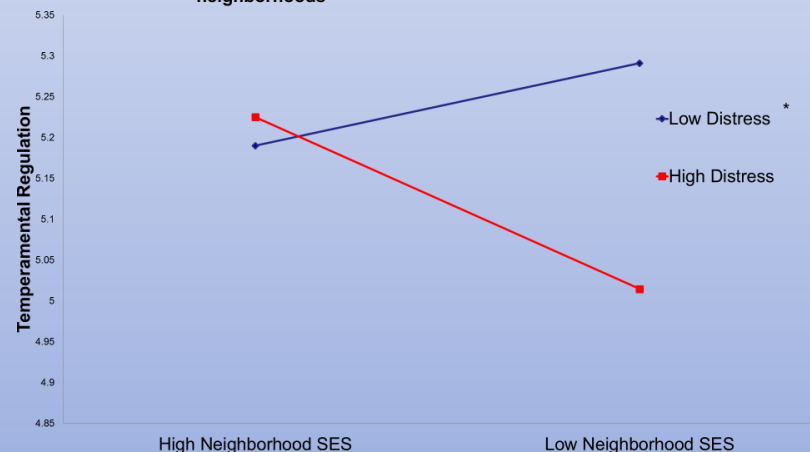
Covariates: postnatal psychological distress, social support, individual-level SES.

RESULTS

Figure 1. Infants exposed to higher prenatal psychological distress have greater temperamental negativity when they live in low SES neighborhoods



Figure 2. Infants exposed to higher prenatal psychological distress have lower temperamental regulation when they live in low SES neighborhoods



DISCUSSION

Exposure to psychological distress during gestation was associated with infant temperament.

Infants exposed to greater prenatal psychological distress displayed more temperamental negativity and lower temperamental regulation.

This association was much stronger in low SES neighborhoods.

The moderating effect of neighborhood SES was present even after adjusting for postnatal psychological distress and individual level SES.

Infants may be more vulnerable to maternal psychological distress when they live in low SES neighborhoods.

Women in low SES neighborhoods with low levels of psychological distress may be more resilient and somehow pass this resilience on to their babies.

CONCLUSION

The effects of prenatal exposure to psychological distress on infant temperament depend on the neighborhood in which the mother lives during pregnancy.

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* Note that neighborhood SES and prenatal psychological distress are continuous variables but for illustration are displayed at the mean of the upper and lower quartiles.

Sexually Dimorphic Adaptations In Maternal HPA Axis and ANS During Pregnancy

Gerry Giesbrecht^{1,2}, Tavis Campbell², Nicole Letourneau^{1,3}

Departments of Pediatrics,¹ Psychology,² and Nursing³ University of Calgary, Calgary, Alberta, Canada

BACKGROUND

Pregnancy initiates a cascade of adaptations within maternal physiology. Some of these adaptations are sexually dimorphic (Clifton, 2010).

Sex-specific changes within stress response systems, as indexed by basal salivary alpha amylase (sAA) and cortisol, have not been studied but could help to explain sex-specific effects of maternal stress on fetal development.

Our hypothesis was that fetal sex contributes to pregnancy adaptations within the ANS and HPA axis.

RESEARCH QUESTIONS

1. In pregnant women, do diurnal fluctuations in basal ANS and HPA axis differ as a function of fetal sex?
2. Are diurnal patterns of sAA and cortisol related to sexually dimorphic fetal growth strategies?

METHODS

Diurnal maternal (n = 291) saliva was collected at two time points in pregnancy: < 22 wks GA and again ~ 32 wks GA. Samples were collected at waking, waking +30 min, mid- morning, and evening on 2 days at each time point.

Saliva was assayed for cortisol and alpha amylase.

Birth weight was obtained from birth records.

DATA ANALYSIS

Multilevel models determined whether maternal prenatal diurnal cortisol and sAA differ as a function of fetal sex and birth weight.

All models were adjusted for maternal covariates that are known to influence stress physiology during pregnancy

RESULTS

Figure 1. Women pregnant with a female fetus had higher daytime sAA

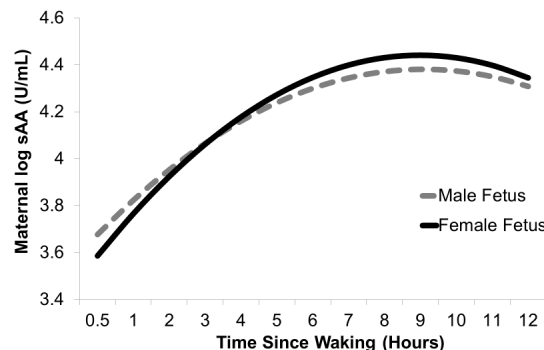


Figure 2. Women pregnant with a female fetus had flatter daytime cortisol slopes.

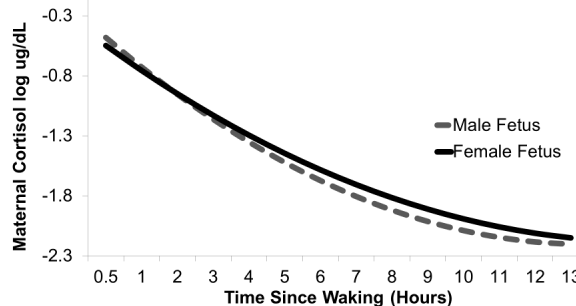
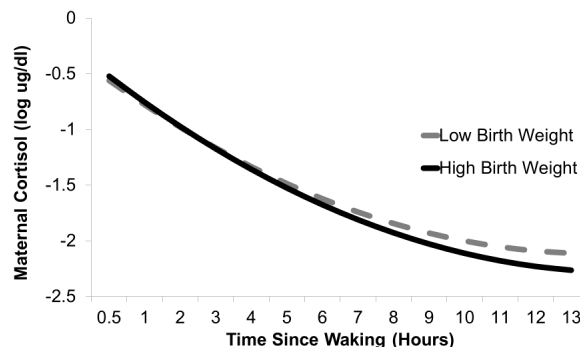


Figure 3. Women with flatter daytime cortisol slopes gave birth to lower birth weight infants.



Note: Birth weight graphed at the 5th percentile.

DISCUSSION

Diurnal sAA and cortisol were elevated among women with a female fetus suggesting that fetal sex plays a role in regulating maternal stress physiology during pregnancy.

Elevations in cortisol were also associated with lower birth weight.

These findings are consistent with sexually dimorphic fetal growth strategies – females tend to limit growth and conserve resources.

Elevations in maternal stress physiology may also contribute to increased vulnerability to stress related disorders in females.

Previous studies suggest that sex differences in the effects of prenatal stress are related to sex-specific vulnerabilities (Sandman et al., 2013) – our findings suggest that fetal regulation of maternal physiology may contribute to sexually dimorphic effects of prenatal stress on fetal and child development.

CONCLUSIONS

Fetal sex contributes to pregnancy-related adaptations within the maternal ANS and HPA axis.

Fetal sex may help to regulate growth by regulating maternal physiology.

REFERENCES

- Clifton (2010). Sex and the human placenta: mediating differential strategies of fetal growth and survival. Placenta 31 Suppl, S33-39
- Sandman et al., (2013). Is there a viability-vulnerability tradeoff? Sex differences in fetal programming. J. Psychosom. Res. 75, 327-335.

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Gerry Giesbrecht^{1,2}, Tavis Campbell², Nicole Letourneau^{1,3}

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All models were adjusted for maternal covariates that are known to influence stress physiology during pregnancy

RESULTS

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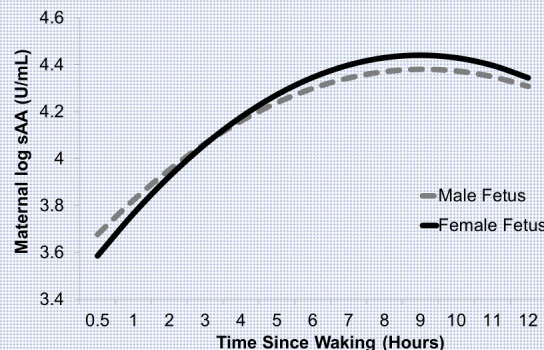


Figure 2. Women pregnant with a female fetus had flatter daytime cortisol slopes.

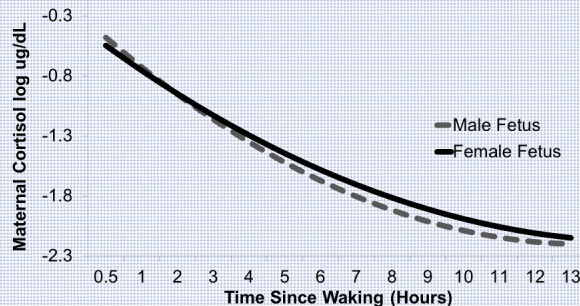
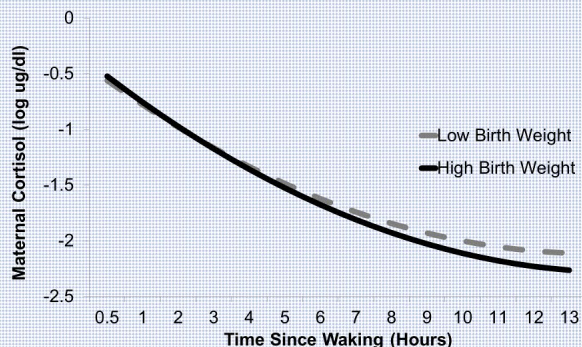


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Fetal sex contributes to pregnancy-related adaptations within the maternal ANS and HPA axis.

Fetal sex may help to regulate growth by regulating maternal physiology.

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Documenting spatial variability in Arctic tundra snowpack using high-resolution remote sensing

Phyllis M. Walker, Ryan Walker, Robert M. Madsen, Phyllis M. Walker
 Arctic Research Center, Centre for Northern Studies, University of Alberta

Introduction:

- Snow depth, density, and water content are important hydrological variables
- Snow depth, density, and water content are important hydrological variables
- Spatial and temporal variability in snowpack structure and composition is important for understanding hydrological processes
- Current methods for measuring snow depth and density are limited by spatial and temporal resolution, and accuracy
- Need for high-resolution spatial and temporal data to understand hydrological processes

Methods:



Structure-from-Motion (SfM) snow depth maps were generated from drone imagery collected during the 2018-2019 winter at the Mallik Creek, NWT, snow cover the development of the tundra snowpack.

A snow depth map (Walker & Madsen, 2019) has demonstrated snow depth error of less than 1 cm using SfM.

Drone imagery (2019)

Structure from Motion (SfM)

Snow depth map

Snow depth map

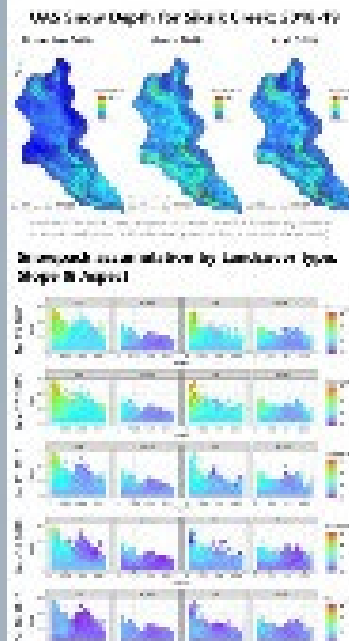
Snow is not distributed evenly across the tundra. We use Drones to map high-resolution changes in snow depth over the winter



Scan me

Check out a presentation on snow depth maps for this presentation

Results:



Snow depth maps for three different dates (March 1, March 15, March 30) and a grid of 12 small maps showing snow depth changes over time.

High-resolution maps of snow depth maps for three different dates (March 1, March 15, March 30) and a grid of 12 small maps showing snow depth changes over time.

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New directions in planning for citizen science at the California Academy of Sciences



Alison N. Young, Roberta Ayres, Rebecca Johnson, Ph.D., and Jean Farrington
California Academy of Sciences, 55 Music Concourse Dr. San Francisco, CA 94118

S. D. BECHTEL, JR.
FOUNDATION
STEPHEN BECHTEL FUND

Introduction

The California Academy of Sciences has embarked on an intensive planning period to develop a citizen science program to increase public participation in science, answer pressing research questions, model how natural history collections can accelerate and advance biodiversity studies, and help Californians reconnect with nature. We are developing ways to engage, enlist, and collaborate with citizen scientists to document current California biodiversity to establish a new baseline of species distributions, construct predictive models for future change, and establish clear priorities for more effective conservation of California's unique biota.

Citizen Science Defined at the Academy

1. Engage the public in real, active scientific research connected to the Academy.
2. Create projects with direct impact on biodiversity, science literacy, and conservation.
3. Provide an opportunity for "tiered-involvement" by members of the public with varying expertise and time.
4. Provide multiple entry points for participants at different stages of the scientific enterprise.
5. Engage scientists and participants in mutually beneficial work together.
6. Innovate in the use of mobile and other digital media.

Citizen Science Conference

In May 2012 the Academy hosted three days of meetings and working sessions around citizen science, biodiversity research, and conservation outcomes. This was the first citizen science meeting of its kind on the west coast.

Goals of these meetings:

1. Benefit from the participants' experience and their institutions' research, programming, and resources to inform the design of the Academy's new citizen science program.
2. Discuss best practices in citizen science biodiversity research.
3. Identify common goals, areas of need, and logical next steps.

Invited:

Citizen science practitioners, biodiversity researchers, local conservation organizations, data managers, citizen scientists

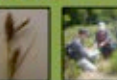
Topics:

- Working with participants in citizen science projects
- Setting research and conservation goals and aligning them with educational outcomes and needs of participants
- The use of technology in citizen science and data management

Test Cases

The two test cases are just the beginning of fully incorporating citizen scientists in the Academy's ongoing exploration of California biodiversity. It is our goal, during this planning period, to test logistics, develop effective protocols, and refine our research questions into the broad umbrella of California biodiversity. We will also explore how project design influences the utility of data for conservation and stewardship behavior of volunteers and researchers.

Test Case: Botany Survey on Mt. Tamalpais



Calamagrostis ophitidis
Collected by John Thomas Howell,
California Academy of Sciences
June 29, 1941

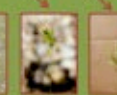


Calamagrostis ophitidis
Rare species
Collected by citizen
scientists
June 23, 2012

To date:
• 60+ volunteers
• 3 survey days
• 500+ observations
comprising 300+
species
• 323 specimens
collected comprising
225+ species



Bromus hordeaceus
Invasive weed
Collected by citizen
scientists
May 5, 2012



This project is in partnership with the Marin Municipal Watershed District

Test Case: Intertidal Survey at Pillar Point



Surveys June 5-7, 2012:
• 50+ volunteers
• 400+ observations
comprising 150+ species
• 22 specimens collected
from select taxa,
including samples for
genetic work



Scientific Goals: Test Cases

1. To use historic specimen data from the Academy and species lists as a baseline with which to compare new data.
2. To begin to establish a benchmark against which to explore climate-related shifts in distribution.
3. To begin to document the current biodiversity of these two areas with an eye toward what kind of effort will be needed to deliver a comprehensive collection.
4. To fill taxonomic or geographic gaps in our collections and collective knowledge about these locations, especially rare and invasive species.
5. To make recommendations on management and conservation strategies.
6. To lay the groundwork for facilitating ongoing monitoring in these areas.
7. To eventually deliver a species list complete with GPS tagged images.

Outcomes

Tiered involvement:

- Volunteers participating in surveys (3-7 hours per day)
- Volunteers mounting herbarium specimens
- Public education and outreach bioblitz event on Mt. Tamalpais: informational programming offered
- Middle and high school Academy groups participated in public bioblitz; middle school group developed three apps through the event for use by the public
- iNaturalist project pages for interested public to upload observations

Tools and technology:

- GPS-enabled cameras most useful for recording observations
- Smartphone apps proved difficult to use in the field – participants preferred paper datasheets
- Mt. Tamalpais plant observations uploaded to Calflora, Pillar Point observations to iNaturalist

Participants

- Recruited participants from local organizations with volunteer groups (e.g., California Native Plant Society, Friends of Fitzgerald Marine Reserve)
- Provided training opportunities, paired survey groups with an "expert" to help with ID

Next Steps

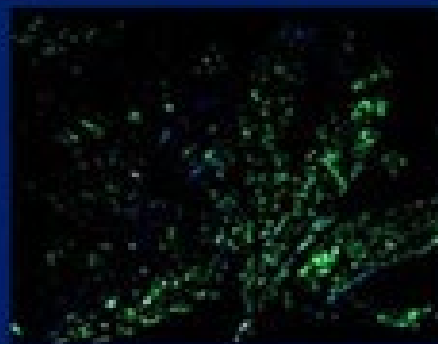
Evaluation (on-going):

- Are we meeting our goals?
 - Are we meeting the needs of our participants?
- 2013+: Expand current projects, begin to create additional projects
- Add in goals not covered fully in test cases (tiered involvement, multiple entry points, mobile/digital media)
- 2014: Add a citizen science component to the public floor of the Academy
- Future: CA network of science institutions, national/international eventually

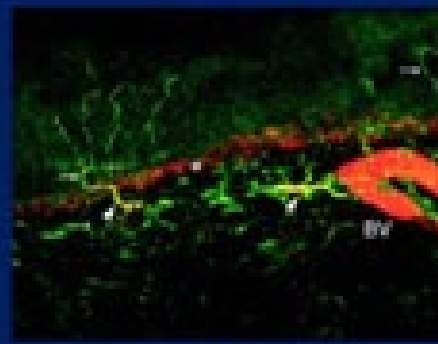
Want more information?

Visit www.calacademy.org/science/citizen_science
• The full proceedings from the May 2012 citizen science meeting will be available shortly
Email Alison Young at citizenscience@calacademy.org





Abstracts & Materials



Methods & Materials

Conclusion

Creating visual appeal

- Use white space
- Limit your text
- Choose appropriate font size
 - **Title: 60-90 points**
 - Section titles: 30-45 points
 - Text: 28-32 points
 - Don't go below 28 points in printed format
 - Point size is completely different in electronic format

Vitamin D: Its importance for health, and the use of umbilical cord blood in women and babies

Faculty of Medicine. University of Calgary

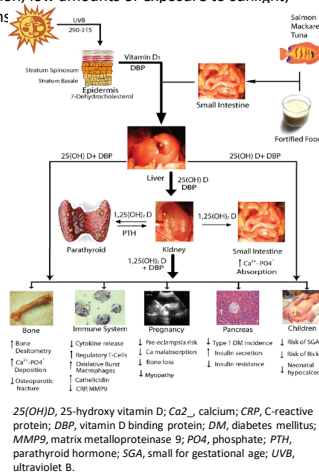
Background

Vitamin D is a steroid hormone that is responsible for regulating calcium and phosphorous absorption, and is therefore involved in bone synthesis and metabolism (1). There are two types of vitamin D that are used by the human body – vitamin D₂ (ergocalciferol) and vitamin D₃ (cholecalciferol)(2). While vitamin D₂ is derived from plants or plant materials, vitamin D₃ is synthesized in human and animal skin upon exposure to UV rays in sunlight (2,3).

Generally, levels of serum 25(OH)D that are <25 nmol/L are now considered to be deficient, levels between 25 nmol/L and 80 nmol/L are considered to be insufficient, while a serum 25(OH)D level of >80 nmol/L is considered to be sufficient (4,5). Based on the above classification, it is estimated that about 1 billion people worldwide have deficient or insufficient levels of vitamin D (4). Risk factors for vitamin D deficiency include reduced synthesis by skin due to increased skin pigmentation, low amounts of exposure to sunlight, aging, latitude, use of sun

Maternal vitamin D status has been associated with adverse pregnancy outcomes such as gestational diabetes, preeclampsia and bacterial vaginosis, as well as delivery by caesarean section (6,7,8,9).

Some of the most commonly studied fetal outcomes associated with maternal vitamin D deficiency during pregnancy are rickets, low birth weight, childhood wheezing and asthma, bone mineralization and bone mass (1, 10, 11)



Methods

Eligible third trimester APrON (Alberta Pregnancy Outcomes and Nutrition) participants were approached by a research assistant and informed about the opportunity to participate in the APrON D/feasibility sub study. They were given some background knowledge about the reason behind the interest in evaluating vitamin D levels, and what the investigators hoped to achieve with the results. If they expressed interest, they were given a consent form which they read and signed. The participants were then asked a few questions from the entry form regarding gravida, skin type, sun exposure, sunscreen use, and country of birth. The research assistant recorded observations about level of skin pigmentation (using the NIS scale) and use of a veil.

After providing the required information, participants were given a copy of the consent form and a box containing all the required supplies. Participants were told to take the box with them to the delivery room and to give it to a nurse – the outside of the box contained instructions for the participants, the nurse and the physician. The participant's data was then recorded in a database for further analysis.

Results

Forty five (90%) of the participants delivered at Foothills Medical Centre (FMC), and five (10%) at the Peter Lougheed Centre (PLC). None of the participants were banking their cord blood, and there were no known fetal abnormalities or pregnancy complications. The mean age for participants was 33 years (SD = 4.15, Range = 23 – 44).

Of the fifty participants, 98% (n = 46) took prenatal vitamins during their pregnancy, while 66% (n = 33) also took additional vitamin D supplements. 88% (n = 44) of the participants were born in Canada. Complete delivery data was available for 82% (n = 41) of the participants, none of whom developed preeclampsia during their pregnancy. Of the fifty participants, only one (2%) delivered at less than 37 weeks of gestation.

Overall, 66% (n = 33) viable samples were collected. The reasons for loss of samples are outlined in the table below:

Table 1: Total number of viable samples collected and reasons for loss of samples:

Reasons for loss	Number of samples (n)	Percentage of samples (%)
Quick/Emergency delivery	3	6
Decided to bank/donate cord blood	2	4
Only one sample collected (either only maternal or only cord)	2	4
Decided to deliver at home	1	2
Forgot to bring box/ give box to nurse	2	4
Nurses/ Lab technicians unsure of what to do with samples	3	6
Unknown	4	8
Total samples lost	17	34
Total viable samples collected	33	66

Discussion

- It is indeed possible to collect cord blood for research purposes in Calgary
 - Large number of positive responses
 - Participants appreciated the low time commitment
- To make the process more efficient, there is need for more thorough communication
 - Required better communication between doctors, nurses, lab technicians and all other personnel involved with the study
- In the future, will aim for a larger sample size and a more ethnically diverse sample of participants



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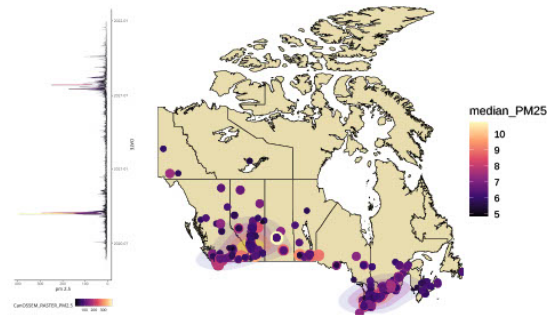
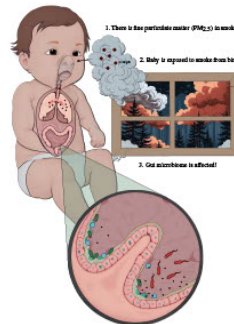
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Acknowledgement: Amrita Bhattacharjee received funding from the Undergraduate Student Research Program in Health and Wellness (USRPR). APrON is funded by Alberta Innovates-Health Solutions.

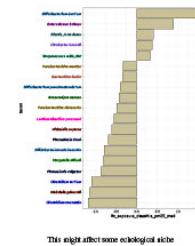
Canada's Wildfire Crisis:

Smoke Alters Early Gut Microbiome Development

What's the matter?

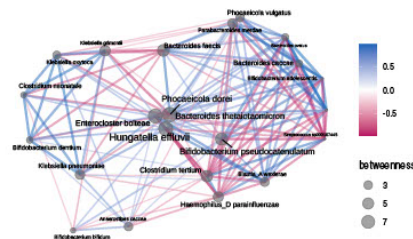


Which bacteria are affected?



This might affect some ecological niche

How do the bacteria interact with each other?



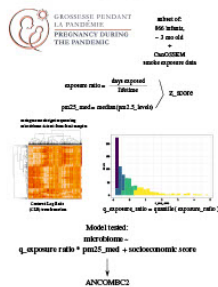
This is work in progress!

We found some wildfire smoke can affect the abundance of some bacteria.

These bacteria share meaningful interactions with each other.

Next steps are to characterise investigate what are they doing (metabolome).

We also aim to look into the health outcomes.



Mood and Food in Preschoolers: Linking Whole Foods to Emotional Dysregulation

Marina Ferreira¹, Elnaz Vaghef Mehrabani², & Gerald Giesbrecht²

¹Department of Neuroscience, ²Department of Pediatrics

Background

- Consumption of a **high-fiber diet** is associated with **improved** mental health **outcomes**^{1,2}
- Temper tantrums** are early indicators of **emotional dysregulation** and are a risk factor for the development of later **internalizing** and **externalizing** **behavioral problems**³

Objective

- To determine the relationship between **fiber consumption** and **temper tantrum behavior** in a sample of three-year-olds

Hypothesis

- An **inverse relationship** between fiber intake and temper tantrums

Participants

- Cohort of mothers/children (**n=1275**) who participated in the Alberta Pregnancy Outcomes and Nutrition (APrON) Study



93.1% of mothers had post-secondary education



59.9% of mothers had a household income >100K



86.7% of mothers were Caucasian

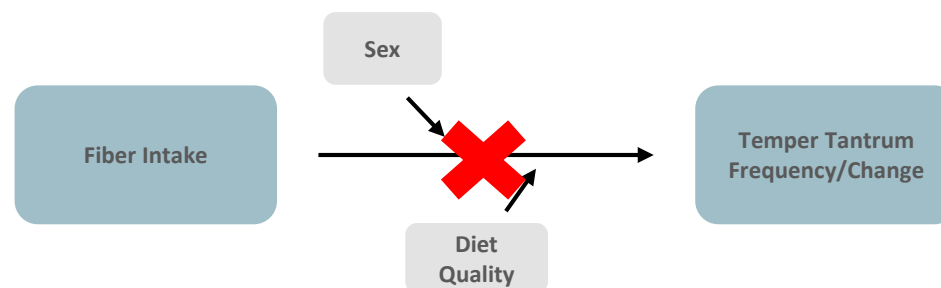


Mean maternal age was **32.03** (SD = 4.02)

Methodology

- Performed linear regressions; used food frequency questionnaire (FFQ) and temper tantrum data from the APrON study

Results



- No influence** of fiber intake on temper tantrum **frequency** both **with** ($F = 0.74$, $p = .530$) and **without** ($F = 0.01$, $p = .921$) sex and diet quality as covariates
- No influence** of fiber intake on temper tantrum **change** both **with** ($F = 1.40$, $p = .243$) and **without** ($F = 1.97$, $p = .160$) sex and diet quality as covariates

Conclusions

- There is **no significant association** between fiber intake and temper tantrum behavior
- Future studies should consider operationalizing the whole food diet in ways other than fiber intake

References

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- [2] Spencer, S.J., Korosi, A., Layé, S., Shukitt-Hale, B., & Barrientos, R.M. (2017). Food for thought: how nutrition impacts cognition and emotion. *npj Science of Food*, 1(1), 1-8.
- [3] Giesbrecht, G.F., Miller, M.R., & Müller. (2010). The Anger-Distress Model of Temper Tantrums: Associations with Emotional Reactivity and Emotional Competence. *Infant and Child Development*, 19, 478-497.

Creating visual appeal - icons



Resources: thenounproject.com; icons8.com

The avante garde...

#betterposter

Discovering the Language of Meaningful Work

Mike A. Morrison, Saakshi Kale

INTRO

- How does work meaningfulness show up in natural language?
- H1: There are certain features of written language that signal whether a person finds their work meaningful.

METHODS

- n=200 page-length work stories. Full-time employees. Several measures of meaningfulness.
- "In 500 words, tell me about your work."
- Machine Learning via scikit-learn and NLTK to discover common language features with meaningful vs. not meaningful stories.

RESULTS

	Identity words at beginning of story. ("I am a ___")
Single-item Work Meaningfulness	.31***
Comprehensive Work & Meaning Scale	.20***
Work And Meaning inventory (WAMI).	.19***

Starting to describe their work with the words "I am a[n]..." significantly correlated with 3 self-report measures work meaningfulness.

DISCUSSION

- Work meaningfulness seems related to identity.
- Could be related to achieving a 'final' identity, a la Maslow's self-actualization.
- "I am" is especially correlated with extremes of meaningfulness (correlation jumps to from .3 to .4 in polarized dataset of high/low only).



When people find their work meaningful, they talk about it using identity words, like...

"I am a writer" vs. "I work for a magazine."



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@mikemorrison

Table 3. Correlation of all variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Other-rated meaningfulness	1											
2. CWMS	.40**	1										
3. CWMS	.30**	.61**	1									
4. Self-reported meaningfulness	.30**	.50**	.60**	1								
5. Self-reported meaningfulness (polarized)	.30**	.50**	.62**	.50**	1							
6. LI	.30**	.21**	.10**	.20*	.08	1						
7. Personal Presence	.31**	.00	-.02	-.03	-.01	.40**	1					
8. Action verbs	.30**	-.02	.01	-.03	-.04	.20**	.40**	1				
9. Abstract Language	.20*	.11	.00	.02	.13	.00	-.01	-.02	1			
10. Positive Sentiment	.22**	.20*	.17*	.22**	.11	.23**	.30**	.23**	.50**	1		
11. Affective Contentness	.30**	.30**	.30**	.42**	.27**	.23**	.00	-.02	-.03	.23**	1	
12. "I am a"	.12	.00**	.20*	.32**	.10*	.10*	.00	.02	.03	-.02	.23	1
13. Algorithm predicted	.10	.30**	.30**	.30**	.30**	.00	-.10*	-.03	.01	.20**	.30**	.30**

*p < .05. **p < .01. ***p < .001

Table 4. The relationship between positive sentiment and meaningfulness.

	WAMI	Single-item Meaningfulness Checklist	CWMS	Other-rated Meaningfulness
Positive Sentiment	.20*	.22**	.17*	.52***

*p < .05. **p < .01. ***p < .001

^(I am a | I'm a | I am an | I'm an)

Table 5. High meaningfulness features. Importance of language features in predicting high self-reported overall work meaningfulness.

Feature	Importance Ratio
Does contain...	
Identity words	2.9:1
Work centrality words	1.4:1
Does NOT contain...	
Pace	1.4:1
Have to	1.3:0

Table 5. The relationship between "I am" language and meaningfulness.

	WAMI	Single-item Meaningfulness Checklist	CWMS	Other-rated Meaningfulness
Correlation with "I am a" language. (full dataset)	.19**	.31***	.30**	.52 (ns)
Correlation with "I am a" language. (polarized dataset)	.41***	.43***	.40***	.36**

*p < .05. **p < .01. ***p < .001



Presenter Name

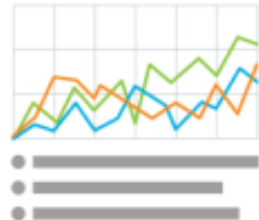
Intro



Methods



Results



For **international students**, **perseverance** and a sense of **social responsibility** are **extra important** for predicting first-year GPA.



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Full title

Authors

Extra Tables
& Figures

Table 1: Descriptive Statistics of Variables

Variable	Mean	SD	Min	Max
1. GPA	2.85	0.45	2.00	4.00
2. Perseverance	3.20	0.60	2.00	4.00
3. Social Responsibility	3.10	0.55	2.00	4.00
4. International Student	0.15	0.37	0.00	1.00



Table 2: Correlation Matrix

	1	2	3	4
1. GPA	1.00	0.45	0.42	0.15
2. Perseverance	0.45	1.00	0.38	0.12
3. Social Responsibility	0.42	0.38	1.00	0.10
4. International Student	0.15	0.12	0.10	1.00

Sometimes minimal might not be enough ...



UNIVERSITY OF
CALGARY

Introduction:

- Virtual reality immerses users in a 3-dimensional environment which simulates reality through sensory feedback.¹
- Virtual reality games, such as SnowWorld VR, have been proven to reduce patient anxiety and pain during procedures.²⁻⁴
- Use of virtual reality in pediatric oncology is limited as a result of lack of game development.

Aim:

- To develop a virtual reality video game which educates pediatric acute lymphoblastic leukemia patients about disease physiology.

Methods:

- A character was storyboarded and subsequently sculpted using Cinema4D, for each blood cell integral to acute lymphoblastic leukemia physiology: B Cell, Erythrocyte, Megakaryocyte, Monocyte, Natural Killer Cell, Neutrophil, and T Cell.
- Using Unity, the characters were placed into a game environment and a mini game was developed for each character.
- Characters, animated using Mixamo software, were vocalized by young children.

Results:

- A virtual reality video game was developed to educate pediatric leukemia patients on disease physiology using unique characters to portray blood cells.
- Through animation and vocalization, each character describes their role as a blood cell in the human body.
- The message given by each character is reinforced using mini games. Each mini game requires that a user complete tasks which are analogous to the function of the corresponding blood cell.

Acknowledgments and References:

We acknowledge the support of the Natural Sciences and Engineering Research Council of Canada (NSERC) Grant number 410-15-0110-10 for the development of this project. We also thank the staff of the University of Calgary for their support.

1. Hoffman, M.R. (2010) Virtual reality: a new medium for education and training. *Journal of the American Medical Association* 304: 103-104.

Virtual reality can be used as an innovative tool to educate children on the role of blood cells in leukemia!

- Basketball is one of the most popular sports in America^{1, 2}, but there is a growing concern among youth players³.
- Regular participation in non-contact programs can reduce injury rates⁴.
- Teams which report high injury rates have lower injury rates⁵.
- Monitoring exercise fidelity of an NMT warm-up program can reduce injury rates⁶.
- Exercise fidelity is not often monitored in youth players.

To use wearable technology to monitor the effects of exercise fidelity of youth players participating in an NMT warm-up program.

Design: Cross-sectional Study

Participants: Target population: basketball players; Current: 10-12 years old.

- Analysis:**
- Complete session of practice or game setting.
 - Players were outfitted with GSR+®, Shimmer Inc., D.
 - Accelerometer (acceleration).
 - Gyroscope (angular velocity).
 - Magnetometer (orientation).
 - Video recording were evaluated by a validated observer using a validated protocol.

Table 1: Types of

Forward Run	1-2 laps run
Forward Run with	1-2 laps run
Backward Zig-Zag	carlioca
Sprinting	1-2 laps of
Forward Run Progression	1-2 laps run
Single Leg Jump Over a	10-15 reps
Line	a line with
Jumps	8-12 reps
Plank	20-30 sec
Side Plank	20-30 sec
Hamstrings	3-10 reps
Walking Lunges	5-10 meter
Side Lunges	2-4 reps

Medication management strategies for doctors may not help to achieve meaningful outcomes in patients with polypharmacy.

What doctors can do against inappropriate prescribing and drug overuse in polypharmacy – a rapid review of clinical trials

GAMSTÄTTNER, Thomas¹; JACOBS, Simone²

¹Deutsche Gesellschaft für Innere Medizin e.V. (DGIM), Wiesbaden

Background

Multimorbid patients with polypharmacy are at risk for inappropriate prescribing and harmful medication overuse.

Objective

To identify from randomized controlled trials strategies for the management of polypharmacy that practicing physicians can employ to achieve meaningful endpoints in multimorbid patients.

Methods

An a priori protocol of a sensitive search strategy for interventional trials indexed in MEDLINE and CENTRAL from 2014 to 2018, including related primary sources, was submitted to internal peer review. Studies qualified for eligibility according to prespecified inclusion criteria. The authors independently screened the results, extracted data and assessed the risk of bias using Cochrane methodology. Reporting followed the PRISMA guidelines. Certainty of evidence was appraised using the GRADE approach.

Results

Of a total of 4381 hits, 10 RCT met the inclusion criteria (Figure 1). A majority of prespecified PICOT criteria were represented (Table 1). Overall risk of bias was judged as very serious (Figure 2). Incomplete reporting for a priori declared outcomes was detected in 6/10 studies (Table 2). Results from 3 RCT (1,324 patients) with high risk of bias on the effects on falls in older patients are unclear (OR 0.99, 95% CI 0.74-1.41). In 1 RCT with high risk of bias, patients (n = 732) experienced a lower rate of adverse drug events (ARR 9.7%, 95% CI 13.4-3.6). 5/7 outcomes did not allow for metaanalysis. Certainty of the effect estimates was very low for all outcomes (Table 3).

Conclusions

Despite the growing challenges of care for patients with polypharmacy and multimorbidity, evidence from clinical trials that address critical outcomes is limited. It is unclear whether the identified interventions that can be by individual physicians to reduce drug overuse and inappropriate prescribing in multimorbid patients; such as protocols for medication review or educational interventions, resulted in clinical improvements.

Table 1: Inclusion Criteria

Population	Interventions	Control	Outcomes	Settings
Patients with polypharmacy - Patients with multiple chronic diseases - Elderly patients >65 years - Patients with inappropriate prescribing	- Any medication management intervention - Medication therapy management - Medication review - Checklist for potentially inappropriate medications - Electronic drug management tools - Drug education - Peer review - Medication education	- Usual care	- Adverse events - Falls - Adverse drug events - Health-related quality of life - Potentially inappropriate medication - Drug overuse - Drug education - Drug adherence	- Primary care - Hospitals - Ambulatory - Outpatient clinics - Individual office visits - Nursing homes

Figure 1: PRISMA flow chart

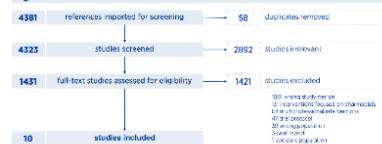


Figure 2: Risk of bias analysis

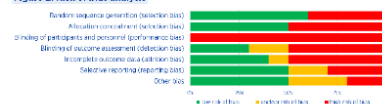


Table 2: Characteristics of included studies (including outcome reporting bias matrix)

Study	Type	Intervention	Outcomes in full-text publication	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Other bias
Dave 2017	RCT, 1042 elderly patients taking the 2D barcode of all their medicines	Discontinuation or dose reduction of full-pharmaceutical drugs (FBD)	✓	✓	✓	✓	✓	✓	✓	✓
Cutler 2018	RCT, 1042 elderly patients taking the 2D barcode of all their medicines	Short a learning period, correct training tool (STOPP) including a checklist for potentially inappropriate medications	✓	✓	✓	✓	✓	✓	✓	✓
Dalton 2014	RCT, 1042 elderly patients taking the 2D barcode of all their medicines	Review of medications by a pharmacist to exclude clinically inappropriate drugs (COPD)	✓	✓	✓	✓	✓	✓	✓	✓
Prokopenko 2014	Quasi-RCT, 1042 elderly patients with long-term antihypertensive treatment	Antihypertensive medication review by a pharmacist	✓	✓	✓	✓	✓	✓	✓	✓
Wagner 2014	RCT, 1042 elderly patients with long-term antihypertensive treatment	Review of medication list according to explicit criteria (STOPP/START criteria)	✓	✓	✓	✓	✓	✓	✓	✓
Schneider 2017	RCT, 1042 elderly patients with long-term antihypertensive treatment	Review of medication list according to explicit criteria (STOPP/START criteria)	✓	✓	✓	✓	✓	✓	✓	✓
Gardner 2014	Quasi-RCT, 1042 elderly patients with long-term antihypertensive treatment	60-hour educational intervention on drug use, followed by on-demand support by a pharmacist	✓	✓	✓	✓	✓	✓	✓	✓
Orlowski 2018	Quasi-RCT, 1042 elderly patients with long-term antihypertensive treatment	Single time point educational intervention by a pharmacist to potentially inappropriate medications according to STOPP/START criteria	✓	✓	✓	✓	✓	✓	✓	✓
Schneider 2014	Quasi-RCT, 1042 elderly patients with long-term antihypertensive treatment	3 individualized pharmacist-patient education (30 minutes each) over 12-week period	✓	✓	✓	✓	✓	✓	✓	✓
Wagner 2014	RCT, 1042 elderly patients with long-term antihypertensive treatment	Review of medication list according to explicit criteria (STOPP/START criteria)	✓	✓	✓	✓	✓	✓	✓	✓

Table 3: Summary of Findings

Outcome	Relative effect (95% CI)	Control	Intervention	Difference	Certainty (GRADE)
Hospitalizations					
Wagner 2014					VERY LOW
Falls					VERY LOW
Wagner 2014	OR 0.99 (0.74 to 1.41)	23.9%	23.9% (24.4 to 23.4%)	0.2% lower (N/A lower to 0.2% lower)	VERY LOW
Adverse drug events					VERY LOW
Wagner 2014	OR 0.48 (0.33 to 0.70)	21.0%	9.7% (7.6 to 12.8%)	8.3% lower (15.4% lower to 3.2% lower)	VERY LOW
Health-related quality of life					VERY LOW
Wagner 2014					VERY LOW
Potentially inappropriate medications					VERY LOW
Wagner 2014					VERY LOW
Drug overuse					VERY LOW
Wagner 2014					VERY LOW
Drug adherence					VERY LOW
Wagner 2014					VERY LOW

References

1. Dave S, et al. (2017) Reducing medication overuse in elderly patients: a randomized controlled trial. *BMJ* 356:f1111.
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9. Wagner G, et al. (2014) Reducing medication overuse in elderly patients: a randomized controlled trial. *BMJ* 356:f1111.



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- Think of your target audience
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- Tell a story
- Make eye contact
- Speak to your audience, not the poster
- Practice, with someone else present!

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