Welcome Back!

We are proud to release the 2nd edition of our Stress in Pregnancy International Research ALliance (SPIRAL) Newsletter. Throughout this newsletter you will find updates on our three ongoing studies: Project Ice Storm, Iowa Flood Study, and the Queensland Flood Project 2011 (QF2011). We have also included highlights from our recent SPIRAL investigators’ meeting, fascinating study findings that have made headline news, and featured student researchers. Due to your continued involvement and participation in our studies over the years, we have been able to continue our goal of investigating the long-term effects of prenatal maternal stress associated with natural disasters on a wide array of childhood outcomes, including intellectual, behavioural, physical, and motor development. We hope that you find this newsletter informative, as well as a sign of the progress being made in our field of research. Thank you and see you again soon!

SPIRAL Investigators’ Meeting 2014

Last September, researchers & students from around the world participated in our first-ever SPIRAL investigators’ meeting, held in Montreal, Canada. The week-long meeting was filled with presentations covering topics of maternal mental health, child development, and the placenta (an organ that connects the mother and fetus, providing a means of communication); group discussions on research findings; and brainstorming sessions on future directions of our three studies. A main area of research discussed was the relationship between prenatal maternal stress and the physical development of the child, including the size of the baby at birth, and skin fold measurements, which are used as an indicator of childhood obesity. The growing link between prenatal stress exposure and increased risk for childhood diabetes and obesity in Project Ice Storm means that this will be a focal area for our younger sister studies: Iowa Flood Study and QF2011. Based on the overall success of our first investigators’ meeting, that brought SPIRAL members together for the first time, we are hoping to host our 2nd investigators’ meeting later this year, September 2015, in Brisbane, Australia.
In the Spotlight: Media Coverage

Research findings from Project Ice Storm have been making news headlines. The Quebec ice storm of 1998 saw millions of residents go without power for up to 40 days during some of the coldest days of winter (as low as –30°C). Members of SPIRAL have been following women who were pregnant during the storm and their child, for up to 16 years.

Over the years, study results suggest that increased levels of subjective stress (i.e. distress about the event) and objective hardship (e.g., the number of days without electricity) experienced by the mother at the time of the storm are associated with an increased risk for asthma, diabetes, and obesity in the child. While it is believed that a pregnant woman’s subjective stress response is communicated to her fetus via high levels of maternal stress hormones, such as cortisol, little is known about how maternal objective hardship affects the fetus, and the child’s development later on. A recent publication in the journal PLOS One by the Project Ice Storm team suggests that the answer lies in epigenetics. Epigenetics describes the process by which environmental factors can change which parts of a person’s DNA get turned on or off. This can happen at any time, but we show that the mother’s environment (the ice storm) changed the unborn child’s epigenetics. Project Ice Storm took blood samples from the children at age 12-13 years, and measured the epigenetic profile (called methylation) in 480,000 locations on the DNA. We found that the amount of methylation on a large number of locations was linked to the number of days the mother went without electricity in the ice storm; surprisingly, the methylation was unrelated to the mother’s level of distress after the storm. These results help us to understand how objective stress, like days without power, can influence the children’s development without necessarily going through the mother’s feelings of stress. Our next challenge is to see whether these epigenetic changes are the cause of the children’s risk of asthma, diabetes, and obesity. Stay tuned!

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SPIRAL Word Search

Australia  Biology  Canada  Child  Development  Disasters  DNA  Environment  Epigenetics  Flood  Frustration  Hair  Hardship  Hormones  Ice  Intellectual  Iowa  Maternal  Methylation  Motor  MRI  Natural  Postpartum  Pregnancy  Prenatal  Quebec  Queensland  Social Support  SPIRAL  Storm  Stress  United States  Urine

Instructions: Insert the un-used letters, in order, in the box below to discover our hidden message!


*The answer can be found on page 4.
Study Updates

SPIRAL’s three longitudinal studies are taking place in Canada, the United States, and Australia, respectively. Below you will find updates on each of our studies, as well as unique features that sets each assessment apart.

Project Ice Storm: The effects of prenatal maternal stress on brain development during adolescence

As the teenagers, and comparison participants, of this project turn 16 years of age, they are being invited to participate in a study that involves magnetic resonance imaging (MRI). MRI is a non-invasive imaging technique that uses magnetic field and radio-frequency waves to visualize brain tissue, and also allows for the examination of internal organs, such as the kidneys and abdominal fat. Adolescents who participate in this phase are asked to lie on a bed-like table that moves into a machine with a cylindrical opening. For one hour, pictures are taken of participants’ heads and abdomens while they watch a movie. The purpose of these scans is to examine how exposure to prenatal maternal stress, while participants were in their mother’s womb, may have influenced the structure of their brain and/or body.

The Iowa Flood Study: Effects of prenatal maternal stress on pregnancy outcomes and infant development

The 5½ year assessments are currently winding down. Since December 2013, children have been visiting the University of Iowa for the latest phase of face-to-face assessments that included a wide variety of child and maternal tasks and questionnaires. Children were assessed with respect to their motor behaviour, intellectual functioning, hormone levels (e.g., cortisol), and physical characteristics (e.g., weight, height, blood pressure, facial landmarks, and fingerprints). Children were also asked to complete an exercise that was meant to produce short-term feelings of frustration (pictured), which may have altered their hormone levels. During the assessments, mothers completed questionnaires that assessed their mood, sources of social support, as well as their children’s behavioural development.

QF 2011: Effects of the Queensland flood on pregnant women, their pregnancies, and their children’s early development

Preparations for the upcoming QF2011 assessments are currently underway. As participants turn 4 years of age, mothers and their children will be invited to revisit the Mater Hospital, where they will be asked to complete a variety of tasks. Each mother will be asked to complete questionnaires that assess her overall well-being, social support, and her child’s development. Independently, children will also be asked to participate in an assortment of tasks that assess their social, emotional, behavioural, motor, and intellectual functioning, as well as their ability to exert self-control in the pursuit of obtaining a desired reward. Information on this phase of the study will be provided shortly. See you soon!
Featured Student Researchers

Rebecca Brock  Iowa, United States
Rebecca is a Post-Doctoral student at the University of Iowa (U Iowa). She completed her Bachelor of Science at North Dakota State University, and M.A. and Ph.D. in Clinical Psychology at U Iowa. For the past couple of years, Rebecca has been involved in analyzing data from the Iowa Flood Study. Her research interests center on examining the effects of prenatal maternal stress on maternal mental health outcomes, such as depression and anxiety, across pregnancy and the postpartum, in addition to the protective effects of social support.

Katrina Bredhauer  Queensland, Australia
Katrina is a Ph.D. student involved with the QF2011 Flood Project. Katrina is a registered psychologist, and obtained her Bachelor of Science from the University of Southern Queensland. She has five years of clinical experience and nine years of research experience. For her Ph.D. research project, Katrina is interested in examining how prenatal maternal stress affects intellectual and motor development in infants. Katrina was involved in administering the face-to-face assessments at 16 months and 2½ years of age.

Lei Cao  Québec, Canada
Lei began her career as a biology teacher. She completed her Masters at the University of Henri Poincaré in France, and her Ph.D. at the University of Trier in Germany in the field of Molecular Biology. Lei currently works as a Post-Doctoral fellow at the Douglas Mental Health University Institute, performing laboratory experiments to examine how genetic and epigenetic factors influence the relationship between prenatal maternal stress, associated with a natural disaster, and offspring development from infancy to adolescence.

Belinda Lequertier  Queensland, Australia
Belinda is a Ph.D. student working on the QF2011 Flood Project. Belinda completed her Bachelor of Science, Bachelor of Psychology, and Master of Clinical Psychology. For her Ph.D. project, Belinda is examining how maternal mind-mindedness (a mother’s ability to understand and reflect on the internal world of her child) is influenced by factors including prenatal maternal stress associated with the 2011 Queensland floods. Belinda was involved in administering the QF2011 face-to-face assessments at 16 months and 2½ years of age.

Find out more about SPIRAL:
www.mcgill.ca/spiral

Contact Us
If you have any comments, questions, or concerns, we welcome your feedback. Please contact us at the following address:

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Thank You Very Much!