VOLUME 3

EARLY BRAIN & BIOLOGICAL DEVELOPMENT: A SCIENCE IN SOCIETY SYMPOSIUM

Summary Report

MAY 30 – JUNE 3, 2011 BANFF, ALBERTA, CANADA

Alberta family wellness initiative

The Norlien Foundation
102 8th Avenue SW
Calgary, Alberta T2P 1B3
CANADA
Office (403) 215-4490
http://www.norlien.org/

SUGGESTED CITATION FOR THIS REPORT:

Early Brain & Biological Development: A Science in Society Symposium. Summary Report. Volume 3.(2012). Calgary, AB, Canada: Norlien Foundation.

Purpose of Report

This report is the third in a series of summary reports describing the Norlien Foundation's broad knowledge-mobilization efforts in early brain and biological development, mental health, and addiction.

Writer/Editor

Marylu Walters, MSc, Edmonton, AB

Welcome

"The time is now, using our ingenuity and pragmatism, to move this agenda forward by integrating the scientific knowledge into policy that will support major changes in practice." **Nancy Mannix,** Chair & Patron, Norlien Foundation

In the 2010 Early Brain & Biological Development Symposium we focused on laying down the scientific foundations of the core story of child development. We have powerful scientific knowledge about how early childhood experience sets the stage – for good or ill – for lifelong health and well-being. We also know the kinds of supports that are needed to create an optimal environment for healthy development. It is time to take concrete steps to make a difference in the health and well-being of current and future generations. In 2011, our focus advanced to turning what we know into what we do. Investing in intervention, treatment, and prevention early in the life of a child will pay dividends in productive and socially responsible adults. Since the first Symposium, we are already seeing policy changes in Alberta's addiction and mental health system and in the government's approach to early childhood development that will create a practice environment leading to healthier children, families, and communities. The level of continued interest from the science, policy, and practice communities in the Alberta Family Wellness Initiative's (AFWI) strategy to support healthy families in Alberta has been tremendous. By participating in the Initiative we are working together within a common framework of understanding to find innovative ways to influence research agendas, policy development, and practice. Through this united effort, not only are we building a prosperous Alberta, we are contributing to the common good of all of Canada.

TABLE OF CONTENTS

Executive Summary

THE NORLIEN FOUNDATION

Created in 1997, the Norlien Foundation is a proactive private foundation with offices in Calgary and Edmonton, AB. The Foundation is active in knowledge translation and transfer, applied research, evaluation, and networking. It has established partnerships with numerous national and international organizations working in the areas of childhood development, addiction, and mental health. The Foundation initiates strategic projects to enhance the quality of life for all Canadians, particularly those living in Alberta.

Since its inception, the Alberta Family Wellness Initiative (AFWI) has funded and initiated a multitude of activities in early childhood development and addiction meant to ultimately bring about change in policy and practice for the benefit of Alberta and its families. Through activities in networking, applied research, knowledge translation and dissemination, professional development and training, and evaluation, the AWFI is committed to finding ways to bridge the gap between what we know from science and what we do. Fundamental to this mission is providing the science, policy, and practice communities with a common framework of understanding based on the latest scientific knowledge about the effects of early childhood experiences on lifelong health and well-being.

Strategic Initiative

To move this work forward, the AFWI, in partnership with the Government of Alberta and Alberta Health Services, launched twin three-year interdisciplinary knowledge-mobilization strategies in early brain and biological development, and recovery from addiction. These strategies are intended to complement and build upon each other, reflecting the interconnectedness of early childhood development and addiction. Together, they serve as an innovation platform to provide knowledge competencies and engagement that will build integrated capacities among researchers, policy makers, and practitioners.

ALBERTA FAMILY WELLNESS INITIATIVE

In 2007, the Norlien Foundation created the Alberta Family Wellness Initiative (AFWI). Based on a framework of epigenetics and developmental and behavioural neurosciences, the AFWI creates opportunities to better understand and apply scientific knowledge to factors influencing child development and its relationship to addiction and other mental health outcomes. It is hoped these efforts will encourage more informed decision-making to create, deliver, and fund a wide variety of appropriate services, programs, and policies that support healthy families in Alberta.

The AFWI's strategic plan calls for three annual Early Brain & Biological Development (EBBD) Symposia and three Recovery from Addiction (RFA) Symposia, with participants invited back each year to build upon their experience and knowledge. Participants in each Symposium series are change leaders in Alberta selected for their unique capacity to influence research agendas, cross-ministerial collaboration, policy development, decision-making, program design, and practice. Between Symposia, participants have the opportunity to engage in activities designed to enhance their learning and skills. The total experience provides participants with up-to-date foundational knowledge and the tools and skills needed to apply this knowledge in real-world settings.

The first EBBD Symposium was held May 31 through June 4, 2010; the first RFA Symposium was held October 18 to 22, 2010. Developments in the immediate year following indicate the AFWI strategy is already achieving results in Alberta.

Early Results

The 2010 EBBD Symposium opened a window on compelling evidence from a wide range of disciplines that early experiences, combined with gene-environment interaction, lay the foundation for healthy brain development and all aspects of human development throughout life. The 2010 RFA Symposium created a greater awareness and understanding of the current scientific research, clinical practice, and evaluation evidence in addiction and established the principle that addiction is a chronic disease of the brain with its roots in toxic stressful experiences in early childhood. These first Symposia began a process for understanding the factors that contribute to healthy development, the factors that can derail development, and the implications of this knowledge for programs and policies in Alberta.

Uptake of the Symposia learnings was quickly evident. Participants are now engaged in connecting the knowledge they gained back to the many areas of policy, services, training, and research they represent. As a result, policy outcomes have already emerged in Alberta. Within about a year of the first EBBD Symposium, the Government of Alberta produced two important documents representing policy shifts related to EBBD learnings: Let's Talk About the Early Years, a report by the Chief Medical Officer of Health, and Creating Connections: Alberta's Addiction and Mental Health Strategy. These documents are connected by their inclusion of elements of the core story of early brain development laid out at the Symposium.

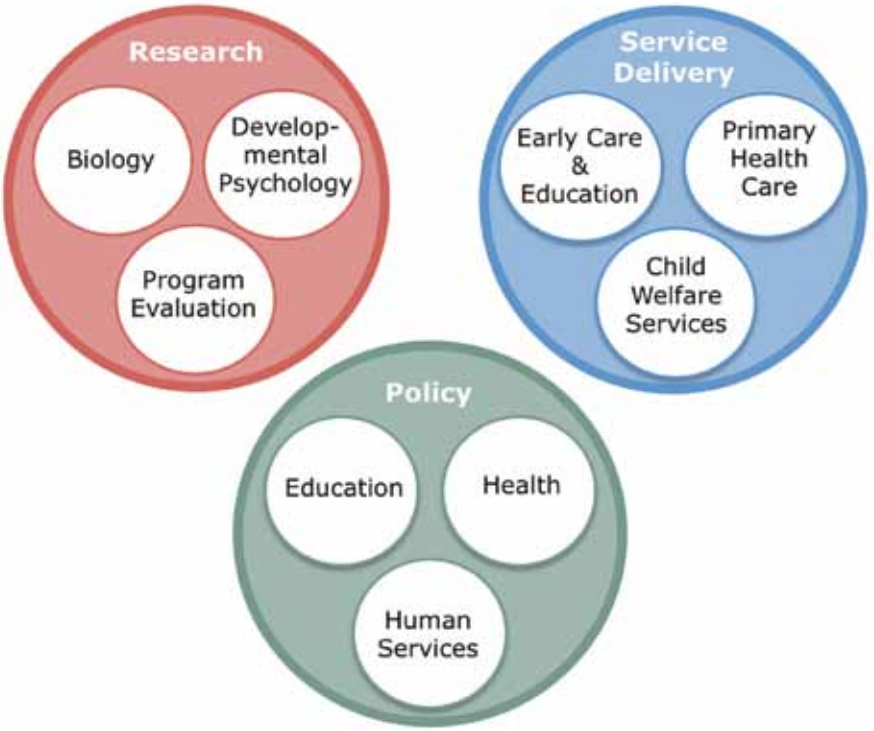
Let's Talk incorporates language and key concepts discussed at the EBBD, such as the far-reaching effects of toxic stress on brain structure and function, the importance of the "serve and return" interaction that forms secure attachments between parent and infant, and the gene-environment interaction that creates epigenetic change. Significantly, the report also emphasizes the need to invest more in the early years, including targeted interventions and programs that support both children and their parents – key points presented at the EBBD Symposium.

Likewise, key elements of the current scientific knowledge presented at the EBBD form the basis of Alberta's Addiction and Mental Health Strategy. Among the innovative changes to the province's addiction and mental health system, the strategy adopts a family-based, more comprehensive approach to prevention and treatment that features chronic disease management and a continuum of care model, in line with what the science tells us about early brain and biological development.

These changes in the policy framework will help support evidence-based change in the practice community, which will in turn feed back outcome data to inform further policy development. The result for Alberta will be an integrated, continuously improving, evidence-based addiction and mental health system.

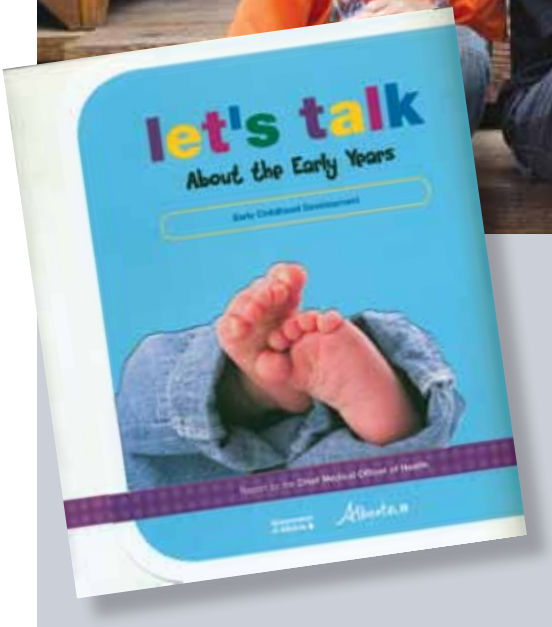
Transcending Professional Barriers:

Reproduced with permission from the Center on the Developing Child at Harvard University. http://developingchild.harvard.edu



LET'S TALK ABOUT THE EARLY YEARS

Report by the Chief Medical Officer of Health, Government of Alberta

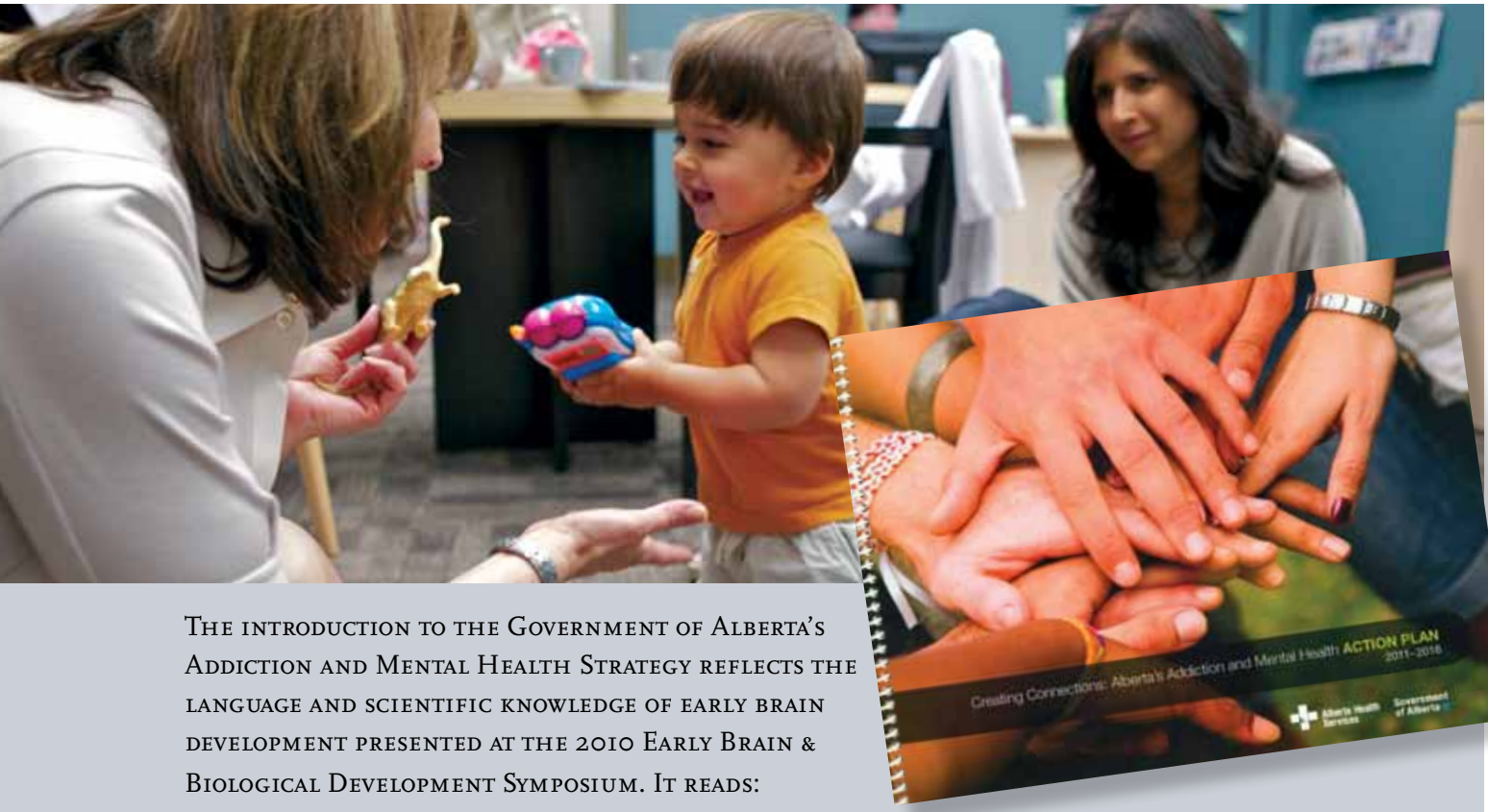


Highlights from the Report

- Science tells us that what happens in a child's early years has a long reach forward.
- The quality of a child's early environment and the availability of positive experiences are crucial in determining the strength of the brain's developing architecture.
- Negative experiences and toxic physical and social environments can disrupt development and put a child on a more difficult life path.
- Early intervention is cost-effective: we can pay now or we can pay more later.
- Healthy early childhood development emphasizes all areas of development; you can't do one without the others.
- Positive, stable relationships in a child's early years are essential to provide the scaffolding for later developmental outcomes that matter.
- Development takes place in a "serve and return" process, meaning the positive interaction between young children and their caregivers that leads to secure attachments.
- Communities of all types (school, neighbourhood, cultural, religious, workplace) can support healthy early childhood development by providing the resources and social support networks families need.
- Individuals, families, communities, and governments all have a stake in ensuring healthy early childhood development for all Alberta children.

CREATING CONNECTIONS:

Alberta's Addiction and Mental Health Strategy



The introduction to the Government of Alberta's Addiction and Mental Health Strategy reflects the language and scientific knowledge of early brain development presented at the 2010 Early Brain & Biological Development Symposium. It reads:

"The Strategy is based on our current understanding that addiction, mental health problems, and mental illness are caused by a complex interplay of genetic, biological, personality, and environmental factors. We now know that the basic architecture of the human brain is constructed through an ongoing process that begins before birth and continues into adulthood.

"Early experiences literally shape how the brain gets built. Just like building a house, it is step-by-step, beginning with a strong foundation, including supportive and resilient families and communities. Exposure to chronic and serious early stressors creates an exaggerated stress response in the brain and body that, over time, may erode the solid foundation on which mental health develops."

The strategy establishes five strategic directions, each specifying priorities, key results to be achieved, and supporting initiatives:

1. **Build healthy and resilient communities.**
2. **Foster the development of healthy children, youth, and families.**
3. **Enhance community-based services, capacity, and support.**
4. **Address complex needs.**
5. **Enhance assurance.**

In addition, seven key enablers are identified as critical to building required organizational capacity to achieve the desired key results:

1. **Policy direction and alignment.**
2. **Individuals with lived experience and family engagement.**
3. **Funding and compensation frameworks.**
4. **Workforce development.**
5. **Research, evaluation, and knowledge translation and use.**
6. **Leverage technology and information sharing.**
7. **Cultural safety, awareness, and competency.**

EBBD 2011

The second Early Brain & Biological Development Symposium was held May 30 through June 3, 2011, at The Banff Centre. While the 2010 Symposium was focused on laying down the foundations of the core story of early brain and biological development, the 2011 Symposium was designed to focus more sharply on how to move that foundational base of interdisciplinary knowledge into Alberta's science, policy, and practice communities – the next step in the ultimate goal of turning "what we know into what we do."

Symposium Structure

The Symposium brought together more than 100 participants from diverse backgrounds, perspectives, and professions representing a wide range of organizations in Alberta. Most were reconvening for their second EBBD. The Symposium opened with a video featuring a number of participants reporting their experiences incorporating learnings from the 2010 EBBD into their work in a variety of settings. Their reports indicate that the first EBBD succeeded in engaging participants in transforming their approach to reflect current scientific knowledge and bring about change in their spheres of influence. Morning plenary sessions featured expert presentations on the latest research in early childhood development. Smaller group afternoon sessions focused on understanding and communicating the science and its implications for policy and practice. Throughout the week, Learning Teams met to work on specific group goals for applying knowledge gained from the Symposium to their workplaces. On the final morning, the groups made presentations to a special guest panel of senior-level decision-makers from academic, government, and health-related sectors on how they planned to continue working together to achieve these goals over the following year.

Foundational Science

The Symposium unfolded from a series of presentations by the Content Faculty, 13 distinguished scientists from universities in North America and the United Kingdom. Themes for each day's presentations built logically throughout the week. Monday provided a recap of the core story of early brain development. Tuesday examined the effects of stress on the biology of development, or how stress gets "under the skin" to produce changes in brain and body. Wednesday addressed enduring challenges of toxic stress and evidence-based approaches to prevention and treatment. Thursday looked at the foundations of lifelong health

and models for change. The core principle that early childhood experiences lay the foundation for lifelong physical and mental health, learning, and productivity was re-affirmed. The importance of consistent, responsive relationships with caring adults was emphasized as the key buffer against the effects of toxic stress in early childhood. A third, corollary principle that emerged was the need for policies and programs across multiple sectors to support caregiver and community capacities fundamental to the healthy development of young children.

Implications of the Science

The Content Faculty presentations suggested a number of priorities for the research, policy, and practice communities. The overwhelming scientific evidence of the effects of adverse childhood experiences on the biology of development points to the possibility of identifying biological markers as precursors to behavioural symptoms of mental disorders and addictions. More research is needed in this area. In the practice domain, there is a need for systems to ensure interventions are evidence-based and monitored for effectiveness. There was also emphasis on the need to incorporate information on the science of early brain development into the training of primary care professionals and to frame this information for the public, particularly for new parents. Since the first EBBD, changes along these lines have already taken place in Alberta, for example, in nursing school curricula. For policy, new approaches – not necessarily new funding – are required, for example, rebalancing funding to invest more in the pre-school years and putting caregiver and community supports in place across the wide gamut of policy areas that influence child health and development. Policy decisions since the first EBBD have set these changes in motion in Alberta.

Communicating the Science

While the science of early childhood and brain development has advanced dramatically in recent years, the public still has a foggy, often misguided notion of how the brain develops; what, if anything, can be done to promote healthy development; and who is responsible for doing it. When thinking about child development issues, the public is influenced by deep-seated values and cultural models that they use unconsciously to frame incoming information about the world around them. New scientific information must negotiate this swamp and may not come through intact. This has major implications for advocates seeking to change policy with respect to child health and development.

The FrameWorks Institute is a non-profit research organization that uses research from the social and cognitive sciences to translate or re-frame scientific information for non-scientists. FrameWorks has conducted research to uncover the values and cultural models underlying Albertans' knowledge and attitudes regarding early childhood and brain development, mental health, and addiction. Results from that research were shared at the Symposium. Each afternoon, researchers from FrameWorks provided hands-on workshops on framing the scientific knowledge into a common "core story" of early child development to increase public understanding and influence policy and program decisions.

Resources

Participants received a preview of the new AFWI website (http://www.albertafamilywellness.org/), which provides a portal for accessing a wide range of resources on early brain and biological development, child mental health, and addiction geared specifically to researchers, health care professionals, front-line professionals, policy makers, and the general public. These include document and video libraries, learning modules, event listings, and information updates via email, as well as video summaries of Symposia highlights and a collection of current Working Papers from the National Scientific Council on the Developing Child. The website will be a continuing source of current information for all stakeholders.

Further Engagement

Working in Learning Teams, Symposium participants prepared action plans for continuing their engagement and incorporating the learnings of the Symposium into their workplaces in the coming year. For example, members of one team plan to find ways to integrate the early childhood development core story into their work and share feedback in quarterly videoconferencing meetings; another team plans to facilitate inclusion of EBBD content into promotional and educational materials and media. The Learning Teams are meant to continue as formed throughout the three-year strategy. Participants will reconvene in the spring of 2012 for the third annual EBBD Symposium.

INTRODUCTION:

Now Is the Time to Turn Knowledge into Action

The weight of evidence from a wide range of research disciplines — developmental and behavioural neuroscience, epigenetics, developmental psychology, molecular biology, economics, and program evaluation — is converging on a single, fundamental conclusion: early childhood matters, enormously.

Experiences during the first few years of life can support or derail the lifelong course for physical and mental health, learning, and productivity. We know that the complex biology underlying these effects is the result of the interplay between genes and environment. We also know that the foundations for healthy development include stable, responsive relationships with adults and safe, supportive environments. These factors depend upon the capacities of parents, caregivers, and communities. At this point the conclusion becomes obvious: almost every policy domain that affects how people live plays a role in the healthy development of children into productive, responsible adult members of society.

Full appreciation of this cascade of effects leads to the purpose of the second EBBD Symposium: turning what we know into what we do. The 2011 Symposium provided an opportunity to discuss a variety of potential program and policy innovations that will apply the best of what we know to solutions for children and their families and yield a higher return on investment for all Albertans. Participants from the research, policy, and practice areas demonstrated their readiness to work together and lead in this effort. By using our collective resources more effectively and wisely, we can provide an optimal environment for early childhood development.

PART 1

FOCUS CHALLENGES FOR LEARNING TEAMS:

Research Priorities (Teams 1 & 2)

Co-ordination of Education, Justice, and Health and Human Services (Teams 3, 4 & 5)

Collaboration Between Academia and Policy and Practice Areas (Teams 6 & 7)

Child Mental Health Policy and Practice (Teams 8 & 9)

Child and Family Primary Care Practice (Team 10)

Early Childhood Intervention and Development Services (Teams 11 & 12)

Training and Development for Clinicians and Professionals (Team 13)

The Symposium Experience

The 2011 EBBD Symposium reconvened a diverse group of participants and expert presenters in a professional setting that fostered learning and discussion in large group, small group, and personal contexts.

2011 Symposium Objectives

Key objectives of the 2011 EBBD Symposium were to:

- Build on knowledge of connections between early brain and biological development and the prevention of negative health and social outcomes, including addiction, across the lifespan.
- Continue dialogues within a multi-disciplinary community, nurture the development of networks, and support innovation in Alberta around early brain and biological development.
- Support participants' capacity for translating knowledge into action (i.e., turning learnings into science, policy, and practice).
- Attend to personal learning objectives within a personal disciplinary and work setting.

The Learning Process

Each day of the Symposium was organized around a theme corresponding to primary areas of research in science, practice, and policy.

MORNING PRESENTATIONS

Morning plenary sessions were devoted to presentations of leading-edge research by Content Faculty, building upon scientific content presented at the 2010 EBBD Symposium, followed by opportunities to engage in question and answer sessions with the presenters.

DISCIPLINARY COHORTS

Participants met with their professional peers in science, policy, or practice cohorts to review the morning presentations and identify the implications and opportunities for initiatives in the context of their own disciplinary communities.

FRAMEWORKS FRAMEFOUNDRY

Communication experts from FrameWorks engaged participants in exercises to deepen their knowledge of framing and practise their framing skills to communicate the science of early child development.

GUEST PANEL REPRESENTATIVES

Maria David-Evans
Deputy Minister
Ministry of Aboriginal Relations
Government of Alberta

Tom Feasby
Dean, Faculty of Medicine
University of Calgary

Richard Hawkes
Senior Associate Dean (Research)
Faculty of Medicine
University of Calgary

Fred Horne
MLA Edmonton-Rutherford
Government of Alberta

Ken Hughes
Chair, Alberta Health Services Board

Jacques Magnan
CEO, Alberta Innovates – Health Solutions

Kurt Sandstrom
Assistant Deputy Minister of Safe Communities, Government of Alberta

Jackie Sieppert
Dean, Faculty of Social Work
University of Calgary

Jim Talbot
Senior Medical Officer of Health
Alberta Health and Wellness

John Thomson
Senior Policy Manager
Government of Alberta

Annette Trimbee
Assistant Deputy Minister of Safe Communities, Government of Alberta

Pam Whitnack
Executive Vice President of Rural Public and Community Health
Alberta Health Services

FACULTY WORKSHOPS

Content and Junior Faculty provided participants with the opportunity to delve deeper into the content presented in the morning sessions and focus on how to turn their learnings into action.

LEARNING TEAMS

Learning Teams, which were organized at the 2010 Symposium, reconvened to work together along with new participants throughout the week in FrameWorks' FrameFoundry sessions and in designated evening Learning Team hours. Each team revisited the vision they created in 2010 for their particular Focus Challenge, created an action plan for the coming year to move closer to that vision, and worked on a team FrameFoundry project to present on the final day of the Symposium.

LEARNING TEAM SYMPOSIUM PRESENTATIONS

The Symposium concluded with a Friday morning session in which the Learning Teams delivered brief presentations to the full Symposium audience. Each team shared its goals for the coming year for communicating and implementing Symposium learnings in their professional settings. A special guest panel of high-level academic, policy, and government leaders in Alberta followed up with questions and comments. Participants took their leave in an atmosphere of enthusiasm and camaraderie as they moved forward into the second year of this unique initiative to create positive change for children and their families in Alberta.

PARTICIPANTS

Of the 100 active participants, over 70 per cent were returning participants from the 2010 Symposium.

The participants encompassed a diverse range of backgrounds, perspectives, and professions, including many from Government of Alberta ministries, Alberta Health Services, and Alberta's research-intensive universities. They included policy makers, program developers, members of the judicial system, health practitioners, clinicians, researchers, psychiatric residents in training, students, advocates, funders, and representatives of numerous professional bodies and organizations. (See Appendix 3 for a list of participants by Learning Teams.)

The participants have agreed to remain engaged in the three-year initiative through its completion. During this time, participants are spending approximately three hours per month communicating with their co-participants and taking advantage of additional mid-year learning opportunities. Their employers have agreed to support the initiative by incorporating these activities into the participants' job responsibilities during this period.

"It's been truly a pleasure to be with an audience that is so keenly engaged and so receptive and open to thinking about what they do and thinking about what their environment looks like, and wrestling with these difficult problems in a serious, good-natured and well-meaning way. I've really enjoyed it."

Richard Frank, PhD
Harvard University

SYMPOSIUM HOST ENVIRONMENT

The Symposium was held at The Banff Centre, located in Banff National Park. Participants stayed at the Centre's on-site hotel. The Banff Centre is a public, board-governed, specialized arts and culture institution providing non-parchment programs in the arts and creativity, and in leadership development, mountain culture, and the environment.

SYMPOSIUM SPONSORS

The EBBD 2011 Symposium was made possible by several regional and national organizations, from both the private and public sectors, which sponsored the event. The sponsors included:

- Norlien Foundation
- Government of Alberta
- Alberta Health Services
- University of Alberta
- University of Calgary
- University of Lethbridge
- Hotchkiss Brain Institute
- Alberta Children's Hospital Research Institute for Child and Maternal Health
- Women & Children's Health Research Institute
- TransCanada Corporation

SYMPOSIUM DEVELOPMENT AND MANAGEMENT

The Symposium involved a number of dedicated people in its development, planning, and delivery. See Appendix 1 for a list of the members of the Senior Leadership Team, the Design Committee, the Program Committee, and the Norlien Foundation staff who supported this event.

DAILY CONTENT THEMES

Day 1
The Frameworks of Early Brain Development

Day 2
Stress and the Biology of Development

Day 3
Addressing the Enduring Challenges of Toxic Stress

Day 4
The Foundations of Lifelong Health

Day 5
Where Science Meets Real Life

PART 2

The Foundational Science

The Content Faculty set out the scientific foundations of early brain and biological development, including some of the latest thinking in early childhood development, observations as to future directions in the field, and the implications for research, policy, and practice. Complete video recordings of their talks and PowerPoint presentations are available on the AFWI website.

Highlights of the faculty presentations weave a compelling story.

EARLY CHILDHOOD DEVELOPMENT:
What We Know, What We Need to Do, and Why It Matters

Rapid advances in the science of early childhood development present a challenge for society that cannot be ignored. Findings from neuroscience, developmental psychology, molecular biology, and economics have converged to conclude that early childhood matters. Adverse early life experiences such as abuse, neglect, and caregivers with mental health and addiction issues affect the developing brain, resulting in increased risk of physical and mental disorders, addiction, and learning deficits later in life.

All of society has a big stake in this issue. The healthy development of all children provides a solid foundation for economic productivity, responsible citizenship, and strong communities.

BUILDING BETTER BRAINS

Different parts of the brain perform different functions and develop at different rates. In the first few years of life neurons are making connections with other neurons. This early brain-building process creates more connections than the brain will have at any other time of life. Connections that are not used get pared away.

"That's where experience matters enormously," says Dr. Judy Cameron, a professor of psychiatry, obstetrics, gynecology and reproductive science and director of the Clinical Translational Science Institute Outreach Program at the University of Pittsburgh. "If your parents read to you, talk to you, and ask you to reason, you are using the brain circuits you will need for reading, comprehension, and reasoning. Those circuits will be strengthened and stay in place. If you're on your own a lot and watching TV all the time, you're not using the same circuits and they will not be strengthened. Social interaction is a good way to get a child to use the circuits needed into adulthood."

Early experience also alters gene expression inside the brain cells, Dr. Cameron says. "Genes are like a cookbook. They provide a set of instructions for the cook/cell nucleus. Choosing which instructions the cell pays attention to depends upon the environmental setting. So environment matters."

In her laboratory work with monkeys, Dr. Cameron notes a big difference in the social development of baby monkeys separated from their mothers at different ages. If the mother is taken away from the baby at one week, the infant shows a social deficit as it matures. A monkey separated from its mother at one month doesn't exhibit the same deficit. "It depends on when you experience the stress what the outcome will be. During that three-week difference, the processes that are going on in the brain and the neural circuits that are forming are those that are going to be most affected by an adverse early experience."

Dr. Cameron's group found that pairing the baby monkey with a surrogate mother at an early stage rapidly remediates the infant's social behaviour, but intervention at a later stage has no effect.

"This tells us that there's a very good window of opportunity for therapy. If you provide therapy early, it can reduce disruptions in the developing immune and nervous systems so you don't have later problems in learning, behaviour, and health. If you want to maximize return on investment you need to pay attention to the basic principles of neuroscience and provide intervention early."

HOW STRESS "GETS UNDER THE SKIN"

Scientists are starting to get a handle on the biological pathways that underpin brain development and how stress "gets under the skin" to affect brain and body. Early toxic stress embeds itself in our biology in a range of systems and manifests itself in adulthood in any number of chronic conditions and disorders, from cardiovascular disease and diabetes to addiction and mental illness. How early exposure to psychosocial risk translates into biological risk for disease later in life could be explained by elevated levels of inflammation, says Dr. Andrea Danese, a clinical lecturer in child and adolescent psychiatry at the Kings College Institute of Psychiatry in London, U.K.

Inflammation is a component of the body's innate immune system that allows us to respond quickly to physical damage or infection. "Inflammation is also a well-established predictor and cause of medical conditions such as cardiovascular disease," Dr. Danese says. His research in collaboration with two major cohort studies – the New Zealand Dunedin Multidisciplinary Health and Development Study and the British Environmental Risk (E-Risk) Longitudinal Twin Study – found a significant correlation between maltreatment in childhood and elevated inflammation in later years. What's more, these effects start to surface as early as age 12.

"This means strategies for adult disease should start from an early age," Dr. Danese concludes. "We can ask adults to improve their diet and exercise, but this misses the point: the origins of these lifelong disease processes are in childhood. I think we should start thinking about intervention made early in life having perhaps much larger returns in health and wealth than interventions made later in life."

Dr. Matthew Hill, an assistant professor in the departments of cell biology/anatomy and psychiatry and member of the Hotchkiss Brain Institute at the University of Calgary, also points to inflammation as a key component of the biological mechanisms by which early stress has residual effects into adulthood. Evidence suggests wheels are set in motion at an early stage when the brain's stress system is developing. "It seems that adverse experience during this period creates what we call 'epigenetic' changes that essentially program the stress system to be hypersensitive."

Specifically, early life stress can trigger an epigenetic mechanism that silences the expression of the glucocorticoid receptor gene. Glucocorticoids are secreted in response to stress and act to limit stress-induced inflammation. Individuals who experienced early life adversity show resistance to the anti-inflammatory action of glucocorticoids.

"It's currently believed that hyper-inflammation is really the silent partner of what's mediating a lot of these effects of early life stress and quietly brewing under the skin," Dr. Hill says.

THE DOSE EFFECT

There is no evidence of a unique relationship between particular early risk factors and outcomes. However, the number of early risk factors adds up to produce a cumulative risk. Various studies, including the Dunedin study, confirm this so-called "dose effect." One of the largest, the Adverse Childhood Experience (ACE) study (a collaboration between the Centers for Disease Control and Prevention and Kaiser Permanente in San Diego, CA), analyzed the relationship between a wide array of adverse childhood experiences (ACEs) and health and behavioural outcomes later in life in 17,000 members of the Kaiser Health Plan. Subjects were given a score of one for each of nine ACEs:

1. Recurrent physical abuse
2. Recurrent emotional abuse
3. Contact sexual abuse
4. An alcohol and/or drug abuser in the household
5. An incarcerated household member
6. Someone who is chronically depressed, mentally ill, institutionalized, or suicidal
7. Mother is treated violently
8. One or no parents
9. Emotional or physical neglect

The study found that the number of ACEs has a graded relationship to many common medical and public health problems, from smoking and lung disease, alcohol abuse, and HIV risk to attempted suicide, teen sexual behaviour, depression, and liver disease. ACEs also come in clusters. In fact, 16% of the subjects were carrying the embedded biology of four or more adversities. ACEs appear to affect multiple biological systems and brain functions, leading to multiple problems in different health and social domains.

The ACE study was retrospective: adult subjects were asked to recall their early childhood experiences. The Dunedin study, which followed subjects from birth, measured for a set of ACEs constituting childhood maltreatment, such as physical and sexual abuse and harsh discipline, and found a similar dose effect of biological embedding in children.

"There's a whole array of things that can come out of disordered development as a result of toxic stress," says Dr. Robert Anda, a senior scientific consultant to the Centers for Disease Control and co-principal investigator in the ACE Study. "The potential manifestations of adversity in people's lives are infinite."

EARLY STRESS BUFFERS

When children grow up under conditions of high adversity, they fall behind in developmental milestones. The more severe the amount of toxic stress they're experiencing, the more likely they are to fall behind.

"Wrapping a child in bubble wrap is the worst thing we can do to help them develop into competent, stress-resilient adults," says Dr. Megan Gunnar, a professor at the Institute of Child Development at the University of Minnesota. "You have to have experiences that challenge you if you're going to be competent as an adult. It's the toxic stressors that we worry about.

One of the best predictors of resilience in children is at least one safe, secure adult relationship, Dr. Gunnar says.

"The big message is the critical role of relationships in stress regulation, especially in early child development. In real estate it's location, location, location. In biology it's timing, timing, timing. And in child development it's relationships, relationships, relationships."

SEND IN THE CLOWNS

Dr. Gunnar has seen the effect of relationships on stress regulation in her research laboratory, where she studies the activity of the hypothalamic pituitary adrenocortical system, which is critical in mediating the impact of adversity on children's health and brain development. The system produces cortisol, a powerful steroid hormone that is necessary for healthy functioning. However, if cortisol is frequently elevated in response to chronic stressors, it can have powerful negative effects on development. Dr. Gunnar's research involves putting children into situations that produce fear reactions and measuring the effects on cortisol levels. For example, a child and his or her parent will be together in a room and a clown will enter and invite the child to play. Circus wisdom notwithstanding, some children are frightened by clowns.

"We measure cortisol before and after these experiences and we also look at the quality or security of the parent-child relationship," Dr. Gunnar explains. "In secure relationships, even though the child is frightened by our clown, we see no increase in stress hormones – they're not having to kick that powerful stress response system in. They're frightened; they go to the parent; the parent is the place of security. But not so with insecure kids. They elevate cortisol even though their parent is present. It's the expectation of supportiveness the child is going to get from the parent that makes the difference."

The core component of the relationship that so powerfully buffers stress is the serve-and-return reciprocity of the relationship that has been developing since birth, Dr. Gunnar says.

BABIES ARE SOCIAL BEINGS

Human infants come into the world ready to attach and to serve and return with those around them. They show a preference for looking at drawings of faces and within a month they will attune to the eyes of another as the key feature for communication. At two months they will scan between the eyes and mouth for more cues as to what another is thinking. Meanwhile they are producing their own social signals mirroring the expressions of those around them. By six weeks the ability to perceive others' emotions and to produce emotional signals lends itself to a back and forth interaction between the baby and parent or other caregivers. By age one, a baby expands his or her social world by initiating a shared attention with another on an object in his or her environment.

"This kind of interaction is essential and sets the stage for all kinds of learning that goes on in early childhood – language learning, cognitive learning, emotional regulation," says Dr. Heather Henderson, an associate professor in the department of psychology at the University of Miami. "Social interactions are important not only for making well-rounded social children but for making children who do well in school, who achieve up to their full potential, and thrive in many other domains of development.

"This means we need to think about the consequence of having a limited quantity or quality of social interaction with caregivers in the early environment." Such limiting factors could include parental substance abuse or psychopathology or factors within the child such as temperament or developmental disability.

Research with behaviourally inhibited children and children with autism shows that learning deficits due to poor early social interaction can be mitigated by early intervention involving cognitive behavioural therapy targeting attention and other self-regulatory responses. This type of learning is a function of the pre-frontal cortex, which has a long window of plasticity.

"The Dunedin study showed a linear relation between childhood self-control and ability to focus, and adult health and wealth," Dr. Henderson says. "The gradient is steep. The good news is we can teach this, partly because of the long window of pre-frontal cortex development. This suggests a great intervention and prevention target. It could even be a public health level intervention that would help everyone."

At the very least, it is possible to provide a pre-school environment with high-level instructional supports to minimize losses and maximize gains for children at risk because of early deficits in social interaction, Dr. Henderson says.

PARENTING AND ADDICTION

Dr. Linda Mayes, a professor at the Yale Child Study Center in the Yale School of Medicine, looks at early adverse experiences and parent-child attachment from an intergenerational viewpoint. "Adverse childhood experiences compromise children's cognitive and emotional development well into adulthood, but they also compromise the capacities of those children as adults to care for the next generation. This becomes part of the intergenerational transmission of trauma, psychopathology, and parenting behaviours."

Chronic stress impacts key biological systems, including reward and stress regulatory systems, she says. These systems are also central to capacities required to care for another, such as self-control, emotional regulation, distress tolerance, decision-making, anticipation of consequences, and capacity to maintain executive control functions in stress situations.

Dr. Mayes talks about an emerging biology of parenting. Animal and human studies suggest the presence of a new infant activates a parent's neural circuitry that is involved in balancing reward seeking and stress modulation. If parents were securely attached when they were growing up there is greater activation of the brain's reward regions when they are interacting with their own baby. They are also wired to respond to an infant's distress cues with future-focused action to attend to the child's needs. This does not happen with addicted parents. They experience decreased reward activation in response to a baby's positive emotions and less sensitivity and more stress in response to their baby's cries. As a result of the addictive process they have become habituated to maladaptive reward-seeking behaviour for dealing with stress.

"Early adversity changes how we as adults manage stress and sets the stage for the addictive process," Dr. Mayes explains. "When you become a parent, the baby's cues become stressful rather than rewarding because you can't anticipate the reward of being successful in the future in taking care of someone. The stress increases your craving to do something habitual to decrease the stress, raising the potential for neglect or abuse. Thus the cycle is back to early adversity for the child.

"This has important implications for how we think about working with depressed or addicted adults who are also parents. It means thinking about addiction as a developmental disorder, one that started very early." This suggests the possibility of changing the focus of intervention from decreasing drug use to improving parenting and increasing stress tolerance. Some programs using this approach, specifically focused on increasing a mother's mindfulness of her experience as a parent and the needs of the child, have shown effectiveness comparable to, and sometimes better than, standard drug treatment.

INVOLVED FATHERS MAKE A DIFFERENCE

The role of the father in parenting has tended to take a back seat in research and program development until recently. Research shows that early father involvement helps children adapt to difficult life situations, and children of involved fathers tend to have fewer behavioural problems and do better in school. The benefits extend to the men in terms of better health and longevity and more satisfying romantic relationships. Women married to involved fathers tend to experience lower levels of post-natal parenting stress and depression and are more responsive to their children.

"Bottom line: all of these changes tend to lower children's risk of being abused and/or neglected," says Dr. Kyle Pruett, clinical professor of psychiatry at the Yale Child Study Center. These observations led to the development of a research and intervention program called Supporting Father Involvement (SFI), the first randomized, controlled clinical trial focused on father involvement in low- and middle-income families.

"We're keying in on the idea that if you want to help the family, you have to start with where the family started – the couple relationship," says Dr. Marsha Kline Pruett, a professor at Smith College School for Social Work, who with Dr. Pruett was part of the team that developed the SFI program. "Stress and unresolved conflict between the parents has a negative effect on children – we all know that."

The study, conducted in California, compared three groups: a control group that received an information session, and two groups – fathers only and couples only – that participated in a 16-week intervention consisting of interactive sessions dealing with co-parenting and relationship issues.

The results showed the fathers' groups helped men become more involved in children's care while children's problem behaviours remained stable. The couples' groups also helped fathers get more involved and kept children's behaviours stable while reducing parenting stress, depression, and anxiety. The control group remained the same or worsened, and their children's behaviour problems increased. Strengthening the co-parenting relationship is what makes the difference, the researchers point out.

The SFI study is now being replicated in Alberta, starting with pilots at sites in Red Deer, Cochrane, Lethbridge, and Edmonton.

"The SFI project has been an unusually successful application of a knowledge base translated into how we can do something to lower the risks that children experience," Dr. Pruett says. "Knowledge translation is a constant motivating pressure that those of us who are generating science in this field feel."

WHERE ARE THE EVIDENCE-BASED TREATMENTS/INTERVENTIONS?

Knowledge translation is a major concern of Dr. John Weisz, a clinical psychologist and professor of psychology at Harvard University. Over the past half century, he says, scores of treatments have been developed, tested, and found to be effective for children and adolescents with mental health problems and disorders.

"Yet, less than five per cent of the care provided to children in North America who have mental health problems is guided by evidence-based practices. Most of the usual treatments offered in clinical practice settings have never been tested in any formal scientific way. Some may work well. Some almost certainly do not work well. The question is: how can we bridge that gap between what we know would help children and what they actually receive in everyday practice?"

Part of the problem is that most evidence-based treatments are designed for a single disorder or a homogeneous cluster of disorders, such as the Coping Cat for anxiety disorders and Parent Management Training for disruptive behaviour disorders. However, children tend to show up with several co-occurring disorders. Busy clinicians don't have time to learn separate treatments for all the different diagnoses they treat. Further, treatment is usually non-linear: different disorders rear up and take priority at different times over the course of treatment. "So treatment starts to look like fighting the mythical Hydra – lots of tentacles, lots of co-morbidity," Dr. Weisz says.

Some services and tools have been developed to address these challenges and help clinicians apply evidence-based treatments in practice. PracticeWise (www.practicewise.com/web/), for example, offers summaries of the best available research studies and clinical protocols, and summaries representing the most common components of evidence-based practices.

Dr. Weisz's group has developed the Child STEPS Treatment Model, which integrates evidence-based treatment components into a protocol with modules addressing four problem clusters – anxiety, depression, conduct disorders, and trauma. The protocol includes a web-based treatment feedback system to gauge how children are responding and provide guidance for treatment adjustments.

"Clinicians we work with say this array of modules can be applied to roughly 75 per cent of their caseload," Dr. Weisz says.

Dr. Weisz is looking to neuroscience to provide more information about the biological processes that accompany changes in emotional, cognitive, and behavioural domains to help guide treatment. He asks: "Is it possible to use biological wisdom and measurement to individualize treatment and understand in a sophisticated enough way what's happening with those core regulatory processes that can help us decide whether medication is needed, or whether psychotherapy, and if so which of several varieties might be most appropriate and helpful?"

TOWARD INDIVIDUALIZED TREATMENT

Dr. John March, a professor of psychiatry and behavioural science at Duke University Medical Center and director of the Neurosciences Medicine Group at the Duke Clinical Research Institute, is convinced that individualized treatment is exactly where the field is heading. He sees medicine over the next two decades moving from curative treatments oriented toward the average patient to personalized pre-emptive treatments that interrupt the course of a disease before the patient becomes symptomatic.

"The treatments we have available now target clinical phenotypes, meaning the kids are already sick and showing behavioural symptoms when we begin their treatment and the object is to make the disease state go away. That's a little late in the game, like treating someone who has already had a fifth heart attack."

Pre-emptive intervention means not only managing early risk factors, such as toxic stress, but also modifying the fundamental biology of the person in a way that reduces vulnerability, he says. This progress will flow from advances in developmental neuroscience that increase understanding of the underlying systems biology from the genome through the development of neural networks that control the information processing centres of the brain where altered executive function or impairments in response inhibition produce the behavioural symptoms of depression, anxiety, or other disorders.

"Over the next 20 years, as we move closer to the biology, the targets of treatment will no longer be illnesses; they'll be information processes which reflect this underlying systems biology at the molecular level," Dr. March says. Pre-emptive treatments would combine drug therapy with psychosocial interventions at critical windows of plasticity in neurodevelopment. Biomarkers that can be related to on-trajectory or off-trajectory development will yield points of leverage for these interventions.

Using electronic health records, it will be possible to create very large data sets that will generate evidence of possible benefits and harms of various treatment methods based on individual histories, environments, and biomarkers, Dr. March says. "This will allow the clinician to say with reasonable predictability that this patient should get this intervention and never that intervention."

IMPORTANT NEXT STEPS

In the near term, steps can be taken to identify and foster promising innovations in early childhood programming.

"There is an abundance of reports about exciting new initiatives, innovative social enterprises, and community-based programs," says Dr. Richard Frank, a professor of health economics at Harvard University. "The question is: why is it so rare that we implement new things that work on a large scale?"

The reasons relate to how government and academia function. In the public sector, unlike the private sector, there is no systematic vetting process to compare programs and identify those that are most effective and efficient. "Institutions are needed to search out and pull together what we know, make it accessible, and present it so comparisons can be made," Dr. Frank says. Another issue is that programs are designed for target populations, usually high-risk groups, Dr. Frank says. "But when they are implemented, the political environment tends to reward doing more for more people. It boils down to mission creep. We have to run our public programs in ways that targeting is supported, not undermined, and make sure the right people get the right services at the right time."

Another challenge in implementation is the danger of neglecting a key "active ingredient" of the original program design, perhaps by cutting corners in the wrong places. "In the private sector, we franchise," Dr. Frank says. "It entails taking a good idea, identifying the active ingredients, simplifying the model, writing down the rules, training people so they can obey the rules, and then measuring fidelity."

Fragmented and rigid budgeting in public health and human services leads to a system where benefits, credits and outcomes are diffuse and there is little incentive for promoting innovation. When budgets are tight, new programs are harder to implement and old ones harder to remove.

Dr. Frank points to two ideas that are getting attention as ways to finance innovation. Under a system called gain sharing, a government would bundle a group of services together that serve multiple dimensions of early childhood needs and establish dimensions for performance. "Then you can set up the payment system in such a way so that the gains are shared by the original payer (the government) and the agency producing the goods. The agency would then reinvest its share in new, innovative programs aimed at the same target."

Another new idea, now being tried in the United Kingdom, is to issue social impact bonds. The government, contracted agency, and private investors agree upon a set of outcomes. "If the program is successful, the investors get a payback from the government," Dr. Frank explains. "So the government only pays back when a program is successful. That means the investors have a huge stake in making sure that the agencies running these programs have been fully vetted, are capable of doing the job, and are likely to do it well."

NEW APPROACHES TO POLICY AND DELIVERY

A new environment that encourages innovation is essential, says Dr. Jack Shonkoff, professor of child health and development with the Harvard School of Public Health and Harvard Graduate School of Education and director of the Center on the Developing Child at Harvard University.

"We understand the underlying biology; we understand the foundations of healthy development; we understand how community caregiver and community capacity strengthen those capacities that enhance the underlying biology, and that leaves us with the policy and program levers for innovation."

Dr. Shonkoff outlines three promising domains for fresh thinking. First, reduce developmental barriers to learning, including problems of the executive function of the brain that make it difficult for children to benefit from an enriched language experience. "We have a lot of promising interventions that are very effective at building emotional regulation and social behavioural skills and executive function in children, but haven't taken them to mainstream."

A second priority is to enhance the resources and capacities of the family environment. "There are skill-building issues that are linked to adult executive functioning skills that have to be addressed for parents beyond just providing information. We need communities that are willing to rethink the concept of parent engagement and community support and take it to a new level."

A third line of innovation is to strengthen the early childhood foundations of lifelong health. "Even a large part of the medical community doesn't connect to the fact that adult disease begins in early childhood."

In order to create an environment where the development and testing of new ideas is possible, it is necessary to totally change the culture of research, policy, and practice, Dr. Shonkoff believes. The current model puts tremendous value on low-risk success, he says.

"We have tremendously powerful messages coming from science, but in order to implement them into a program and then ultimately into a policy means that somebody has to be willing to take some chances. All of the big breakthroughs are based on learning from failure. Somebody has to be willing to commit a program and its staff and philanthropic resources, if not public resources, to say we're going to try this and we're going to make it safe to fail.

"Finally, if we're going to have real change, it's going to require a deep commitment to the issue of legacy. For the people in public office, this is not a re-election issue. It's not something that's going to pay back during the time you're in office. For innovation to take place in the field, we have to have visionary leadership that understands the need for risk and patience and refuses to settle for what we do now as the best we can do."

ENGAGING PUBLIC ACTION

What can society do now with the vast base of scientific knowledge that is already available? Dr. Anda says there is no time to lose.

"Every human system or function is affected by ACEs. This is a developmental process that affects all of society."

Dr. Anda suggests two immediate action steps. "Number one is to collect population- based information about childhood adversity and its effect on society in whatever geographic unit you live in. That gets it on the books so that everyone, including policy makers and legislators, can see it as 'our' problem.

"The other action is to package this information in a way that's appropriate for the average person so they can understand it. And then give them resources to turn to if they want help. If they understand the problem, they will want change, and the systems around them are going to have to respond to them. It's a classic public health approach."

Abstract:

THE INTERPLAY BETWEEN EARLY BRAIN AND BEHAVIOUR DEVELOPMENT

By Judy Cameron, PhD

References: National Scientific Council on the Developing Child Working Papers 1 and 2. See Appendix 7 for a full list of citations.

The current science of early child development underscores the importance of viewing the needs of children in a broad context. Findings from neuroscience, developmental psychology, molecular biology, economics, and program evaluation research are converging to conclude that early childhood matters. Early experiences play a key role in the development of a child's brain as well as his or her behaviour. How this process works involves four key concepts:

Concept #1: Brains and skills are built over time. Both early experience and genes affect the architecture of the maturing brain. The quality of that architecture as it emerges sets up either a sturdy or weak foundation for all the learning and behaviour that follow. Specialized areas of the brain involved in vision, language, motor skills, and other functions develop at different rates and times. As the child develops, brain cells or neurons collect information through dendrites and connect to other neurons. During the first three years of life, many more connections are made than the brain will have at any other time in life. Over the next several years these connections are pared down so that only the most used connections remain. This is where early experience matters enormously. If a child's parents read to, talk to, and encourage the child to reason, the brain circuits needed for skills such as reading, analysis, and reasoning will be strengthened while others fade away. A child left alone in front of a TV much of the time will not use the same circuits and won't develop the same reasoning skills.

Concept #2: Brain architecture and skills are built in a "bottom up" sequence. Some of the first circuits formed and pruned are sensory circuits. Language development starts very early, within the first year of life. Some of the last skills to develop are the higher cognitive functions such as reasoning and decision-making. Advanced skills build on basic skills.

Concept #3: "Serve and return" is a key ingredient in the learning process. Children learn best when an attentive adult is engaged with them. This process of social interaction focuses the child's attention and gets the child to use the circuits needed to do well in adulthood.

Concept #4: Brain plasticity – the ability to change behaviour – decreases over time. The window of opportunity for development remains open for many years, but the costs of remediation grow with increasing age. Dollars invested in early childhood produce a higher rate of return than money invested in later years.

Early experience not only influences the development of neural circuits, it also influences which genes get expressed inside the brain cells – a process called epigenetics. Early experiences leave lasting chemical "signatures" on genes.

Research on juvenile monkeys provides insight into the timing of appropriate interventions. There is a significant difference in social behaviour between a monkey removed from its mother at age one week and one separated from its mother at age one month. The neural circuits formed during the three-week difference will be most affected by adverse early experience. Meanwhile, all 200 genes expressed in the amygdala of the monkey weaned at one week are changed. An intervention pairing that monkey with an attentive surrogate mother makes a difference, but the timing of the intervention is critical: introduced at 25 days, the surrogate mother intervention rapidly remediates behaviour, but at 40 days the intervention is not effective.

The message: to maximize return on investment, pay attention to the basic principles of neuroscience and human capital formation from economics, and provide intervention early. Later remediation will produce less favourable outcomes.

"Using the analogy of cooking, think of genes as the cookbook and the cell nucleus as the cook. If you have young children coming over, you will pull out the cookie recipes, but if you're making Christmas dinner, you will follow other recipes. In the same way, cells respond to their environment, and the genes that they read and the proteins that they make are going to be influenced by what is appropriate for the environment." **Judy Cameron, PhD, University of Pittsburgh**

Abstract:

Stress and Neurobehavioural Development in Childhood

By Megan Gunnar, PhD

References: National Scientific Council on the Developing Child Working Papers 2, 3, and 5. See Appendix 7 for a full list of citations.

Presentations at the 2010 EBBD Symposium established that adverse early life experiences increase the risk of physical and mental disorders, including increased risk of addiction and other negative health outcomes. The key message is the critical role of relationships in stress regulation, especially in early child development.

The biology of stress supports our capacity to respond to a threat. For example, the medulla produces adrenaline in the autonomic nervous system; the hypothalamic pituitary adrenocortical system produces cortisol, a powerful steroid hormone. When the stress system is activated frequently, the costs to the body can result in poor brain and physical growth in childhood and have far-reaching effects into adulthood, from Type 2 diabetes and coronary heart disease to depression and anxiety disorders.

It is neither desirable nor possible to protect children from all stress. Positive stress, such as frustration while learning to perform a challenging task like riding a bike, helps a child develop into a competent, resilient adult. Serious temporary stress, such as being in an accident or losing a loved one, can be made tolerable by having supportive adults with whom the child has a relationship available to buffer the body's stress systems. Stress becomes toxic when it produces prolonged activation of the stress system, either because there is an absence of protective relationships or those the child must use for stress buffering are sources of fear and threat. Risk factors for toxic stress, such as neglect, abuse, or exposure to violence, have a cumulative effect: the more of them present in a child's life, the more probability of negative outcomes such as severe developmental delays and markedly reduced growth.

Not everyone is affected in the same way by risk factors for toxic stress. One of the best predictors of resilience in children is at least one secure, responsive adult relationship that can buffer stress and turn what might be intolerable into tolerable stress. Some genes make children more susceptible to adverse early life care, but researchers are finding that those same "risky" genes appear to foster better than average development if the child grows up in a supportive environment.

This researcher has studied the effects of supportive relationships in regulating stress, in particular the production of cortisol in infants and children. A newborn baby has a highly reactive stress system, which becomes buffered in the first year of life in a supportive environment. When faced with a scary situation, the child will show fright and seek proximity to his or her parent or other supportive caregiver, but there will be no rise in cortisol. For example, in a study of toddlers exposed to clowns, all showed the same frightened behaviour, but those in secure attachment relationships did not register a rise in cortisol, while children in insecure attachment relationships showed elevated cortisol. The difference between the two groups was the children's expectation of supportiveness from the parents in the room with them.

The powerful stress-buffering core component of these relationships is the serve-and-return reciprocity. Responsive serve-and-return care or its lack early in life writes on our genes and affects how they work throughout life.

"Relationships are the critical modulators of the effects of toxic stress. So, even very bad things can happen to young children, but in the context of supportive relationships, children can learn from those stressors and do fairly well. The absence of consistent relationships is itself a form of toxic stress early in life.
"In real estate it's location, location, location. In biology it's timing, timing, timing. And in child development it's relationships, relationships, relationships." **Megan Gunnar, PhD, University of Minnesota**

Abstract:

Adverse childhood experiences: connecting the development lens to the health of our society

By Robert Anda, MD, PhD

References: National Scientific Council on the Developing Child Working Papers 3, 8, 9, and 10. See Appendix 7 for a full list of citations.

Adverse childhood experiences (ACEs) affect every human function and consequently have a vast impact on society. This is an issue that urgently requires a public health/prevention approach.

The Adverse Childhood Experiences (ACE) Study is a collaboration between the Centers for Disease Control and Prevention and Kaiser Permanente's Health Appraisal Clinic in San Diego. Viewing the life pathway as a pyramid, the study assessed the links from a base built on ACEs through succeeding levels of social, emotional, and cognitive impairment to disease and early death. Most interventions enter at a point too high up the pyramid where something has already gone wrong. This approach is costly and the returns are poor.

The ACE study subjects – more than 17,000 members of the Kaiser Health Plan – provided detailed information about their childhood experiences of abuse, neglect, and family dysfunction. While subjects rated relatively high on socio-economic status, education, and quality of health care, ACEs were common. The study assessed a wide array of traumatic childhood experiences as well as many behavioural, health, and social problems from adolescence to late adulthood. The findings are consistent with recent discoveries about the neurobiology of stress and the effect of stress on the developing central nervous system.

The study showed that ACEs occur in clusters. An ACE distress dose score was devised to measure this effect and it was determined that 16% of the subjects were carrying the embedded biology of four or more adversities. The ACE score correlated with a range of health-risk behaviours, such as smoking, alcohol abuse, teen sexual behaviours, and HIV risks. As the number of ACEs increased, the risk for health problems – from alcoholism and fetal death to suicide attempts, liver disease, and teen pregnancy – increased significantly. Likewise, the risk for multiple co-occurring health and social problems rose with the ACE score. Researchers also found that the number of drug prescriptions written for all 17,000 subjects over a specified period rose with the ACE score.

In order to change these pathways, it is important to understand that health-risk behaviours are adaptations to the way a person's brain architecture was built. In the past we have responded to one problem at a time in isolation. It is time to develop systems that respond to the whole person. This is a public health issue. The most effective action we can take is to bring the information we now have to the general public so they can change the way they relate to their children.

"The most important, necessary, effective thing we can do now is to take this information to everyone. Some people will find transcendence in the information and be able to distance themselves from what happened to them and see their lives in perspective. They will begin to heal themselves and change their relationship to their children and that will change the intergenerational transmission of the things we're talking about at this Symposium."

Robert Anda, MD, PhD, Consultant, Centers for Disease Control and Prevention

Abstract:

BIOLOGICAL EMBEDDING OF ADVERSE CHILDHOOD EXPERIENCES

By Andrea Danese, MD, PhD

References: National Scientific Council on the Developing Child Working Papers 3, 9, and 10. See Appendix 7 for a full list of citations.

Adverse childhood experiences have been linked to medical as well as psychiatric disorders in later life. What is not known is the mechanism by which exposure to toxic stress in early childhood translates into risk for disease in adult life. There are strong data suggesting an association between childhood maltreatment and cardiovascular disease later in life, pointing to inflammation as a key factor.

Inflammation is a part of the innate immune system. It is the body's response to injury or infection that quickly helps prevent the spread of infection and promote tissue repair. Inflammation is also a well-established predictor and cause of cardiovascular disease and is an important mechanism in the development of other medical conditions. This suggests inflammation could be the missing link between exposure to childhood maltreatment and physical health later in life.

This hypothesis was tested in research carried out in collaboration with two cohort studies: the New Zealand Dunedin Multidisciplinary Health and Development Study and the British Environmental Risk (E-Risk) Longitudinal Twin Study. The first collaboration compared reported childhood maltreatment to levels of C-reactive protein (an element of inflammatory response) in 1,000 subjects followed from birth to age 32. Results showed a direct association between cumulative exposure to early childhood stresses – including maternal rejection, harsh discipline, frequent and disruptive change of caregivers, physical abuse, and sexual abuse – and inflammation levels at age 32. Subjects exposed to childhood maltreatment were twice as likely to show elevated inflammation levels in adult life as those who were not. The study also looked at the relative contribution of stress in early life and stress in adult life. The effect of childhood maltreatment proved larger.

When do the biological effects of maltreatment emerge? Collaboration with the E-Risk study looked at a sample of children at age 12. The children who were maltreated already showed elevated levels of inflammation.

The conclusion is clear: timing matters. Effective prevention strategies for adult disease should start in childhood and include attention to the psychosocial environment children live in. Interventions made early in life will have much larger returns in health and wealth than interventions made later in life.

"Strategies for preventing adult disease should start from an early age. We can suggest that adults improve their diets, exercise more, and quit smoking, but this misses the point. The origins of these lifelong disease processes are in childhood."

Andrea Danese, MD, PhD, King's College London

Abstract:

Residual effects of early life stress into adulthood: biological mechanisms

By Matthew Hill, PhD

References: National Scientific Council on the Developing Child Working Papers 3, 9, and 10. See Appendix 7 for a full list of citations.

Toxic stress experienced in early life can increase a person's risk of developing an array of cardiovascular, inflammatory, mental, and metabolic illnesses. Stress produces a shift in the body's biological systems to prepare for "fight or flight" in response to a perceived threat in the environment. These biological changes include increased blood glucose, increased blood pressure, modulation of the immune response, vigilance, and arousal. As a short-term response, they prime an individual to perform optimally and are essential to survival. But repeated activation of these systems, especially in response to chronic toxic stress, results in a wear-and-tear effect on the body called allostatic load. Breakdown of these stress response systems can alter gene expression, affect a child's developing brain architecture, and increase vulnerability to both physical and mental illness and addictive disorders later in life.

The Adverse Childhood Experiences (ACE) Study found a significant association between early life stress and depression in adulthood. The Dunedin cohort studies in New Zealand also found an increased risk for depression associated with childhood maltreatment. Other studies suggest that early life stress may change the set point at which the body responds to stress, creating a steady-state level of increased stress and heightened sensitivity to stress in adulthood. There is also evidence that early life adversity is associated with reduced size of the hippocampus and pre-frontal cortex areas of the brain. Impairment of the pre-frontal cortex can increase risk taking and impulsive behaviours such as alcoholism and promiscuity.

How does toxic stress get under the skin? Current theory points to glucocorticoid resistance. Glucocorticoids are among the molecules secreted in response to stress and act to limit stress-induced inflammation. Individuals who experienced early life adversity show resistance to the anti-inflammatory actions of glucocorticoids. This fits with the increased prevalence of inflammatory diseases such as asthma and autoimmune diseases in such individuals. Persistent inflammation has also been linked to the development of major depression. Stress also causes the release of a peptide called corticotropin-releasing hormone (CRH) in regions of the brain involved in emotional processing. Glucocorticoid resistance results in elevated levels of CRH, leading to changes in emotional behaviour and stress perception. Human and animal studies indicate that early life stress can trigger an epigenetic mechanism that silences the expression of the glucocorticoid receptor gene.

These studies have also shown that good, warm parental care early in life can counter these effects and produce resilience to stress later in life. This positive result is matched under the skin by reduced biological responses to stress, and lower inflammation.

"Early child development is a very plastic and vulnerable period during which the biological development of the stress systems is ongoing and sensitive to disruption. The environmental conditions of early life prime the development of the stress system and can contribute to mental and physical health and well-being in adulthood."

Matthew Hill, PhD, University of Calgary

Abstract:

FOUNDATIONS OF SOCIAL AND EMOTIONAL DEVELOPMENT

By Heather Henderson, PhD

References: National Scientific Council on the Developing Child Working Papers 1, 2, 5, 6, and 11. See Appendix 7 for a full list of citations.

Social interaction is an essential developmental process for many types of learning in early childhood. Human social interaction requires the ability to perceive and produce social signals, understand others' thoughts and emotions, and co-ordinate our behaviour with the people around us. It supports the development of language, academic skills, social competence, and emotional well-being. It also lays the foundation for later risk and resilience.

A child grows up in a context of relationships – with parents, caregivers, peers, and others – in which the influences are bi-directional over time: the child is affected by the environment and the environment is affected by the characteristics of the child. Infants come into the world ready to attach and interact with those around them in a serve-and-return relationship. From the start they are able to recognize the voices of their caregivers and will preferentially turn to them. Within a month they will fix on the eyes as the salient feature in another's face and in two months will have learned to scan between the eyes and mouth for information about what the other is thinking. During the same period, they are producing social signals that express their own state. At the end of the first year, they are able to share attention with another about objects in their environment. This ability sets the stage for a range of learning, both cognitive and emotional.

Deficits in early social interactions, due either to a child's own temperament or developmental disability or to external factors such as parental psychopathology, can have a cascading effect on development. Inhibited temperament and autism are two factors within the child that can alter early social development. An inhibited child has a lower threshold for responding to novelty with a fear reaction. This leads to an attention bias toward potentially threatening situations and, in about 18% of cases, a pattern of withdrawal, anxiety, academic difficulties, and increased risk of psychopathology in adolescence.

The cascading effects of social interaction deficits can be reduced through early interventions that target core social abilities involving self-control. These are governed by the pre-frontal cortex, which has a long window for change. Childhood self-control is a predictor of adult health and wealth outcomes, suggesting that teaching self-control could be a public health intervention for all children.

"Fostering self-regulatory skills in children is very important. The Dunedin study showed the capability for self-control as a child has an effect on your functioning as an adult in terms of your health and your financial stability, things that at a public health level are so important to our communities. I think it's a skill set that we can reinforce and model for children in many contexts – home, school, neighbourhoods, and other areas – and I think that could have the biggest bang for our buck over time."

Heather Henderson, PhD, University of Miami

Abstract:

Promoting youth well-being through psychotherapy: redesigning treatments for real-world clinical care

By John Weisz, PhD, ABPP

References: National Scientific Council on the Developing Child Working Papers 6 and 7. See Appendix 7 for a full list of citations.

One out of five children in North America suffers from a mental health disorder. Scores of evidence-based treatments (EBTs) have been tested in randomized controlled trials and about 50 have shown respectable effects in treating mental health disorders in children and adolescents. Yet they have not penetrated very far into the everyday mental health care system that serves children. Most interventions that have been used in clinical practice have not been formally tested, and because they haven't been tested, we don't know if they work.

While EBTs often outperform usual clinical care in randomized controlled trials, these trials are generally conducted in pristine research conditions that are not much like the complex and challenging conditions seen in everyday clinical practice. Most EBTs are designed for a single disorder or a small cluster of similar disorders, yet the large majority of children treated in clinical practice tend to have multiple disorders and diverse types of problems. Also, EBTs tend to be linear, with a series of sessions and topics following a prescribed order, but most real-world treatment is not linear: children's problems and treatment needs often change over the course of treatment.

The Child STEPs program addresses these problems by using a flexible modular approach designed to improve the effectiveness of EBTs in clinical care. The system restructures the elements of EBTs and integrates them into a coherent modular protocol that can be applied to roughly 75 per cent of the caseload of outpatient clinicians who treat youngsters in the 8-13 age range. The model is designed for four problem clusters – anxiety, depression, trauma, and misconduct – using elements of cognitive behavioural therapy and behavioural parent training. The protocol builds upon three core skills a child needs to cope with these mental health and behaviour problems: affect regulation, cognitive regulation, and behavioural regulation. An easy-to-use web-based feedback system helps the clinician quickly gauge how the child is responding to treatment and make modifications as needed.

The STEPs approach has been tested and found to be more effective than usual clinical treatments and standard EBT approaches on multiple measures of clinical outcome. It also rates high in clinician satisfaction.

Key questions about the biology underlying psychotherapy treatment effects with young people remain. Are there biological characteristics that can help predict which treatments will work best with which individuals? Can understanding the biology help to improve the effectiveness of current therapies or lead to more effective approaches?

"If you take a child into a medical clinic and the child needs medication, or the child needs surgery, you can be pretty confident that there's a system in place to monitor the care that's provided. People are not going to prescribe medications that have never been tested; they're not going to do surgical procedures that haven't been through very careful scrutiny. This is not the case with mental health care for children. There's no safety device, there's no organization, no bureau of government that watches over the quality of care that's provided for children with mental health problems. This is why this problem is very important. Nobody else is taking care of it right now. There's an opportunity to take care of it in Alberta."

John Weisz, PhD, ABPP, Harvard University

Abstract:

THE PIVOT TO PRE-EMPTIVE INTERVENTIONS IN PSYCHIATRY

By John March, MD, PhD

References: National Scientific Council on the Developing Child Working Papers 6 and 7. See Appendix 7 for a full list of citations.

Recent advances in translational developmental neuroscience have shown that mental illness and substance use disorders have their roots in early child development and can be traced directly to the complex interactions between the developing brain and its environment. Current treatments were developed for the average patient and target behavioural symptoms of illnesses that we label depression, anxiety, obsessive-compulsive disorder, schizophrenia, or other mental disorders. Treatment typically begins only after the symptoms appear. Intervention at this stage comes too late, like treating someone who has already had a fifth heart attack.

Over the next 20 to 30 years, medicine will move from non-specific curative treatments aimed at behavioural symptoms to pre-emptive personalized treatments that are based on the fundamental biology underpinning these disorders and that interrupt the course of a disease before the patient becomes symptomatic.

Four pivots are needed to develop these pre-emptive interventions:

- Better understanding of the fundamental biology through translational developmental neuroscience. This will involve mapping the pathways to disorders over time, from genes to cells to neural networks that affect how the brain processes information and ultimately produces the behavioural symptoms diagnosed as mental illness.
- Personalized predictive tools in the form of biomarkers – objective measures of fundamental biology that can be used to identify children who are vulnerable to going off trajectory in their neural development. These biomarkers will make it possible to develop interventions that directly target the mechanisms by which mental illness develops and return the child to a more normal developmental trajectory. Ideally, treatment would combine pharmaceutical and psychosocial interventions for optimal results.
- Development of novel interventions (drugs, behavioural interventions, devices) based on the underlying biology and a shift to early-phase clinical pharmacology. This new, practical model for drug development will speed the entry of new therapies into clinical trials by shifting emphasis from traditional Phase 3 and 4 studies to "quick win, fast fail" Phase 1 and 2 studies of new compounds.
- Prevention trials and comparative-effectiveness research. Electronic medical records technology will make it possible to do large pragmatic studies in the real world with large numbers of patients, resulting in very large data sets. This will lead to evidence-based personalized medicine where the clinician can say with reasonable predictability that "this particular patient should get this treatment and never that treatment."

"We've spent an enormous amount of money but we don't have much to show for it. Now we're at a tipping point where that's going to change pretty dramatically over the next five to 10 years, where you have disease-specific personalized interventions that will really make a difference in the lives of people." **John March, MD, PhD, Duke University**

Abstract:

The impact of early adversity on parenting

By Linda Mayes, MD

References: National Scientific Council on the Developing Child Working Papers 1, 2, 3, 5, 8, 9, and 10. See Appendix 7 for a full list of citations.

Early childhood adversity not only compromises children's cognitive and emotional development, it also compromises the capacity of children as adults to care for the next generation. This long-term impact of early adversity on parenting is part of the mechanism that perpetuates a cycle of intergenerational transmission of trauma, psychopathology, addiction, and dysfunctional parenting.

The emerging biology of parenting is uncovering the mechanisms by which early childhood experiences positively or negatively impact the adult transition to parenthood and the capacity to care for another. The presence of a new baby activates specific circuits in the brain, turning them up in sensitivity to cues the baby is giving. This neural circuitry is involved in reward seeking and stress regulation and affects key capacities such as self-control, distress tolerance, decision-making, and the ability to maintain executive control functions in stress situations – all of which must come into play as a parent responds to a child's distress.

If the parent felt securely attached as a child, there is a powerful activation in the brain's reward centres when the parent is engaging in serve-and-return interactions with his or her own baby, such as holding and talking. The more time spent caring for the baby, the more the neural circuits that balance reward-seeking behaviour and stress regulation are enhanced. Animal and human studies document the changes in brain activity that signal this successful transition to parenthood. There is a consistent difference in brain wave activity between parents and non-parents when responding to photos of babies' faces. Seeing her own baby's happy face activates a mother's dopamine-regulated reward circuits. This effect is dampened in depressed or addicted mothers. Likewise, when faced with a crying baby – a stressful situation for any parent – the secure mother's circuitry regulates the stress response as she moves to attend to the child's distress in anticipation of the future reward of a happy baby. Because of her own adverse early childhood, the addicted parent's neural circuitry is geared toward a heightened perception of the parent's own stress and a habitual, impulsive, and maladaptive choice of behaviour – substance abuse – to relieve it. This addictive process brings with it the potential for neglect or abuse and a continuation of the cycle of early childhood adversity.

This model for looking at addiction and parenting has implications for interventions with parents and children. An example is a program called Mothering from the Inside Out, which has been shown to be effective in decreasing substance abuse by focusing on the adult as a parent. The program focuses on increasing the mother's distress tolerance, ability to delay reward (relief), and capacity to maintain decision-making through developing mindfulness – the capacity to think of herself and her child in terms of what she and the child are thinking and feeling. Over time, a mother's ability to mentalize in this way translates into the child's capacity to be a thinking, empathetic adult.

"It doesn't just happen that we become parents. It's built into our biology. Something happens when you have a baby that activates components of the reward circuitry in your brain. This has important implications for how we think about working with depressed or addicted adults who are also parents." **Linda Mayes, MD, Yale University**

Abstract:

SUPPORTING FATHER INVOLVEMENT AND CO-PARENTING TO ENHANCE FAMILY RESILIENCE AND EARLY CHILD EXPERIENCE

By Marsha Kline Pruett, PhD, MSL; and Kyle Pruett, MD

References: National Scientific Council on the Developing Child Working Papers 1, 5, 8, and 10. See Appendix 7 for a full list of citations.

The importance of the mother-child relationship in early child development has been well documented, but until recently little research has looked at the father-child relationship. Recent social changes have affected family roles and highlighted the importance of positive fathering as a buffering factor in a child's early years. Growing evidence shows that children of involved fathers tend to have better peer relations and fewer behavioural problems and attain a higher level of educational achievement. This information suggests a rationale for supporting positive father involvement and co-parenting in at-risk families. However, evidence-based interventions with families are still scarce.

The Supporting Father Involvement (SFI) study in California is a proven randomized clinical trial that demonstrates positive effects of father involvement on parents' mental health and parenting, couple relationships, and child outcomes. Replication of the SFI program is currently underway in Alberta.

The SFI project is based on the premise that in order to help the family it is necessary to start where the family begins: the couple relationship. In the California study, low-income families – including couples who were either married, living together, or not living together – were randomly assigned to three groups. The control groups received a single information session; groups consisting only of fathers and only of couples met regularly for 16 weeks. The study focused on five important risks/buffers for family well-being:

- Parents' well-being.
- Parenting issues (father involvement, parenting stress).
- Couples' relationship quality, how well they work together in care of the child.
- Family of origin issues (transmission of problems from one generation to the next).
- Life stressors and social supports.

In follow-up assessments, the control groups remained the same or worsened with respect to individual mental health, relationship status, parenting stress, and children's behaviour problems. Both the fathers' groups and the couples' groups saw fathers become more involved and children's behaviour problems remain stable. The couples' groups also reduced parenting stress and increased couple relationship satisfaction. A second phase of the study included co-parenting non-biological dads, with similar results. A final phase involved child welfare families where children were no longer being abused. Results showed reductions in alcohol use, domestic violence, and harsh parenting, as well as less anxiety and improved cognitive skills in the children.

This evidence-based program has vast clinical implications for enhancing early child experience and strengthening family resilience in the face of poverty, conflict, isolation, and other risk factors.

"Involved fathers tend to live longer, be happier in their work, and have more satisfying adult romantic relationships. Women co-parenting with involved fathers tend to experience lower levels of post-natal parenting stress and depression and be more responsive to their children. Bottom line: all of these changes tend to lower children's risk of being abused or neglected."

Kyle Pruett, MD, Yale University

Abstract:

PROMOTING WHAT WORKS IN EARLY CHILDHOOD TO PREVENT HEALTH, BEHAVIOURAL HEALTH, AND OTHER SOCIAL PROBLEMS

By Richard Frank, PhD

References: National Scientific Council on the Developing Child Working Paper 7. See Appendix 7 for a full list of citations.

Developments in neuroscience and clinical preventive services have produced a variety of promising early childhood intervention programs. However, policy makers face many challenges in identifying innovations that work and scaling them up in real-world settings to achieve broad social impacts.

First, compared to private markets, where the system is driven by the profit motive and there are well-developed vetting processes, in the public sector there is no systematic vetting process and no consistent way of measuring program costs and outcomes. Second, programs are usually designed with target populations in mind but are implemented in political and human environments that reward doing more for more people. The result is mission creep. Thus, the cost-effectiveness shown in clinical trials is not seen in practice.

A third challenge is to identify the active ingredient in a social innovation so as to make the innovation work in environments other than the incubator that produced it. In the private sector this is called franchising. It involves taking a good idea, identifying the active ingredient, simplifying the model, setting out the rules, training people to follow the rules, and measuring performance.

Fragmentation of public health and human services is another impediment. Often money for a program comes from a variety of sources, so different agencies take credit for providing different services to the same people. Opportunities for co-ordination are overlooked, outcomes are diffuse, and there is little incentive to support specific innovations. Rigidities in government budgeting is another problem. Political pressures on budgets, particularly during economic downturns, make it difficult to remove old programs and introduce more efficient new ones.

Two new ideas on financing innovations in health and social services are gaining attention and may help solve these problems:

Gain sharing – The original payer (government) and a service provider agree on performance targets and a payment system so that the gains or savings are shared by the payer and the service provider. The provider reinvests those savings into programs aimed at the same target.

Social impact bonds – This method is being tried in the criminal justice arena in the United Kingdom and involves three parties: government (the ultimate payer), the agency that performs the service, and private investors. The government issues the bonds and offers investors payouts based on achievement of program outcomes. This means the investors have a large stake in ensuring that the agencies running the programs have been fully vetted and are likely to do the job well.

Addressing these issues will require new partnerships among government, philanthropic institutions, and academia. We are all going to have to change the way we do business.

"People from the United States and Canada draw from the same well of good ideas, particularly in the early childhood area. There's increasing collaboration between researchers and policy makers in the two countries and they fall prey to some of the same traps, a lot of which have to do with scaling and inflexibilities in government financing. My message is that there are new ways to do things and new ways to look at things that harness some of the learning from the private sector."

Richard Frank, PhD, Harvard University

Abstract:

LEVERAGING SCIENCE TO SHAPE THE FUTURE OF EARLY CHILDHOOD POLICY

By Jack Shonkoff, MD

References: National Scientific Council on the Developing Child Working Papers 7 and 11. See Appendix 7 for a full list of citations.

IT IS NOW EVIDENT THAT AN INTEGRATED SCIENCE BASE UNDERLIES EVERYTHING WE DO IN THE FIELD OF EARLY CHILDHOOD DEVELOPMENT. CONTINUING ADVANCES IN THE SCIENCE OF LEARNING, THE BIOLOGY OF ADVERSITY, AND INTERVENTION RESEARCH PROVIDE AN UNPRECEDENTED OPPORTUNITY TO WORK TOGETHER TO TURN THIS WEALTH OF SCIENTIFIC KNOWLEDGE INTO NEW IDEAS AT THE POLICY AND PRACTICE LEVELS TO PROMOTE BIGGER IMPACTS ON THE LIVES OF CHILDREN.

We have a logic model for a co-ordinated approach to achieve desired long-term outcomes in physical and mental health, educational achievement, and productivity. The science tells us that the biological precursors – for good or ill – of these outcomes result from the cumulative effects of gene-environment interaction over time. We also know the foundations of healthy development include stable, responsive relationships with adults, safe, supportive environments, and appropriate nutrition. These factors are influenced by the capacities of the caregivers and the community. At this level it becomes clear that every policy domain in both the public and private sectors – from primary health care and housing to paid parental leave and flexible work hours – that has a potential impact on the way people live has an important influence on health and learning outcomes for children. These are the policy and program levers for innovation.

Much of what we do now is built on a theory of change that provides information to parents and early enrichment to children, and we do that well. The best of what we do produces significant differences in outcomes, but the effect sizes of our most successful interventions are still small. We can and should do better. An enhanced theory of change would add another dimension to policy and practice that builds protective interventions against effects of toxic stress.

The Center on the Developing Child at Harvard University has identified three promising domains that are ripe for innovation: 1) reducing barriers to learning; 2) enhancing the resources and capacities of the family environment; and 3) strengthening the early childhood foundations of lifelong health. Under item 2, for example, the key to providing protection against stress for children is to build the skills of the adults who affect their everyday lives, in particular their executive function skills. This requires communities willing to rethink the concept of parent engagement and community support, beyond simply providing information.

To create an environment that encourages the development and testing of new ideas requires a total change in the culture of research, policy, and practice. This new ecology of innovation would shift incentives from encouraging low-risk, low-impact success to encouraging big breakthroughs by making it safe to fail and learn from failure.

"Where the field is going next is not for the timid to decide. We have tremendously powerful messages coming from science, but in order to transform them into more effective programs and policy, somebody has to be willing to take some chances. For innovation to take place, we need visionary leadership that is willing to create an environment that understands the need for risk, patience, and refusal to settle for what we have now as the best we can do."

Jack P. Shonkoff, MD, Harvard University

PART 3

IMPLICATIONS FOR THE SCIENCE, POLICY, AND PRACTICE COMMUNITIES IN ALBERTA:

What We Need to Do and How to Do It

The scientific evidence that adverse childhood experiences influence the developing brain with lifelong effects on mental and physical health and learning is too powerful to ignore. Even as the science continues to advance, we have more than enough information, and therefore an imperative, to act now. The Content Faculty presentations suggested a number of priorities and next steps for the research, policy, and practice communities.

Directions for Research

Identifying biological markers

Rapid advances in neuroscience over the past decade point to the possibility of identifying early biological markers as precursors to behavioural symptoms of mental disorders and addictions that emerge in adolescence or later. Uncovering correlations between biomarkers and psychosocial/behavioural markers could lead to more effective early interventions, as well as opportunities for more accurate prognoses, better evaluation of treatment progress, and ultimately the potential for personalized treatment and prevention of mental illness. Ethical issues such as concerns about the risk of "medicalizing" children will need to be addressed. The possibility of early screening for biomarkers in a public health context also raises issues. While there might be some hesitation about collecting data regarding conditions for which available services may be inadequate or lacking, early screening is done in other areas of health with beneficial results. In the case of cancer, for example, an aggressive approach to the disease broadened screening and ultimately improved treatment. This is an area where increased communication between scientists, service providers, and policy-makers will be critical.

Enhancing "air traffic control"

There is increasing evidence that the pre-frontal cortex of the brain, which is responsible for "air traffic control" functioning such as self-regulation, planning, working memory, and decision-making, is profoundly affected by toxic stress. Children living in high-stress environments can be seen falling behind in this area as early as two years of age. It is also known that the pre-frontal cortex has a longer window of plasticity than other parts of the brain and may lend itself to retraining. Researchers have begun targeting interventions to functions served by this area of the brain using game-type systems with pre-kindergarten

children in high-stress situations such as homelessness. Retraining to enhance cognitive inhibitory control skills supported by the pre-frontal cortex is a promising area of research that will be applied to early intervention and treatment in children with ADHD as well as other disorders.

New research paradigm

The traditional research paradigm involves a long, rigid cycle – from developing a new idea, securing funding, and implementing the proposal to collecting and analyzing data and publishing results. With a time investment of as much as six to eight years, the price of failure is high. This current climate is more conducive to tweaking the status quo than to encouraging innovation. A new, more productive paradigm applied to behavioural interventions as well as to drug development borrows from the technology sector, where a rapid cycle allows for early clinical testing, learning from failure, and changing direction or starting over. Financial incentives and policy direction are required to change the environment in order for innovation along these lines to occur.

Implications for Policy

Timing is of the essence

For policy makers, new approaches – not necessarily new funding – are required. Science shows irrefutably that experiences as early as the first three years of life lay the groundwork for all future development, learning, and mental and physical health. Neuro-circuits in different parts of the brain develop at different times. This means interventions must be applied while there is still a window of plasticity. Timing matters. Policy must reflect this knowledge with initiatives that support families, and ultimately communities, with appropriate programs, timely interventions, and rebalanced funding to focus more on the pre-school years. These policy directions and initiatives are already happening in Alberta.

A model for change

Within a year of the 2010 EBBD Symposium, Alberta Health and Wellness published Let's Talk About the Early Years, a report on early childhood development by the Chief Medical Officer of Health. The report, aimed at the general public, reflects the language and current scientific knowledge of brain-architecture development that were put forward at the 2010 Symposium. Published shortly after, the Government of Alberta's Addiction and Mental Health Strategy is designed to transform the addiction and mental health system in Alberta and reflects the diffusion of knowledge and concepts from the first Symposium among the policy and practice communities in Alberta. The strategy is based on the current understanding that addiction, mental health problems, and mental illness are caused by a complex interplay of genetic, biological, personality, and environmental factors and that early experiences shape how the brain gets built.

Providing caregiver and community supports

Many programs aimed at early childhood development focus on providing information for parents and early enrichment. These programs are effective to a degree, but they are not sufficient for addressing the severe adversity that some children endure in their homes and communities. The science tells us that the existence of one or more stable, supportive relationships with adults in a child's life can be a powerful buffer against the effects of toxic stress. Building the capacities of parents and community caregivers in the child's network of relationships will strengthen this buffer. In this context, a broad range of government policies and programs, as well as those in the private sector, come into play for their impact on families and caregivers. This calls for co-ordinated cross-sector, cross-ministry, and cross-agency initiatives to put needed caregiver and community supports in place. This collaborative approach is already underway in Alberta. The provincial government's Addiction and Mental Health Strategy is a fully integrated model for change resulting from the co-ordinated effort of 17 ministries. The Early Brain & Biological Development and Recovery from Addiction Symposia provide a platform for continuing cross-ministerial engagement through opportunities for multi-disciplinary dialogue, co-ordinated action planning, and rapid transfer of knowledge into policy and practice.

Targeting vs. universality

One challenge for policy is to find a balance between targeting and universality in program implementation. An intervention that is carefully targeted to high-risk groups in the research phase may show significant results as measured against a control group. Yet when the program is adopted for implementation, there is a temptation at the policy level to make it available to a wider clientele, a decision that could water down the measured effectiveness of the program. However, it may be advantageous to implement some interventions at a public health level, such as those aimed at enhancing self-regulatory skills that have been shown to correlate with effective adult functioning in terms of health and financial stability.

Measuring effectiveness

Implementing new programs and policies entails accountability. The benefits to be realized from early interventions are often measured in the long term. For example, savings in health care costs for treating cardiovascular disorders possibly due to early adversity may not be realized until 40 or more years in the future. Likewise, lower incarceration rates will not register in the short term. A challenge for

policy and program design is to develop short- and medium-term measures, and not only measures of monetary impact. An example of an intervention supported by data showing measurable effectiveness is the Supporting Father Involvement (SFI) program, an intervention for parents that has shown measurable benefits to the child. The SFI program is currently being replicated in four Alberta communities. Other examples of data-supported interventions exist in the area of addiction treatment for parents. Alberta's Addiction and Mental Health Strategy and related Action Plan lay out key results to be achieved in five strategic directions, with performance measures, initiatives and tasks, action roles and responsibilities, and action timelines from 2011 through 2016 spelled out in a detailed outcomes matrix. The policy framework is now in place to support proactive change in Alberta's practice community.

Implications for the Practice Community

Evidence-based interventions

In the practice domain, systems are needed to ensure that interventions are evidence-based and monitored for effectiveness. A large number of treatments have been tested and proven effective, but too little of the usual treatment provided to children with mental health problems is evidence-based. One problem is the complexity of the cases that occur in practice and the limited capacity of busy clinicians to explore the full range of available treatments. Systems, such as Child STEPS, that integrate evidence-based treatments into protocols simplify the learning task for clinicians and provide feedback on effectiveness. In addition, data collected from such programs provide information for quality improvement and potential further research. These systems can smooth the pathway for getting evidence-based treatments into practice and should be explored where appropriate.

Clinician involvement in comparative effectiveness studies

Electronic medical records technology will make it possible to do comparative effectiveness studies by involving large numbers of patients in clinical trials that produce much larger data sets than are currently generated. This will involve clinicians enrolling their patients in trials and entering treatment and outcome data into a co-ordinated province-wide system. Mining large data sets will provide clinicians with more context-based decision support and the ability to provide more individualized treatment. This will improve outcomes for patients and families and provide ongoing quality improvement for Alberta's addiction and mental health services.

Bringing fathers into the picture

Much more attention has been devoted to the role of mothers in early child development than to the father-child relationship. Yet studies have shown that children of involved fathers have more positive outcomes, including better relationships, higher educational achievement, and fewer behavioural problems. The Supporting Father Involvement program focuses on supporting

co-parenting and the couple relationship as the basis of the family. The program has shown positive results in California and is currently being piloted in Alberta. The practice community will benefit from monitoring results and considering the potential for extending the program province-wide. When integrating any innovative program into the existing system, practitioners need to be aware of the importance of maintaining the fidelity of the program to ensure optimal results.

Taking the core story to the people

Information provided to new parents tends to focus on pre-natal health. There is a need for follow-though to provide new parents with a road map or "calendar" of early childhood development and the skills they need in order to parent more effectively. Also, the public in general needs to understand the core story of early brain development so as to support effective and efficient community programs and services. The first EBBD Symposium set out the core story and the scientific evidence behind it. Participants carried the message back to their colleagues and began to incorporate it into their professional responsibilities. The Government of Alberta continued the dialogue with the publication of Let's Talk About the Early Years. Primary care practitioners are well positioned to further disseminate this information to the public. Appropriate training curricula are already being put in place in Alberta, for example in schools of nursing, to provide the necessary skills and knowledge to perform this role.

Professional development and accreditation

A concerted effort in training and professional development will be required to ensure that targeted outcomes in the Alberta Government's Addiction and Mental Health Strategy can be achieved. Workforce development is identified as a key enabler in the strategy. Work is underway with educational institutions to ensure that programs contain the appropriate level of addiction and mental health content. There are also a number of incentives that will help clinicians to adopt new practices in line with current scientific knowledge in addiction and mental health and to acquire the information and skills they need to do so. This includes defining the competencies required of people working with addiction and mental health clients and providing access to competency-based professional development programs. Work is underway with accrediting, professional, and other bodies to develop a competency and professional development framework to help ensure that organizations, programs, and people meet the essential requirements and minimum standards for quality.

The Alberta Family Wellness Initiative (AFWI) website (http://www.albertafamilywellness.org/), with its extensive resource library, learning modules, and videos of Symposia presentations, is an important tool to reinforce knowledge uptake by practitioners.

Collaboration is Key

While the priorities outlined in this section appear under separate headings for different stakeholder communities, most involve the co-ordinated efforts of all stakeholders, including those in the private sector. Through the Alberta Government's transformative Addiction and Mental Health Strategy, the unique Alberta Family Wellness Initiative (AFWI) programs and resources, and other public and private efforts, Alberta is providing a role model for change in how society addresses addiction and mental health issues and fosters the development of healthy children, families, and communities. Taking the next step forward in this initiative requires leadership, vision, and collaboration at an unprecedented level. The Early Brain & Biological Development and Recovery from Addiction Symposia, through the hard work, dedication, and leadership of participants, have already shown it can be done. The important next steps are already happening in Alberta.

Faculty Comments on the Implications of the Scientific Knowledge

Dr. Weisz – "Less than five per cent of the treatment provided to children who have mental health problems actually matches any of those that have been tested and shown to work. I think that a very appropriate next step is to look for the smoothest path to getting those treatments into practice settings so children can take advantage of them. One of those paths that our work suggests might be helpful is integrating treatments into coherent protocols that simplify the task of learning for busy clinicians."

Dr. Mayes – "Participants here have been learning about early adversity and how that is expressed across life and builds the stage for lifelong health or not. But it's not just the child that we're looking at; it's the idea that early adversity impacts that child when he or she becomes an adult and a parent. That adult then has the responsibility of caring for children and becomes part of the intergenerational transmission potential of trauma and adversity through that mechanism. That raises all sorts of intervention issues and intervention implications."

Dr. Gunnar – "One of the big messages is: the earlier, the better. That should motivate us to not wait until kids get into school. There are things that are lost that are hard to get back if we don't start as early as possible."

Dr. Danese – "Childhood maltreatment is a very well-established risk factor for both mental health conditions and for addiction in young people and adults. I think by understanding a little bit more about the biology that is underlying the effect of maltreatment on psychopathology, we will be able to understand how to help young people that have suffered from traumatic experiences early in life by modifying biological processes related to it."

Dr. Henderson – "I think fostering self-regulatory skills is really important. In the Dunedin study it wasn't just that the very low self-controlled kids were troubled; there was a real gradient of risk where even if you shifted from being average in self-control up to being a little bit above average, that had a significant effect on your functioning as an adult in terms of your health and your financial stability – things that at a public health level are so important to our communities. So I think helping children foster self-regulatory skills is a goal we all need to have, and it's one that can be implemented in many different contexts, not just the home environment, but school environments, neighbourhoods, and other areas. I think that could provide the biggest bang for our buck over time."

Dr. March – "If you were mentally ill as an adult, you were almost certainly mentally ill first as a child, so we can no longer treat the mental health landscape, particularly the intervention side of the mental health landscape, as though these are adult disorders. They're actually disorders of kids. They begin with kids and by the time you become a mentally ill adult, if that's the first time that anybody begins to intervene, it's like beginning to treat a patient who's already had five heart attacks. The horse is so far out of the barn that we have no chance or little chance of actually intervening effectively. The option of prevention can only happen with early interventions in childhood."

Dr. Cameron – "I think that better education of the public is extremely important. We know that dealing with very difficult situations for children in adversity is not good for them, but the general public doesn't actually understand exactly how that works. Why does it influence the brain? We can show it so clearly; we can show it really changes how brain circuits develop. If people had a better understanding of that, I think they would be much more open to trying to make sure that children get into therapy and they get it as soon as possible."

Dr. Hill – "When someone becomes pregnant and they undergo pre-natal classes, they essentially learn how to take care of their body and optimize the health of the fetus. Most women do this because they recognize the importance of it. But there's neglect in supplying information to parents on what happens after the baby is born. There are a lot of basic lessons that both parents could benefit from learning. These are certain strategies that can help aid the development of their child, and I think everyone would want their child to have the best chance."

Dr. Frank – "Finding the active ingredient that really makes a program shine is key to replicating it and maximizing its effectiveness. Making it as simple as you possibly can, making it so that people understand how to adapt it under different scenarios, writing a manual and training people to actually implement the program, and then measuring it to make sure it's done properly – in the private sector, that's what we do when we franchise. In the public sector we need to find ways of replicating those activities in order to get the types of benefits that you get from franchising."

Dr. Anda – "We have this information about how adversity in childhood affects the way children's brains develop and function. Now we need to get this information out to everyone in a community-based or public health approach. What happens with adverse childhood experiences is that people tend to feel isolated, that this is just happening to them, and they feel afraid and ashamed. Taking this to the general public will create a discourse that makes it an 'us' problem, not a 'them' problem and will take people out of isolation so they'll begin to think about alternative ways of doing things that are healthier for them and for their families."

Dr. Shonkoff – "We need to make it safe for people to try new things and fail and not have to pay a high price for that. Programs should be places where new things are tried and if they don't work, the program director shouldn't worry about the program being closed down because you tried something that didn't work. There's no field in which innovation takes place that doesn't build this innovation on the history of a lot of failed attempts. This would be a big culture shift for the early childhood field because it has not been given the latitude and the freedom to try new things. It's been held very closely to the models that have been demonstrated to work, and this is the challenge."

PART 4

Communicating Science

HOW WE DO IT:

Framing and the Alberta Challenge

In order to turn scientific knowledge about early brain and biological development into effective policies and programs, communicators must translate the science to policy makers and the public into a language that makes sense to them. Cognitive science research has shown that the public, including policy makers, don't passively receive and accept information. Instead, they apply cultural models when they think and reason about early brain and biological development. Communications from scientists, government, advocates, and the news media reinforce these cultural models.

Fortunately, communication about early brain and biological development can be improved dramatically. It is possible to change the public conversation and create more effective communications about this issue in Alberta by reframing the information and applying new communications strategies. This, in turn, will help the public support the policies and programs that positively impact child well-being.

The FrameWorks Institute has conducted extensive research in the United States with the Harvard Center on the Developing Child on how to strategically communicate information about child development and children's mental health. The Alberta Family Wellness Initiative (AFWI) has sponsored projects that have allowed FrameWorks to extend its research program into Alberta. Despite similarities between the United States and Alberta, cultural patterns of understanding differ in subtle but important ways. By understanding how Albertans reason about child development, advocates for healthy early child development and children's mental health can frame their messages more effectively.

Default Understanding of Development

FrameWorks compared how Albertans think and reason about child development to the scientific understanding of these issues, creating a map of the "swamp" of public thinking. Key cultural models in this "swamp" include:

Confusion About Development. The public is confused about the process of child development, including what supports healthy development and what can go wrong. They understand that the brain is involved in some way, but exactly how the brain develops remains mysterious.

The "Self-Made" Child. Albertans believe that much of child development is more or less automatic and immune to outside influences. From this reasoning comes the belief that exposure to stress won't harm development and, in fact, builds strength and character.

The "Family Bubble." This way of thinking emphasizes the primary role of parents in children's development to the exclusion of other caregivers, environments, and community factors.

Role of Programs. Albertans accept a role for programs that support child development but have little understanding of what comprises effective, high-quality programs.

These cultural models contrast with the scientific understanding that development is influenced by many interactive factors in predictable ways with predictable outcomes. The models also limit the public's ability to understand which environments are more likely to support healthy development and which are not.

Default Understanding of Children's Mental Health

The Alberta public thinks specifically about child mental health from another set of contradictory cultural models. These include:

Children are too young to have mental health/children are "mini-adults." The public toggles between thinking that children are too undeveloped to have mental health problems that need intervention, and thinking that children are simply smaller versions of adults who thus need the same interventions as adults.

Mental illness is caused by a chemical imbalance/mental health is all about emotions. The public thinks about mental illness and mental health in two different ways. When thinking about mental illness, the public reasons that its cause is a chemical imbalance for which the obvious remedy is medication. When the topic is mental health, the discussion is about controlling negative emotions and the solution is for parents to provide additional discipline in order to control their misbehaving children.

None of these cultural models leads to an understanding of what good mental health is for children or how that mental health can be supported through effective programs and policies.

The research also uncovered some positive default patterns of thinking. Albertans have a strong understanding of development as being about the skills and abilities one needs to be successful later in life. They also readily understand that environments affect development (although they lack an understanding of the specifics), and they accept that government has a role to play by providing programs and services to children and families who need them. Finally, Albertans understand the goal of positive child development to be the creation of an interdependent, well-functioning society. Alberta's scientists, policy makers, and leaders can build on these strengths as they craft messages about child development and children's mental health.

Reframing Early Child Development and Children's Mental Health

A frame is the central organizing principle that structures meaning in any communication. It includes the use of elements such as values, metaphors, context, data, visuals, and tone to support that meaning.

Components of effective reframing should:

- Redirect attention away from incorrect default cultural models.
- Link the values behind the issues to societal and individual goals.
- Use simplifying models, or tested metaphors, to explain the key concepts.
- Connect these key concepts from the science explicitly to potential policy and program implications.
- Note the consequences of continued inaction.

Reframing Child Development with Values

A value is a general claim about desirable social and personal conditions. Values are the ideals behind the organizing principles on which people base their decisions. The story of early child development begins by establishing that the healthy development of children is a collective concern. The values outlined below are those that successfully orient the public to consider what is at stake for all Albertans:

Interdependence. What affects one part of Alberta affects us all. We need policies and programs that encourage development by protecting children's brains and preventing conditions that put children at risk for physical and mental health problems. Promoting healthy development through policies and programs in Alberta shows our recognition that we only succeed as a province when all children can thrive.

Ingenuity. High-quality programs are required to tackle problems in early childhood development and bring about significant long-term improvements in children's lives. Alberta's well-known capacity for innovation should be trained on pursuing new approaches to developing such programs and promoting child mental health.

Simplifying Models for Core Concepts

Simplifying models are designed to bridge the gap between expert understanding and public thinking. Experts often assume that the public shares their understanding of how a problem works. However, there is actually a mismatch between expert and public understanding because the expert information does not fit into existing lay cultural models. Furthermore, the information is often misunderstood, reinforcing those cultural models. The following simplifying models have been developed, tested, and found effective in improving public understanding of early child development and children's mental health in Alberta:

Brain Architecture. The basic architecture or physical structure of the human brain is constructed through an ongoing process that begins before birth and continues into adulthood. Like the construction of a home, the building process begins with laying the foundation, framing the rooms, and wiring the electrical system in a predictable sequence. Early experiences literally shape how the brain gets built; a strong foundation in the early years increases the probability of positive outcomes. A weak foundation increases the odds of later difficulties.

Can't Do One Without the Others. You can't focus on developing just one part of the child without paying equal attention to the other capacities. Cognitive, emotional, and social capacities are tightly connected throughout the life course.

Serve and Return. The interactive influences of genes and experience shape the developing brain. Like the process of serve and return in games such as tennis and volleyball, young children naturally reach out for interaction. When adults respond by mirroring back those interactive gestures in a consistent way, the child's learning process is complete.

Levelness. One way to think about child mental health is that it's like the levelness of a table. That levelness is what makes a table usable and functional, just as the mental health of a child is what enables him or her to function. Some children's brains develop on floors that are level, with healthy, supportive relationships, and access to good nutrition and health care. Other children's brains develop on uneven floors. They are exposed to abuse or violence, have unreliable and unsupportive relationships, and lack access to key programs and resources.

Toxic Stress. Experiencing a chronic stressful condition such as neglect or abuse can create what scientists call toxic stress and can disrupt developing brain architecture. This can lead to lifelong difficulties in learning, memory, and self-regulation. Some types of stress are positive, such as the challenge of learning a new skill, and some stress can be made tolerable by the presence of supportive relationships, like having a strong family when a loved one dies. But children who are exposed to sustained, serious stress develop an exaggerated toxic stress response that, over time, weakens their defence system against diseases, from heart disease to diabetes to depression.

Pay Now or Pay Later. Trying to change behaviour or build new skills on a shaky foundation requires more work and is less effective than preventing and addressing problems early on. Remedial education, clinical treatment, and other professional interventions later in life are more costly and produce less desirable outcomes than funding programs and services that offer a healthy environment, positive experiences, and appropriate learning experiences earlier in life. The return on investment for early intervention programs is well established. We can measure "effectiveness factors" that make the difference between programs that work and those that don't work to support children's healthy development. In addition, we can evaluate the efficiency of programs for young children by comparing the benefit of the investment to the cost. This allows a reliable comparison between programs that don't improve child development and those that show real results.

Telling a Solutions Story

It is important for communicators to tell a solutions story, one that highlights the opportunities and successes of programs and policies that support child development and children's mental health. Neglecting to talk about solutions leaves the public feeling that the problems are overwhelming and unsolvable. In contrast, talking about effective programs and policies, with concrete examples, encourages the public to participate in engaged problem-solving to overcome the challenges that many children in Alberta face.

The entire body of research from Alberta, along with helpful examples and applications, can be found in Talking About Child Development and Children's Mental Health in Alberta, www.frameworksinstitute.org/toolkits/alberta/, user name and password: fw.

Information on the FrameWorks research process is covered in Appendix 5.

Closing Comments

The second Early Brain & Biological Development Symposium took off from the momentum of EBBD 2010 and carried this unique three-year initiative in knowledge transfer to the next level. Presentations and workshops reinforced and added to the knowledge imparted in the first Symposium, giving new impetus to the initiatives underway to provide a better foundation for healthy children, families, and communities in Alberta.

Symposium participants included over 100 professionals from many sectors involved in child health and development, education, and community services. Most were returning for the second EBBD Symposium having spent the intervening year disseminating the learnings from EBBD 2010 to their colleagues and incorporating them into their own work. They arrived with enthusiasm, thoughtfully absorbed faculty presentations and workshops, asked probing questions, engaged vigorously with presenters and colleagues, and shared their own knowledge and experience generously. At the end, they went away with a renewed commitment to playing a leadership role in this far-reaching, collaborative effort. Participants' closing comments on what the Symposium experience meant to them are the most telling testament to the impact this initiative is already having on policy and practice in Alberta:

"The quality of the presentations was stellar, at a really high level. Learning the science that we normally wouldn't have easy access to and hearing it in this context on a theme basis – I'll definitely be able to use it in my work."

"I'm involved in planning and evaluation, so it was important for me to see that fit between research and practice. Practice evaluation involves the rigor of research, so it was useful to see the rigor of the science. It gives some direction on how we might effectively evaluate it when we put it into practice in the real world."

"This symposium has given me a whole bunch of ideas I can implement in my practice right away, plus a whole list of educational materials I want to take back to share with my team. Also, after 25 years in my clinical career, this experience has been a boost, an affirmation that what I do is important, that work that's done in practice is important, that the long-lasting consequences of doing it well is important. It was inspiring and validating!"

"The concept of the importance of the role of fathers was significant for me, and the importance of relationships. It was a validation of what I have observed in my own work."

"I am full of gratitude! How often in one lifetime does one get to spend time in the presence of such brilliant minds?"

"What we experienced this week inspired us to go to the bigger systems, such as the school boards, to try to get the dialogue going."

"Despite the mountain of great scientific knowledge we have, the distance to climb is still pretty far. Bridging that gap is where we want to be."

"A lot of the science was useful in integrating the rest of my knowledge. I feel there are ways to shift my way of thinking, to mentalize what other people might be thinking, and to help others achieve their goals. I can also see a lot of resources that can be shifted around and used differently."

"I was interested to hear the evidence from the human cohort studies. I was pleased to see that as the next step over the biological science focus from last year. I also appreciated learning about the Alberta research regarding values and how to frame the scientific knowledge in ways so as not to blame the mother."

"This year involved solidifying what we're doing and concentrating on the 'how' part. Right from the start we could think about how we're going to do it. It was inspiring to see that people are enthusiastic about going to the next step."

"As a junior researcher, it was a great experience for me to have lunch with senior researchers that I wouldn't have crossed paths with before. I could pick their brains and interact on a smaller scale than I could at the usual conferences."

"The symposium was helpful in that it broadened my outlook and my thinking. Some of the presentations related to certain types of research I wasn't familiar with and opened my view on how to incorporate some of it into my own research. Also, with respect to my learning team, there was a lot of interaction and bonding. We're in our second year now, so we are feeling more comfortable with each other and I think there will be more opportunities now to pick up the phone and work with each other in the future."

"I like how the week builds from scientific research to application – how we can use this knowledge in a practice situation – and then on the last day how we in our learning teams can take it into our own work."

"I particularly like the FrameWorks component. I do a lot of writing in my work and it gives me another way to approach it and perhaps get better results."

"Seeing all these different disciplines at all levels getting together – it's very powerful."

"The sessions this week have been very exciting. I'm looking forward to putting it all to use in my work."

"I liked being able to debrief right after the presentations and then expand on them in the faculty workshops later in the day."

"The symposium was very well planned – a little tipped toward science, but we need to build on the science. It was a wonderful, great experience to be with like-minded people. Already I see lots of ripples happening. The policies and programs that result will look different in different communities. I was also impressed by our learning teams' ability to use our framing skills so well."

Appendix I

SYMPOSIUM PEOPLE: DEVELOPMENT AND MANAGEMENT

The Symposium involved a great number of people in its development, planning, and delivery. Major groups involved these activities were:

Senior Leadership Team

Members of the team that directed the development of the Symposium's overall structure and format included:

Kim Ah-Sue, MA, Program Officer, Norlien Foundation

Elaine Broe, MA, Director, Learning Solutions, Leadership Development, The Banff Centre

Glenda MacQueen, MD, PhD, FRCPC, Professor, Department of Psychiatry, University of Calgary

Steve MacDonald, Deputy Minister, Human Services, Government of Alberta

Gillian Najarian, EdM, Deputy Director, Harvard Center on the Developing Child

Charles Nelson, PhD, Professor of Pediatrics and Neuroscience, Harvard Medical School

Kate Pedlow, LLB, General Counsel and Program Officer, Norlien Foundation

Paula Tyler, President, Norlien Foundation

Design Committee

Design of specific aspects of the Symposium format and events was led by members of the Design Committee, which included:

Kim Ah-Sue, MA, Program Officer, Norlien Foundation

Elaine Broe, MA, Director, Learning Solutions, Leadership Development, The Banff Centre

Anita Kozyrskyi, PhD, Associate Professor, Department of Pediatrics, University of Alberta

Steve MacDonald, Deputy Minister, Human Services, Government of Alberta

Frank MacMaster, PhD, Cuthbertson and Fischer Chair in Paediatric Mental Health, University of Calgary

Sandra Mintz, MBA, Executive Director, Chinook Primary Care Network, Alberta Health Services

Kate Pedlow, LLB, General Counsel and Program Officer, Norlien Foundation

Kesa Shikaze, BScOT, Project Manager, Alberta Health and Wellness, Government of Alberta

Paula Tyler, President, Norlien Foundation

Program Committee

Kim Ah-Sue, MA, Program Officer, Norlien Foundation

Glenda MacQueen, MD, PhD, FRCPC, Professor, Department of Psychiatry, University of Calgary

Gillian Najarian, EdM, Deputy Director, Harvard Center on the Developing Child

Charles Nelson, PhD, Professor of Pediatrics and Neuroscience, Harvard Medical School

Kate Pedlow, LLB, General Counsel and Program Officer, Norlien Foundation

Paula Tyler, President, Norlien Foundation

The Norlien Foundation

Nancy Mannix, JD, Chair and Patron

Staff

Paula Tyler, President

Kate Pedlow, LLB, General Counsel and Program Officer

Nicole Sherren, PhD, Scientific Director and Program Officer

Kim Ah-Sue, MA, Program Officer

Marisa Etmanski, Director of Edmonton Office

Alisha Devji, MPH, Program Assistant

Heidi Dunstan, Executive Assistant and Special Projects

Teresa Stewart, Executive Assistant

David Elton, PhD, Policy Advisor

Ralph Strother, MD, Consultant

Arlene Weidner, RN, Consultant

Kate Stenson, Administrative Support

CJ Lemke, Administrative Support

Appendix 2

SYMPOSIUM PEOPLE: PRESENTERS AND FACULTY

CONTENT FACULTY

Robert Anda, MD, PhD
Consultant, Centers for Disease Control and Prevention

Co-principal Investigator, Adverse Childhood Experiences (ACE) Study. He has conducted research in a variety of areas including disease surveillance, behavioural health, mental health and disease, cardiovascular disease, and childhood determinants of health. He is a Senior Scientific Consultant to the Centers for Disease Control and Prevention (CDC), with Carter Consulting. He played the principal role in the design of the ACE study.

Judy Cameron, PhD
University of Pittsburgh

Professor of Psychiatry, Obstetrics, Gynecology & Reproductive Science; Director, Clinical Translational Science Institute Outreach Program, University of Pittsburgh; Affiliate Senior Scientist, Oregon National Primate Research Center. Over the past 10 years she has been a member of the MacArthur Foundation Research Network on Early Experience and Brain Development and is currently a member of the National Scientific Council on the Developing Child, the Scientific Research Council for the National Child Study Center in New York, and the Dana Alliances for Brain Initiatives.

Andrea Danese, MD, PhD
King's College London

Clinical Lecturer/Assistant Professor in Child and Adolescent Psychiatry, Institute of Psychiatry, King's College London. His research focuses on the biological mechanisms through which early experiences influence child development and exert enduring effects on adult health. Dr. Danese has been collaborating with the Dunedin Multidisciplinary Health and Development Study and the Environmental-Risk Longitudinal Twin Study. His research has contributed to discussions about social and public health policies in the U.S. and the U.K.

Richard Frank, PhD
Harvard University

Margaret T. Morris Professor of Health Economics, Department of Health Care Policy, Harvard Medical School. From 2009 to 2011, he served as the Deputy Assistant Secretary for Planning and Evaluation at the U.S. Department of Health and Human Services, directing the Office of Disability, Aging and Long-Term Care Policy. He is also a Research Associate with the National Bureau of Economic Research and serves as co-editor of the Journal of Health Economics.

Megan Gunnar, PhD
University of Minnesota

Regents Professor, Distinguished McKnight University Professor of Child Development and Director of the Institute of Child Development, University of Minnesota. Dr. Gunnar's main interest area is stress and coping in infants and young children. Her work documents the importance of sensitive and responsive care by adults in the modulation and buffering of stress physiology in the developing child. She is director of the NIMH Center on Early Experience, Stress and Neurobehavioral Development and is a member of the National Scientific Council on the Developing Child and of the Canadian Institute for Advanced Research's program on Experience-based Brain and Biological Development.

Heather Henderson, PhD
University of Miami

Associate Professor, Department of Psychology, and Director, Social Development Laboratory, University of Miami. Dr. Henderson's research program focuses on social and emotional development in typically-developing children, children with extreme temperaments (e.g., extreme shyness), and children with autism. She is particularly interested in the role of self-processes, including self-monitoring and self-referenced memory, in relation to variations in social adaptation. She serves on the Editorial Board of the International Journal of Behavioral Development and Emotion.

Matthew Hill, PhD
University of Calgary

Assistant Professor, Departments of Cell Biology/Anatomy and Psychiatry and the Hotchkiss Brain Institute, University of Calgary. Dr. Hill did his graduate work at the University of British Columbia and postdoctoral work at The Rockefeller University. His research looks at structural and functional changes within the brain that occur following chronic stress and relate to the development of anxiety and fear, and how targeting these changes may help to treat stress-related mental illnesses such as generalized anxiety or post-traumatic stress disorder.

Marsha Kline Pruett, PhD, MSL
Smith College

Maconda Brown O'Connor Professor, Smith College School for Social Work. Dr. Kline Pruett is an American Psychological Association Board Diplomate in Couple and Family Psychology. Her clinical and research interests relate to the promotion of healthy family development during life transitions. She is currently involved in curriculum development; intervention, consultation, and research programs regarding father involvement in the child welfare system; parenting co-ordination; translating new research regarding early childhood experience and its relationship to later mental health outcomes; and service provision in family courts.

John March, MD, PhD
Duke University

Professor of Psychiatry and Behavioral Science, Duke University Medical Center; Director, Neurosciences Medicine, Duke Clinical Research Institute. Dr. March has extensive experience in developing and testing the efficacy and effectiveness of pharmacological and cognitive-behavioural treatments for pediatric and adult mental illnesses. He is a NARSAD Distinguished Senior Investigator and has been principal or co-principal investigator on multiple NIMH-funded treatment outcome studies as well as the Child and Adolescent Psychiatry Trials Network. Dr. March is a member of the American College of Neuropsychopharmacology, the College of International Neuropsychopharmacology, and the American Academy of Child & Adolescent Psychiatry Workgroup on Research.

Linda Mayes, MD
Yale University

Arnold Gesell Professor of Child Psychiatry, Pediatrics, and Psychology, Yale Child Study Center, Yale University; Chairman, Directorial Team, Anna Freud Centre, London, U.K. She currently oversees the Developmental Electrophysiology Laboratory at Yale, which includes dense array electroencephalography as a method for studying brain activity in real time. With two colleagues, she oversees a new Master's program in psychodynamic developmental neuroscience offered between University College London and Yale School of Medicine. She is a member of the National Scientific Council on the Developing Child.

Kyle Pruett, MD
Yale University

Clinical Professor of Child Psychiatry and Nursing, Yale University. Dr. Pruett served as Director of Medical Studies at the Yale School of Medicine's Child Study Center and as president of Zero to Three: The National Center for Infants, Toddlers, and Families. With his wife Marsha Kline Pruett, he is co-investigator in the Collaborative Divorce Project to reduce the trauma of divorce in young children's lives, and the abuse and neglect evidence-based prevention study, Supporting Fatherhood Involvement, for California's Department of Social Services. The study is undergoing replication at several sites in Alberta, and in Hartford, CT.

Jack Shonkoff, MD
Harvard University

Julius B. Richmond FAMRI Professor of Child Health and Development, Harvard School of Public Health and Harvard Graduate School of Education; Professor of Pediatrics, Harvard Medical School and Children's Hospital Boston; Founding Director, Center on the Developing Child, Harvard University. Dr. Shonkoff currently chairs the National Scientific Council on the Developing Child and has served as Chair of the Board on Children, Youth, and Families at the National Academy of Sciences. He is a member of the Institute of Medicine of the National Academy of Sciences.

John Weisz, PhD, ABPP
Harvard University

Professor of Psychology, Harvard Faculty of Arts and Sciences and Harvard Medical School; President and CEO, Judge Baker Children's Center. He has served as President of the Society of Clinical Child and Adolescent Psychology and as President of the International Society for the Study of Child and Adolescent Psychopathology. Since 2001, he has been Director and Principal Investigator of the Research Network on Youth Mental Health, funded by the MacArthur Foundation. He is also Chair of the Committee on Evidence-based Practice, Society of Clinical Child and Adolescent Psychology (APA, Div. 53).

MODERATOR

Marvin Fritzler, PhD, MD, University of Calgary

Professor of Medicine, University of Calgary. Dr. Fritzler has an international reputation for his research and clinical work in the fields of autoantibodies and autoimmune diseases. He is noted for identifying over 20 autoantigens that are applied in clinical diagnostic assays that provide early and accurate diagnoses of specific autoimmune illnesses. He is currently chair of the Government of Alberta's senior strategy and policy advisory board, the Alberta Research and Innovation Authority.

DISCIPLINARY COHORT LEADS

Bryan Kolb, PhD, FRSC, University of Lethbridge

Professor of Psychology and Neuroscience, Principal Investigator, Canadian Centre for Behavioral Neuroscience, University of Lethbridge. Dr. Kolb is a Fellow of the Royal Society of Canada and of the Canadian Institute for Advanced Research's Experience-based Brain and Biological Development Program. He is currently a theme leader in the Canadian Stroke Network.

Glenda MacQueen, MD, PhD, FRCPC
University of Calgary, Alberta Health Services

Professor and Head, Department of Psychiatry, University of Calgary; Clinical Department Head of Psychiatry, Calgary Health Zone, Alberta Health Services. Dr. MacQueen received the 2008 Innovations in Research Award from the Canadian College of Neuropsychopharmacology. She is a Fellow of the Royal College of Physicians of Canada.

Roger Palmer, PhD, University of Alberta

Director, MBA, Public Management Stream, School of Business, University of Alberta. In 2002, Dr. Palmer was appointed Deputy Minister of Alberta Health and Wellness. Major improvements during his tenure included: the provincial online wait list registry; the first provincial electronic health record in Canada; and the negotiation of an agreement with physicians and health authorities that created Primary Care Networks to improve family medicine in Alberta.

FRAMEWORKS INSTITUTE FACULTY

Diane Benjamin, MPH

Senior Associate, the FrameWorks Institute. Prior to joining the Institute, she served as Director of Outreach for the Maternal Child Health Training Program at the University of Minnesota and was Director of Minnesota KIDS COUNT at the Children's Defense Fund of Minnesota.

Alexis Bunten, PhD

Senior Researcher, the FrameWorks Institute. With a doctorate in socio-cultural anthropology, she is a Ford Postdoctoral Fellow at UC Santa Cruz, where she is working on a project theorizing indigenous capitalism.

Tiffany Manuel, PhD

Director of Impact and Evaluation, the FrameWorks Institute. She has served as a Senior Policy Analyst at the U.S. Department of Health and Human Services, as a Senior Researcher at Harvard University's Radcliffe Institute for Advanced Study, and as an Assistant Professor of Political Science and Public Policy at the University of North Carolina.

Moira O'Neil, PhD

Senior Researcher, the FrameWorks Institute. A sociologist, she works with an interdisciplinary team employing a range of methods to further public understanding of social issues.

JUNIOR FACULTY

Sarah Kate Bearman, PhD, Harvard University

Jackie Bruce, PhD, Oregon Social Learning Center

Scott Compton, PhD, Duke University

Tisamarie Sherry, MD-PhD Candidate,
Harvard University

Sasha Silveanu, MPhil, Washington State
Family Policy Council

Appendix 3

SYMPOSIUM PEOPLE: PARTICIPANTS BY LEARNING TEAMS

AREA 1: Research Priorities

FOCUS AREA: Exploring the priority needs for research in Alberta that builds upon the content presented in the Symposium and how a research agenda could be developed that supports the needs of the policy and practice arenas.

TEAM 1 – Research Priorities

Troy Harker, PhD, MSc, Fellow in Neuropsychology, Stollery Children's Hospital

Anita Kozyrskyj, PhD, MSc, Associate Professor and Research Chair, Maternal-Child Health and the Environment, Pediatrics, University of Alberta

Deborah Kurrasch, PhD, Assistant Professor, Medical Genetics, University of Calgary

Frank MacMaster, PhD, Cuthbertson and Fischer Chair in Paediatric Mental Health, University of Calgary

Kara Murias, MD, MSc, Resident Physician, Pediatric Neurology, University of Calgary

Suzanne Tough, PhD, MSc, Professor, Paediatrics and Community Health Sciences, University of Calgary

TEAM 2 – Research Priorities

Karen Benzies, PhD, Associate Professor, Nursing, University of Calgary

Matthew Brown, PhD, Postdoctoral Fellow, Psychiatry, University of Alberta

Lucia Capano, MD, Resident Physician, Pediatric Neurology, University of Calgary

Xinjie Cui, PhD, MBA, Director, Child and Youth Data Lab, Alberta Centre for Child, Family and Community Research

Deborah Dewey, PhD, Professor, Paediatrics and Community Health Sciences, University of Calgary; Director, Behavioural Research Unit, Alberta Children's Hospital

Debbie McNeil, PhD, MSN, Director, Public Health Innovation and Decision Support Surveillance and Health Status Assessment, Population and Public Health; Adjunct Associate Professor, University of Calgary

Dianna Millard, PhD, Director, School Research and Improvement Branch, Ministry of Education, Government of Alberta

Fiona Schulte, PhD, Postdoctoral Research Fellow, Pediatric Oncology, Alberta Children's Hospital

AREA 2: Co-ordination of Education, Justice, Health, and Human Services

FOCUS AREA: Building and leveraging a common science base related to the learnings of the Symposium to guide collaborative problem-solving and innovation across the domains of education, justice, health, and human services generally in order to improve co-ordination among systems and deliver more effective services for children and their families in Alberta.

TEAM 3 – Co-ordination of Education, Justice, Health, and Human Services

Judith Barlow, MA, Executive Director, Young Offender Branch, Correctional Services, Alberta Solicitor General and Public Security

Gail Campbell, MEd, Director, Early Learning, Ministry of Education, Government of Alberta

Brian Malloy, Executive Director, Access and Early Intervention, Addiction and Mental Health, Alberta Health Services

Richelle Mychasiuk, MA, PhD Candidate, Canadian Centre for Behavioural Neuroscience, University of Lethbridge

David Ray, BA, BSW, Manager, Aboriginal Initiatives, Ministry of Aboriginal Relations, Government of Alberta

Michael Trew, MD, Senior Medical Director, Addiction and Mental Health, Alberta Health Services

Valerie Wiebe, RN, BN, MN, Executive Director, Addiction and Mental Health, Alberta Health Services – Calgary Zone

Susan Westenberger, BS, Sergeant, Community and Youth Services, Calgary Police Service

TEAM 4 – Co-ordination of Education, Justice, Health, and Human Services

Gloria Chalmers, MEd, Acting Director, Community Building and Investment – Children and Youth, United Way of the Capital Region

Dawne Clark, PhD, MA, Coordinator, Centre for Child Well-Being, Associate Professor, Child and Youth Studies, Mount Royal University

Margaret E. Clarke, MD, FRCP, Professor, Paediatrics and Psychiatry, University of Calgary

Muriel Dunnigan, Acting Director, Children and Youth, United Way of the Capital Region

Cathy Pryce, RN, MN, Vice President, Addiction and Mental Health, Alberta Health Services

Chris Sprysak, CA, BComm, LLB, LLM, Associate Professor, Law School, University of Alberta

Lorraine Stewart, PhD, Executive Director, Ministry of Education, Government of Alberta

Sherri Wilson, BSc, HEd, Senior Manager, Ministry of Health and Wellness, Government of Alberta

TEAM 5 – Co-ordination of Education, Justice, Health and Human Services

The Honourable Ted Carruthers, Judge, The Provincial Court of Alberta

Ruth Collins-Nakai, MD, MBA, Director, Council for Early Child Development

Fern Miller, BA, Senior Manager, Ministry of Health and Wellness, Government of Alberta

Tim Moorhouse, MA, Assistant Deputy Minister – Recreation and Sport Development, Alberta Tourism, Parks and Recreation

Marni Pearce, PhD, Director, Cross-Ministry Services, Ministry of Education, Government of Alberta

Trish Reay, PhD, Associate Professor, Department of Strategic Management and Organization, School of Business, University of Alberta

Pippa Rowcliffe, MA, Director of Communications, Human Early Learning Partnership, University of British Columbia

Sandra Woitas, MEd, Director, Edmonton Public Schools Foundation

Wendy Yewman, MA, Regional Manager, Community Partnerships, Services and Supports, Edmonton and Area Child and Family Services Region 6

AREA 3: Collaboration Between Academia and Policy and Practice Areas

FOCUS AREA: Encouraging more effective collaboration related to the learnings of the Symposium between academia and the policy and practice areas to benefit children and their families in Alberta.

TEAM 6 – Collaboration Between Academia and Policy and Practice Areas

Lynette Beauchamp, BSW, RSW, Mental Health Coordinator, Primary Care Network, Alberta Health Services

Gerry Giesbrecht, PhD, Postdoctoral Fellow, University of Calgary

Jane Hewes, PhD, MA, Chair, Early Learning and Child Care, Grant MacEwan University

Saifa Koonar, MBA, President and Chief Executive Officer, Alberta Children's Hospital

Pattie Pryma, RN, MN, MEd, Associate Professor, Nursing, Mount Royal University

Sherry Thompson, PhD, Project Lead, Health Needs and Service Design 2030, Alberta Health Services

TEAM 7 – Collaboration Between Academia and Policy and Practice Areas

Karen Cotton, BA, BEd, Senior Manager, Mental Health Initiatives, Young Offender Branch, Correctional Services Division, Alberta Solicitor General and Public Security

Suzanne Curtin, PhD, Associate Professor, Psychology and Linguistics, University of Calgary

Carol Ewashen, PhD, Associate Professor, Nursing, University of Calgary

Susan Graham, PhD, Professor and Canada Research Chair in Language and Cognitive Development and Director, Program in Clinical Psychology, University of Calgary

Noella Piquette-Tomei, PhD, Registered Psychologist; Associate Professor, Education, University of Lethbridge

Brent Scott, MD, MSc, Director, Alberta Children's Hospital Research Institute for Child and Maternal Health, University of Calgary

Marianne Stewart, BNS, MHSA, Vice President, Edmonton Zone, Alberta Health Services

Dale Unrau, Manager, Financial Planning and Partnerships Branch, Ministry of Advanced Education and Technology, Government of Alberta

AREA 4: Child Mental Health Policy and Practice

FOCUS AREA: Exploring ways that the learnings of the Symposium could be used to advance policy and practice in children's mental health.

TEAM 8 – Child Mental Health Policy and Practice

Lola Baydala, MD, Associate Professor, Pediatrics, University of Alberta

Pierre Berube, MEd, Certified Psychologist, Executive Director, Psychologists' Association of Alberta

Germaine Dechant, RN, MHSA, ICD.D, Chief Executive Officer, CASA Child, Adolescent and Family Mental Health

Karen Ferguson, Assistant Deputy Minister, Community Strategies and Support Division, Ministry of Children and Youth Services

Daniel Grigat, MA, Project Coordinator, Knowledge Transfer Initiatives, Alberta Innovates – Health Solutions

Carole Anne Hapchyn, MD, FRCP(C), Clinical Professor, Psychiatry and Pediatrics, University of Alberta; Program Psychiatrist, Infant Services, CASA Child, Adolescent and Family Mental Health; Medical Director, Autism Clinic, Glenrose Rehabilitation Hospital

Nancy Reynolds, DOT, BScOT, President and Chief Executive Officer, Alberta Centre for Child, Family and Community Research

Evelyn Wotherspoon, MSW, RSW, Social Worker, Collaborative Mental Health Care Program, Alberta Health Services

TEAM 9 – Child Mental Health Policy and Practice

Jaret Farris, BComm, BScOT, Director, Community and Outreach Services, CASA Child, Adolescent and Family Mental Health

Rosa Gregory, BSW, Mental Health Coordinator, Edmonton Oliver Primary Care Network

Wade Junek, MD, FRCP(C), President, Canadian Academy of Child and Adolescent Psychiatry; Clinical and Consulting Psychiatrist, Day Treatment Services, Mental Health and Addictions Program, IWK Health Centre

Kimberley Loh, Team Leader, Early Childhood Development, Health Canada, First Nations Inuit Health

Fay Orr, BA, BAA, Mental Health Patient Advocate, Alberta Mental Health Patient Advocate Office

Louise Simard, BA, LLB, Member of the Medical Council of Canada

AREA 5: Child and Family Primary Care Practice

FOCUS AREA: The impacts of the learnings of the Symposium on primary care for children and their families in Alberta and how this content could be used to enhance practice.

TEAM 10 – Child and Family Primary Care Practice

Lisa Cook, PhD, Information Specialist, Chinook Primary Care Network, Alberta Health Services

Marg Cutler, MSW, Manager, Early Learning and Child Care, Calgary and Area Child and Family Services

Greg Eberhart, Registrar, Alberta College of Pharmacists

Sandra Mintz, MBA, Executive Director, Chinook Primary Care Network, Alberta Health Services

Mark Moland, MA, Knowledge Management Consultant, Quality Practice and Partnerships, Alberta Health Services

Beverley Stich, MD, FRPC(C), Clinical Psychiatry Consultant, Edmonton Oliver Primary Care Network; Associate Clinical Professor, Psychiatry, University of Alberta

Danielle Tone, BSW, Improvement Facilitator, Chinook Primary Care Network

Bonnie Lynn Wright, PhD, RN, MScN, CCHN(C), Evaluation Coordinator, Chinook Primary Care Network

AREA 6: Early Childhood Intervention and Development Services

FOCUS AREA: Exploring the ways that the learnings of the Symposium could be used to advance policy and practice in intervention and development services for early childhood.

TEAM 11 – Early Childhood Intervention and Development Services

Phil Carlton, MEd, Director, UpStart Champions for Children and Youth

Daniel Goldowitz, PhD, CMMT, CFRI, Scientific Director, Neurodevelopment Network (NeuroDevNet); Professor, Medical Genetics, University of British Columbia; Associate Director, Trainee Development, Centre for Molecular Medicine and Therapeutics

Nicole Letourneau, PhD, Norlien/Alberta Children's Hospital Foundation; Chair in Parent Infant Mental Health, Faculty of Nursing, University of Calgary

Nazeem Muhajarine, PhD, MSc, Professor and Chair, Community Health and Epidemiology, University of Saskatchewan

Deborah Parker-Loewen, PhD, Registered Doctoral Psychologist, private practice; member of the Child and Youth Advisory Committee, Mental Health Commission of Canada

Diane Shearer, BSW, Senior Manager, Family Justice Services, Alberta Justice

Kesa Shikaze, BScOT, Project Manager, Community and Population Health Division, Ministry of Health and Wellness, Government of Alberta

TEAM 12 – Early Childhood Intervention and Development Services

Casey Boodt, MEdPsych, Interim Director, Community Investments, United Way of Calgary and Area

Laura Ghali, PhD, Director, Research and Community Partnerships for the Fraser Mustard Chair in Childhood Development, and Adjunct Professor, Paediatrics, University of Calgary

Deborah Hopkins, BS, Senior Manager, Early Childhood Development Initiatives, Alberta Children and Youth Services

June McCrone-Jenkins, BEd, Aboriginal Programs and Policy Advisor, Aboriginal Community Initiatives, Ministry of Aboriginal Relations, Government of Alberta

Lillian Parenteau, Chief Executive Officer, Region 10 Métis Settlements Child and Family Services Authority, Alberta Health Services

Shelly Philley, RN, MSA, Director, Reproductive Health, Healthy Child and Youth Development, Alberta Health Services

Marnie Robb, PhD, MEd, Senior Policy Advisor, Ministry of Aboriginal Relations, Government of Alberta

Sandi Roberts, MEd, ECD, SafeCom Leader Education, Safe Communities and Strategic Policy, Justice and Attorney General, Government of Alberta

Wadieh Yacoub, MD, Medical Officer of Health and Director of Health Protection, First Nations and Inuit Health for the Alberta Region, Health Canada; Clinical Assistant Professor, Public Health and Community Health Sciences, University of Alberta and University of Calgary

AREA 7: Training and Development for Clinicians and Professionals

FOCUS AREA: Exploring ways that the learnings of the Symposium could be incorporated into professional training and clinical preparation.

TEAM 13 – Training and Development for Clinicians and Professionals

Nancy Brager, MD, FRCP(C), Director, Undergraduate Medical Education in Psychiatry and Associate Professor, Psychiatry, University of Calgary

Lisa Burback, MD, Resident in Psychiatry, University of Alberta

Louise Forest, MSc, Project Manager, Office of the Chief Medical Officer of Health,

Ministry of Health and Wellness, Government of Alberta

Anita Paras, RN, MN, Workforce Planner and Manager, Ministry of Health and Wellness, Government of Alberta

Lindy VanRiper, MD, Psychiatry Resident, University of Alberta

Jennifer Wells, BSc, BEd, Literacy Manager, Ministry of Advanced Education and Technology, Government of Alberta

Appendix 4

LEARNING TEAM PLANS

Learning Teams, which were formed at the 2010 EBBD Symposium around a common interest in a particular Focus Challenge, reconvened at the 2011 EBBD. Each team revisited and refined the vision they had established for their Focus Challenge area and created a plan or list of action items to implement during the coming year that will move them closer to their vision. Each of the 13 groups collaboratively completed a set of questions called the Learning Team Compass to guide their future interaction and support of each other. The following are excerpts from the Learning Team Compasses of four groups:

LEARNING TEAM COMPASS – TEAM #3

My Learning Team Focus Challenge is:

Building and leveraging a common science base related to the learnings of the EBBD: A Science in Society Symposium to guide collaborative problem-solving and innovation across the domains of education, justice, health and human services generally in order to improve co-ordination among systems and deliver more effective services for children and their families in Alberta.

The Focus Challenge is important to our team because:

It is important to reduce the fragmentation between policy, research, and practice. Improve collaboration to optimize wellness for Alberta's children, families, and communities.

Our Learning Team's vision for the future:

Healthy children, healthy families! Alberta as the village for our children. All of our children are everyone's children.

Our Learning Team's goals for achieving this vision are:

Increase awareness about brain architecture within our organization and primary stakeholders. Working collaboratively within the bodies of policy, research, and practice (as in our Learning Team).

The strengths of our Learning Team members (resources, networks, experience, and knowledge) that we can leverage in support of our vision:

Diversity representation from various sections. Experience and knowledge. Sphere of influence – large networks, commitment.

Our Learning Team members have identified the following areas for potential collaboration (with each other or other Symposium participants):

- Sharing of a universal language – "core story."
- Sharing learning opportunities (conferences).

Our Learning Team has identified the following assets within the science, policy and/or practice communities in Alberta that will assist with the achievement of our vision:

Norlien Foundation, high level leadership commitment/endorsement, ECMap/EOI, "Zone Integrated Plan," AHS, close networks to Alberta science/research, "Participant Directory" – knowing who to call.

LEARNING TEAM COMPASS – TEAM #5

My Learning Team Focus Challenge is:

To spread the word: jointly create a generic presentation, using available EBBD materials, to be used by individual members to deliver to a variety of audiences.

The Focus Challenge is important to our team because:

It allows us to participate in knowledge translation, to practice telling the core story, and to become more familiar with resource materials.

Our Learning Team's vision for the future:

A healthy society with an awareness and appreciation of early child development.

Our Learning Team's goals for achieving this vision are:

1. Develop a presentation.
2. Each member of group will deliver presentation at least once.
3. Provide feedback for the group.

The strengths of our Learning Team members (resources, networks, experience, and knowledge) that we can leverage in support of our vision:

- Diversity of professional backgrounds, professions, and networks.
- Rich Norlien database.

Our Learning Team members have identified the following areas for potential collaboration (with each other or other Symposium participants):

Within our team, we are already collaborating across departments in government and with others outside government.

Our Learning Team has identified the following assets within the science, policy, and/or practice communities in Alberta that will assist with the achievement of our vision:

- Safe Communities Long-term Strategy
- Premier's Council on Economic Strategy
- Addiction and Mental Health Strategy
- ECD Mapping Initiative
- Alberta Centre for Child, Family and Community Research
- Various researchers at the various universities

LEARNING TEAM COMPASS – TEAM #10

My Learning Team Focus Challenge is:

Impact of the learnings of the Symposium on primary care for children and families in Alberta and how this content could be used to enhance practice.

The Focus Challenge is important to our team because:

Primary Care is the first contact into the health system. We are poised to make an impact within this area using our various organizations.

Our Learning Team's vision for the future:

For the betterment of Alberta's children and families, we strive to encourage primary care environments to implement and evaluate leading, evidence-informed practices.

Our Learning Team's goals for achieving this vision are:

1. Introduce the content delivered by our faculty to our settings.
2. Identify areas/programs/structures through which our organizations can connect.
3. Facilitate the inclusion of EBBD content in promotional/educational material and media.
4. Link all of our various organizations' websites to AFWI and Norlien.org.

The strengths of our Learning Team members (resources, networks, experience, and knowledge) that we can leverage in support of our vision:

Geographical proximity, shared frames of reference, differing viewpoints, good latitude over resource allocation, vast span of influence.

Our Learning Team members have identified the following areas for potential collaboration (with each other or other Symposium participants):

We will continue to collaborate with faculty members with bridging science into practice.

Our Learning Team has identified the following assets within the science, policy, and/or practice communities in Alberta that will assist with the achievement of our vision:

The availability of these communities to us throughout the province and their willingness to engage and partner with us.

LEARNING TEAM COMPASS – TEAM #11

My Learning Team Focus Challenge is:

To use the knowledge gained at EBBD Symposium to inform policy and improve practice for children, families, and communities.

The Focus Challenge is important to our team because:

The overwhelming weight of the evidence requires that we act now.

Our Learning Team's vision for the future:

Caring communities supporting optimal child development that will enable children to become happy, healthy, and productive citizens.

Our Learning Team's goals for achieving this vision are:

Within our individual spheres of influence, each group member will:

1. Develop actions to build a shared understanding across all sectors of society of the importance of early brain development.
2. Develop strategies that will lead to influencing policy change that will impact child development.
3. Support promising practice in early child development that can be replicated in all communities.

The strengths of our Learning Team members (resources, networks, experience, and knowledge) that we can leverage in support of our vision:

1. Access to established supporting policy frameworks and public networks.
2. Varied areas of specialty support further collaboration.
3. Challenge each other.
4. Broader perspective as we have members from outside of Alberta.

Our Learning Team members have identified the following areas for potential collaboration (with each other or other Symposium participants):

1. Letters of support for each other's initiatives.
2. Information sharing.
3. Collaborating on intervention research.

Our Learning Team has identified the following assets within the science, policy, and/or practice communities in Alberta that will assist with the achievement of our vision:

1. Members are connected to a range of relevant ECD initiatives in both Alberta and Saskatchewan that will support this work.
2. Non-governmental agencies that have recently made position statements related to the future direction of early childhood development systems in the province.
3. Website provides a forum for shared learning.
4. Team members participate on various local and national leadership bodies including Mental Health Commission of Canada, CIHR, NeuroDevNet, Council of Champions, etc.

Appendix 5

PRIMER ON FRAMEWORKS INSTITUTE METHODOLOGY

Strategic Frame Analysis™ (SFA), developed by the FrameWorks Institute, is an approach to communications that recognizes there is more than one way to tell a story. SFA integrates elements from the cognitive and social sciences to explain how communications, and media in particular, influence public support for social programs and policies.

Using SFA, it is possible to deconstruct the frames currently in the public consciousness and to understand their impact on public policy preferences. Framing refers to the subtle selection of certain aspects of an issue in order to cue a specific response. SFA allows us to test and validate both the negative frames and the potential positive reframes that can help the public see and support desired alternative policy solutions.

Some components of the SFA approach are unique to FrameWorks; others are common social science methods. These methods include:

Content Analysis of News Media

FrameWorks analyzes the framing of various issues in a wide variety of news outlets. This research reveals important thematic patterns in news reporting and identifies the leading frames within that coverage.

Cognitive Interviews

FrameWorks conducts one-on-one interviews with citizens to discern how they think about particular issues. The interviews examine their pattern of reasoning, the connections they make to other issues, and the devices they use to resist new information. These in-depth interviews allow researchers to identify the cultural models – implicit shared understandings and assumptions – that guide people's thinking about abstract social issues.

Peer Discourse Analysis

Peer discourse analysis captures the effects of frames in social settings by exploring inter-group negotiations around particular social issues. The analysis is organized to validate the findings from the cognitive interviews and the media content analysis, experiment with promising alternative frames, and observe the negotiations between members of the public when using dominant cultural models and potential reframing elements. The analysis uses data from moderated focus groups of 10 to 12 people who are influential in the target community.

Expert Interviews and Materials Reviews

To better understand how experts and advocates communicate about an issue, as well as the basic content of the messages they want to advance, FrameWorks researchers interview them, attend their professional meetings, and analyze the publicly available materials they produce. FrameWorks then drafts a core story that lays out the central problems associated with the issue, the evidence that supports these conclusions, and the policy and program solutions that expert knowledge suggests will help resolve the issue.

Mapping the Gap Conceptual Analysis

FrameWorks researchers juxtapose public understanding of an issue (identified through the cognitive interviews, peer discourse analysis, and media content analysis) and the understandings of policy experts on the issue (gathered via the expert interviews and material reviews). FrameWorks can then "map" the ways experts explain social issues against the dominant cultural models the public brings to bear on the same issues. Places where there is incongruity between experts' and the public's understanding of an issue then become primary targets for reframing.

Simplifying Model Development

A simplifying model is a reframing tool that captures the essence of a technical concept through a familiar, easily understood metaphor that has a high capacity for spreading easily through a population. Numerous studies show that the public's ability to reason about complex, abstract or technical public policy concepts relies heavily on metaphor and analogy. FrameWorks develops, tests, and refines simple, concrete metaphorical frame elements that help people organize information on issues in new ways, fill in understanding currently missing from the public's repertoire, and shift attention away from the default patterns they use to understand those issues.

Provincial Experimental Surveys

FrameWorks uses experimental surveys to test the efficacy of using some frames over others. These experiments employ web-based surveys and randomly assign a representative sample to one or more treatments and a control group. The treatment groups are exposed to framed messages and are asked questions that assess their support for a variety of related policy questions. Their responses are compared to those of the control group (which received no stimuli) to determine any effects on the way in which the issues were framed. Using this method, it is possible to demonstrate the extent to which exposure to particular frames affects the public's policy preferences.

Persistence Trials

FrameWorks conducts persistence trials, the last step in developing a simplifying model, to answer two general questions: (1) do participants transmit the model to others with a reasonable degree of fidelity? and (2) how do they transmit the model? In a social setting, pairs of people pass on a candidate simplifying model to subsequent pairs, going further from the researcher's original exposure with each transmission. From these transmissions, researchers observe how the participants react to and use the model, how it travels and holds up, what parts of it persist, and how it appears to change participant thinking on the target issue.

More information about these methods is available at www.frameworksinstitute.org/methods.html

Appendix 6

ADDITIONAL RESOURCES: KNOWLEDGE-TRANSFER REPORTS, POLICY DOCUMENTS, ORGANIZATIONS, WEBSITES

Each of the resources featured below is available online at no cost. Note that this is not an exhaustive list.

1. A Science-based Framework for Early Childhood Policy: Using Evidence to Improve Outcomes In Learning, Behavior, and Health for Vulnerable Children. (2007). Boston, MA: Center on the Developing Child at Harvard University.

Available from:

http://developingchild.harvard.edu/index.php/resources/reports_and_working_papers/policy_framework/

2. Adverse Childhood Experiences (ACE) Study. Centers for Disease Control and Prevention, Government of the United States.

Available from: http://www.cdc.gov/ace/index.htm

3. Alberta's Health Research and Innovation Strategy. (2010). Edmonton, AB: Government of Alberta, Alberta Health and Wellness.

Available from: http://www.advancededucation.gov.ab.ca/media/277640/ahris_report_aug2010_web.pdf

Highlights document available from: http://www.advancededucation.gov.ab.ca/media/277579/final%20ahris%20highlights%20sheet-high-res%20(no%20cover,%20no%20bleeds).pdf

4. Child Maltreatment 2008. (2010). U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. Rockville, MD: Author.

Available from: http://www.acf.hhs.gov/programs/cb/stats_research/index.htm#can

5. Creating Connections: Alberta's Addiction and Mental Health Strategy. (2011). Government of Alberta.

Available from: http://www.health.alberta.ca/documents/Creating-Connections-2011-Strategy.pdf

6. Creating Connections: Alberta's Addiction and Mental Health Action Plan 2011-2016. (2011). Government of Alberta.

Available from: http://www.health.alberta.ca/documents/Creating-Connections-2011-ActionPlan.pdf

7. Depression in Parents, Parenting, and Children: Opportunities to Improve Identification, Treatment, and Prevention. (2009). National Research Council and Institute of Medicine. M. J. England & L. J. Sims (Eds.). Washington, DC: National Academies Press. (Can read entire book online at no cost.)

Available from: http://www.nap.edu/catalog.php?record_id=12565

8. Early Brain & Biological Development: A Science in Society Symposium. Summary Report. (2010). Calgary, AB, Canada: Norlien Foundation.

Available from: http://www.albertafamilywellness.org/resources/search

9. From Neurons to Neighborhoods: The Science of Early Childhood Development. (2000). Shonkoff, J. P., & Phillips, D. A. (Eds.). Washington, DC: National Academies Press.

Available from: http://www.nap.edu/catalog.php?record_id=12565

10. Healthy Development: A Summit on Young Children's Mental Health. (2009). Partnering with Communication Scientists, Collaborating across Disciplines and Leveraging Impact to Promote Children's Mental Health. Washington, DC: Society for Research in Child Development.

Available from: http://www.apa.org/pi/families/summit-report.pdf

11. Let's Talk About the Early Years: Report by the Chief Medical Officer of Health. (2011). Alberta Health and Wellness, Government of Alberta.

Available from: http://www.health.alberta.ca/about/OCMOH-reports.html

12. Positive Futures – Optimizing Mental Health for Alberta's Children and Youth: A Framework for Action (2006-2016). (2006). Alberta Health and Wellness. Edmonton, AB: Author.

Available from: http://www.health.alberta.ca/documents/Mental-Health-Framework-Child-06.pdf

13. Preventing Child Maltreatment: A Guide to Taking Action and Generating Evidence. (2006). World Health Organization & International Society for the Prevention of Child Abuse and Neglect. Butchart, A., Harvey, A. P, Mian, M., & Furniss, T. Geneva: WHO.

Available from: http://whqlibdoc.who.int/publications/2006/9241594365_eng.pdf

14. Preventing Child Maltreatment: Program Activities Guide. Centers for Disease Control and Prevention. Atlanta, GA: Author.

Available from: http://www.cdc.gov/ViolencePrevention/childmaltreatment/index.html

15. Preventing Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities. (2009). A consensus report from the Committee on the Prevention of Mental Disorders and Substance Abuse Among Children, Youth and Young Adults. National Research Council and Institute of Medicine. Washington, DC: The National Academies Press.

Available from: http://www.iom.edu/Reports/2009/Preventing-Mental-Emotional-and-Behavioral-Disorders-Among-Young-People-Progress-and-Possibilities.aspx

16. Recovery from Addiction: A Science in Action Symposium. Summary Report. Volume 2. (2011). Calgary, AB, Canada: Norlien Foundation.

Available from: http://www.albertafamilywellness.org/resources/publication/2010-recovery-addiction-summary-report

17. Report of the Surgeon General's Conference on Children's Mental Health: A National Action Agenda. (2001). U.S. Public Health Service. Rockville, MD: Department of Health and Human Services.

Available from: http://www.surgeongeneral.gov/topics/cmh/childreport.html

18. Strengthening Benefit-Cost Analysis of Early Childhood Interventions: Workshop Summary. (2009). National Research Council and Institute of Medicine. Beatty, A.; Committee on Strengthening Benefit-Cost Methodology for the Evaluation of Early Childhood. Washington, DC: The National Academies Press.

Available from: http://www.nap.edu/catalog/12777.html

19. Talking About Child Development and Children's Mental Health in Alberta. (2011). Washington, DC: Developed by the FrameWorks Institute for the Alberta Family Wellness Initiative supported by the Norlien Foundation.

Available from: www.frameworksinstitute.org/toolkits/alberta/, user name and password: fw

20. The Foundations of Lifelong Health Are Built in Early Childhood. (2010). Boston, MA: Center on the Developing Child at Harvard University.

Available from: http://developingchild.harvard.edu/index.php/resources/reports_and_working_papers/foundations-of-lifelong-health/

21. Transformative Neurodevelopment Research in Mental Illness: Report of the National Advisory Mental Health Council's Workgroup. (2008). Bethesda, MD: National Institute of Mental Health.

Available from: http://www.nimh.nih.gov/about/advisory-boards-and-groups/namhc/neurodevelopment_workgroup_report.pdf

22. Unclaimed Children Revisited: The Status of Children's Mental Health Policy in the United States. (2008). Cooper, J. L., Aratani, Y., Knitzer, J., Douglas-Hall, A., Masi, R., Banghart, P., & Dababnah, S. New York: National Center for Children in Poverty.

Available from: http://nccp.org/publications/pdf/text_853.pdf

23. Why Your DNA Isn't Your Destiny. Cloud, J. (2010, Jan. 6). Time magazine.

Available from: http://www.time.com/time/health/article/0,8599,1951968,00.html

GLOSSARY

Addiction – "Addiction is a primary, chronic disease of brain reward, motivation, memory, and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social, and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors. Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one's behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death." The American Society of Addiction Medicine

Adrenaline (also called Epinephrine) – A hormone secreted when under stress by the medulla of the adrenal gland to prepare the body for fight or flight. When released into the blood stream, adrenaline stimulates the heart, increasing blood pressure, opening airways in the lungs, and increasing blood sugar to provide muscular strength and endurance enabling the body to fight or run in response to a perceived threat.

Brain Plasticity – Capacity of the brain to change structure, function, or organization of neurons in response to experience. This ability persists throughout the lifetime, but specific types of plasticity are age dependent.

Chronic Disease Management Model – A healthcare delivery model currently used to manage chronic diseases such as diabetes and hypertension and gaining favour for treating addiction. The goal is to keep patients healthier and disease-free for as long as possible through screening and early detection, multi-disciplinary and holistic care teams, patient education and self-care, and ongoing case management.

Core Story – A knowledge-translation technique from the FrameWorks Institute. A core story defines a topic in a consistent way, prioritizes the scientific knowledge, identifies the key points, and removes unnecessary detail. A good core story unifies the many messages from the scientific community into a single story line with several basic themes. This simpler model can be used to create a link between scientific findings and policy.

Cortisol – A steroid hormone produced by the adrenal cortex that regulates carbohydrate metabolism and maintains blood pressure. Cortisol is released in response to stress, acting to restore homeostasis. However, prolonged cortisol secretion due to chronic stress can have negative effects on development and far-reaching health effects into adulthood.

Depression – A psychiatric condition involving a primary disturbance of mood that affects a person's thoughts, feelings, behaviours, and physical functioning. Symptoms include feelings of sadness, hopelessness, worthlessness, anxiety, guilt, irritability, fatigue, and pain that persist for a significant period of time.

Dopamine – A neurotransmitter in the brain that is involved in movement, motivation, and reward; also the neurotransmitter most closely associated with addiction. Dopamine is the main neurotransmitter of the reward system and becomes dysregulated in addiction.

Epigenetics – The study of heritable changes in gene expression due to mechanisms other than changes in the underlying DNA sequence. A gene is basically like any other molecule in the cell and thus is subject to physical modifications. Collectively, these modifications can be considered as an additional layer of information that is contained within the genome and are referred to as the epigenome (from the Greek "epi" meaning "over" and genome).

Executive Functions – A set of cognitive abilities that control and regulate other abilities and behaviours. Executive functions include planning and decision-making, abstract thinking, rule acquisition, and cognitive flexibility.

Hippocampus – Part of the brain related to the formation and long-term storage of associative and episodic memories; one of several limbic structures that have been implicated in mood disorders. Included in the functions of hippocampal circuitry are control of learning and memory and regulation of the hypothalamic-pituitary-adrenal (HPA) axis, both of which are altered in depression.

Neurotransmitter – A biochemical substance such as dopamine or serotonin that transmits or inhibits nerve impulses at the synapse.

Positive Stress – Positive stress is moderate and short-lived and is an important and necessary contributor to healthy brain development. It can help motivate individuals to accomplish tasks and achieve goals.

Pre-frontal Cortex – A part of the forebrain that is involved in executive functions such as working memory, decision-making, planning, and judgment.

Program Evaluation – A systematic method for collecting, analyzing, and using information to answer questions about projects, policies, and programs, particularly about their effectiveness and efficiency.

Secure Attachment – Strong, positive, and trusting emotional attachments formed between infants and their mothers and other caregivers.

Serve and Return – The metaphor of a game of tennis used in the core story of brain development to describe the positive interaction between a child and caregiver required for healthy development.

Stress Response System – A fight-or-flight function of the autonomic nervous system that initiates, within seconds of a perceived threat, an integrated repertoire of biobehavioural changes associated with accelerations of heart and respiratory rates, sweat production, and other physiological changes.

Tolerable Stress – Tolerable stress is a severe form of stress, but it occurs in the context of supportive relationships that help buffer its effects and facilitate adaptive coping. Tolerable stress does not produce long-lasting damage to the body.

Toxic Stress – Intense, long-lasting, or uncontrollable stress occurring in the absence of supportive relationships to buffer its effects. In children, toxic stress can occur as a result of an unpredictable home environment, abuse, or being cared for by a parent who is addicted or mentally ill. Toxic stress in the early years of life damages the developing brain and can lead to lifelong problems in learning and behaviour, and increased risk for physical and mental illness.

Appendix 7

FACULTY RESOURCES

National Scientific Council on the Developing Child Working Papers

Working Paper 1. Young Children Develop in an Environment of Relationships. (2004).

Working Paper 2. Children's Emotional Development is Built into the Architecture of Their Brains. (2004).

Working Paper 3. Excessive Stress Disrupts the Architecture of the Developing Brain. (2005).

Working Paper 4. Early Exposure to Toxic Substances Damages Brain Architecture. (2006).

Working Paper 5. The Timing and Quality of Early Experiences Combine to Shape Brain Architecture. (2007).

Working Paper 6. Mental Health Problems in Early Childhood Can Impair Learning and Behavior for Life. (2008).

Working Paper 7. Workforce Development, Welfare Reform, and Development of Young Children. (2008).

Working Paper 8. Maternal Depression Can Undermine the Development of Young Children. (2009).

Working Paper 9. Persistent Fear and Anxiety Can Affect Young Children's Learning and Development. (2010).

Working Paper 10. Early Experiences Can Alter Gene Expression and Affect Long-Term Development. (2010).

Working Paper 11. Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function. (2011).

REFERENCES BY CONTENT FACULTY PRESENTATION

CAMERON – The Interplay Between Early Brain and Behaviour Development

Cramer, S.C., Sur, M., Dobkin, B. H., O'Brien, C., Sanger, T. D., Trojanowski, J. Q., & Vinogradov, S. (2011). Harnessing neuroplasticity for clinical applications. Brain, 134(6), 1591-1609.

Knudsen, E. I., Heckman, J. J., Cameron, J. L., & Shonkoff, J. P. (2006). Economic, neurobiological, and behavioral perspectives on building America's future workforce. Proceedings of the National Academy of Sciences, 103(27), 10155-10162.

Sabatini, M. J., Ebert, P., Lewis, D. A., Levitt, P., Cameron, J. L., & Mirnics, K. (2007). Amygdala gene expression correlates of social behavior in monkeys experiencing maternal separation. Journal of Neuroscience, 27(12), 3295-3304.

GUNNAR – Stress and Neurobehavioural Development in Childhood

Garvin, M. C., Tarullo, A. R., Van Ryzin, M., & Gunnar, M. R. (2012). Postadoption parenting and socioemotional development in postinstitutionalized children. Developmental Psychopathology, 24(1), 35-48.

Fisher, P. A., Gunnar, M. R., Dozier, M., Bruce, J., & Pears, K. C. (2006). Effects of therapeutic interventions for foster children on behavioral problems, caregiver attachment, and stress regulatory neural systems. Annals of the New York Academy of Sciences, 1094, 215-225.

Loman, M. M., & Gunnar, M. R., for the Early Experience, Stress, and Neurobehavioral Development Center. (2010). Early experience and the development of stress reactivity and regulation in children. Neuroscience & Biobehavioral Reviews, 34(6), 867-876.

ANDA – Adverse Childhood Experiences: Connecting the Development Lens to the Health of Our Society

Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. American Journal of Preventative Medicine, 39(1), 93-98.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. European Archives of Psychiatry and Clinical Neuroscience, 256(3), 174-186.

Edwards, V. J., Dube, S.R., Felitti, V. J., & Anda, R. F. (2007). It's ok to ask about past abuse. American Psychologist, 62(4), 327-328.

DANESE – Biological Embedding of Adverse Childhood Experiences

Danese, A., Caspi, A., Williams, B., Ambler, A., Sugden, K., Mika, J., ... Arseneault, L. (2011). Biological embedding of stress through inflammation processes in childhood. Molecular Psychiatry, 16(3), 244-246.

Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. Physiology and Behavior, 106(1), 29-39.

Nanni, V., Uher, R., & Danese, A. (2012). Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: A meta-analysis. American Journal of Psychiatry, 169(2), 141-151.

HILL – Residual Effects of Early Life Stress into Adulthood: Biological Mechanisms

Eiland, L., Ramroop, J., Hill, M. N., Manley, J., & McEwen, B. S. (2012). Chronic juvenile stress produces corticolimbic dendritic architectural remodeling and modulates emotional behavior in male and female rats. Psychoneuroendocrinology, 37(1), 39-47.

Heim, C., Newport, D. J., Mletzko, T., Miller, A.H., & Nemeroff, C.B. (2008). The link between childhood trauma and depression: Insights from HPA axis studies in humans. Psychoneuroendocrinology, 33(6), 693-710.

Hill, M. N., Patel, S., Campolongo, P., Tasker, J. G., Wotjak, C. T., & Bains, J. S. (2010). Functional interactions between stress and the endocannabinoid system: From synaptic signaling to behavioral output. Journal of Neuroscience, 30(45), 14980-14986.

McEwen, B. S. (2008). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. European Journal of Pharmacology, 583(2-3), 174-185.

HENDERSON – Foundations of Social and Emotional Development

Fox, N. A., Henderson, H. A., Marshall, P. J., Nichols, K. E., & Ghera, M. M. (2005). Behavioral inhibition: Linking biology and behavior within a developmental framework. Annual Review of Psychology, 56, 235-262.

Hane, A. A., Henderson, H. A., Reeb-Sutherland, B. C., & Fox, N. A. (2010). Ordinary variations in human maternal caregiving in infancy and biobehavioral development in early childhood: A follow-up study. Developmental Psychobiology, 52(6), 558-567.

Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine, D. S., Steinberg, L., & Fox, N. A. (2009). Impact of behavioral inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. Journal of Abnormal Child Psychology, 37(8), 1063-1075.

WEISZ – Promoting Youth Well-Being Through Psychotherapy: Redesigning Treatments for Real-World Clinical Care

Kazak, A. E., Hoagwood, K., Weisz, J. R., Hood, K., Kratochwill, T. R., Vargas, L. A., & Banez, G. A. (2010). A meta-systems approach to evidence-based practice for children and adolescents. American Psychologist, 65(2), 85-97.

McCarty, C. A., & Weisz, J. R. (2007). Effects of psychotherapy for depression in children and adolescents: What we can (and can't) learn from meta-analysis and component profiling. Journal of the American Academy of Child and Adolescent Psychiatry, 46(7), 879-886.

Weisz, J.R., Chorpita, B. F., Palinkas, L. A., Schoenwald, S. K., Miranda, J., Bearman, S. K., ... Research Network on Youth Mental Health. (2011). Testing standard and modular designs for psychotherapy treating depression, anxiety, and conduct problems in youth: A randomized effectiveness trial. Archives of General Psychiatry, doi: 0: 20111471-9.

Weisz, J. R., Jensen-Doss, A., & Hawley, K. M. (2006). Evidence-based youth psychotherapies versus usual clinical care: A meta-analysis of direct comparisons. American Psychologist, 61(7), 671-689.

MARCH – The Pivot to Pre-emptive Interventions in Psychiatry

March, J. S. (2009). The future of psychotherapy for mentally ill children and adolescents. Journal of Child Psychology and Psychiatry, 50(1-2), 170-179.

Report of the National Advisory Mental Health Council's Workgroup. (2009). Transformative Neurodevelopmental Research in Mental Illness. http://www.nimh.nih.gov/about/advisory-boards-and-groups/namhc/neurodevelopment_workgroup_report.pdf

MAYES – The Impact of Early Adversity on Parenting

Leckman, J. F., Feldman, R., Swain, J. E., Eicher, V., Thompson, N., & Mayes, L. C. (2004). Primary parental preoccupation: circuits, genes, and the crucial role of the environment. Journal of Neural Transmission, 111(7), 753-771.

Rutherford, H. J., Williams, S. K., Moy, S., Mayes, L.C., & Johns, J.M. (2011). Disruption of maternal parenting circuitry by addictive process: Rewiring of reward and stress systems. Frontiers in Psychiatry, 2, 37.

Strathearn, L., & Mayes, L. C. (2010). Cocaine addiction in mothers: Potential effects on maternal care and infant development. Annals of the New York Academy of Sciences, 1187, 172-183.

PRUETT & PRUETT – Supporting Father Involvement and Co-parenting to Enhance Family Resilience and Early Child Experience

Pruett, K. D. (1999). Me, Myself and I: How Children Build Their Sense of Self. Goddard Press Inc.: New York.

Pruett, K., & Pruett, M. K. (2009). Partnership Parenting: How Men and Women Parent Differently – Why It Helps Your Kids and Can Strengthen Your Marriage. Da Capo Press: Cambridge.

FRANK – Promoting What Works in Early Childhood to Prevent Health, Behavioural Health, and Other Social Problems

Draimin, T., Cory, R., & Jagelewski, A. (2010). Social Impact Bonds: Potential Applicability for Canada. Prepared for Human Resources and Skills Development Canada by Social Innovation Generation. http://socialfinance.ca/uploads/documents/SiG_SIBPotentialApplicabilityforCanada_2010.pdf

Shonkoff – Leveraging Science to Shape the Future of Early Childhood Policy

Shonkoff, J. P. (2010). Building a new biodevelopmental framework to guide the future of early childhood policy. Child Development, 81(1), 357-367.

Shonkoff, J. P. (2011). Protecting brains, not simply stimulating minds. Science, 333(8), 982-983.

Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., Pascoe, J. & Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. Pediatrics, 129, doi: 10.1542/peds.2011-2663.

Shonkoff, J. P., Siegel, B. S., Dobbins, M. I., Earls, M. F., Garner, A. S., McGuinn, L., Pascoe, J. & Wood, D. L. (2011). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. Pediatrics, doi: 10.1542/peds.2011-2662.

Norlien Foundation

102 – 8TH AVENUE SW | CALGARY, ALBERTA T2P 1B3
CALGARY PHONE: 403-215-4490 | EDMONTON PHONE: 780-429-3311
NORLIEN.ORG