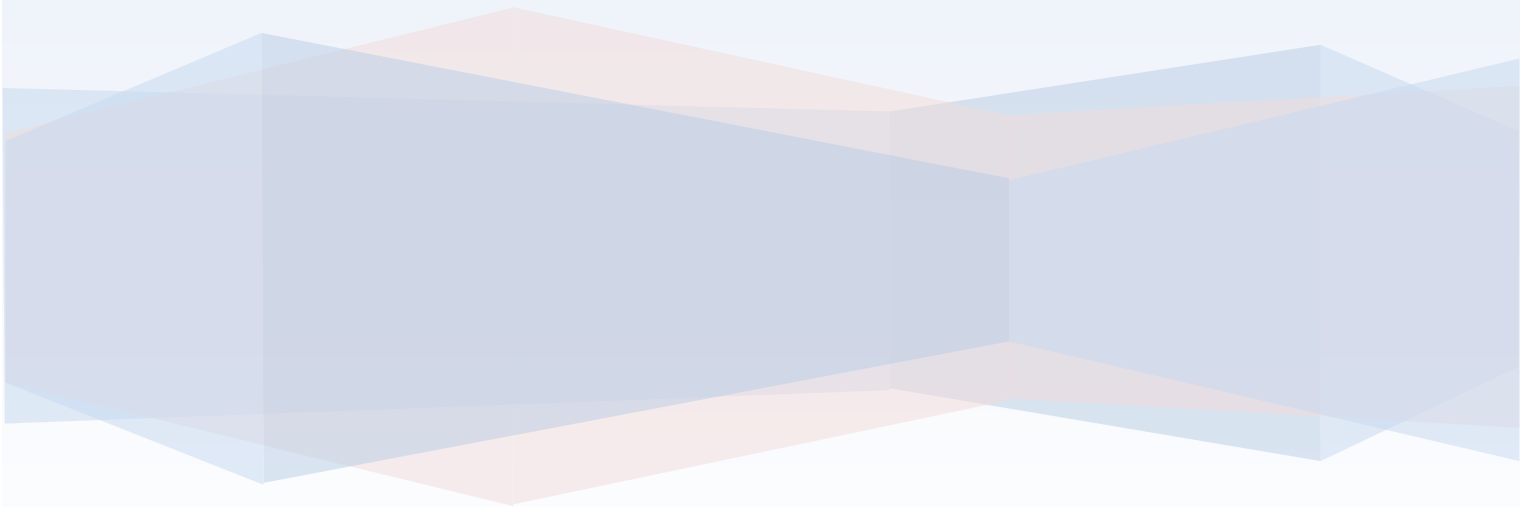# ALL OUR BABIES

2 Year Follow Up Report
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Technical summary

Background

The All Our Babies (AOB) study is a prospective cohort study of approximately 3200 pregnant women and their children designed to examine maternal and child outcomes during the prenatal and early postpartum period and to identify barriers and facilitators to accessing health care services in Calgary, Alberta. Initial data collection began in 2008 and included 2 questionnaires during pregnancy and a 4 month follow up. Follow up questionnaires were developed to examine child development and parenting outcomes at 1, 2, 3, 5 and planning is underway for 8 years. A special questionnaire was developed after a flood (natural disaster) occurred in Calgary in June 2014.

The aim of this project is to summarize the data collected from the 2 year follow-up questionnaire. Specifically, this report describes participant's demographics, lifestyle, mental health, social support, community resource use, health service utilization, child health, child sleep habits, child screen time, childcare environment, child development and parenting at two years post delivery. The impact of family income, childcare arrangements and maternal mental health on key child, maternal and parenting outcomes were examined. Protective factors for age appropriate child development at 2 years of age were identified. A further analysis identified and compared protective factors for child development separately in the contexts of *low maternal mental health risk* and *higher maternal mental health risk.*

Objectives

1. To describe the AOB cohort with respect to demographics, lifestyle, mental health, social support and service utilization at 2 years post delivery.

2. To describe the physical health, sleep habits, screen time, family activities, and child development outcomes (Ages and Stages Questionnaire (ASQ), Brief Infant-Toddler Social and Emotional Assessment (BITSEA), Modified Checklist for Autism in Toddlers (M-CHAT)) of children in the cohort by family income.

3. To describe the parenting experience, parenting sense of competence, parent child interaction of the cohort, by a) maternal rating of emotional health, b) child care arrangement, c) family income.

4. To describe the relationship between maternal anxiety, depression, social support and stressful life events and a) child development, b) child care arrangement.

5. To describe the main protective factors that reduce the impact of poor maternal mental health in the prenatal and postpartum periods on child developmental outcomes at 2 years of age.

6. To derive a resilient status variable and identify protective factors that operate uniquely in high-risk contexts.

Methods

Women were recruited from health care offices, communities, and through Calgary Laboratory Services before 25 weeks gestation from May 2008 to December 2010. Participants completed two questionnaires during pregnancy and a third at 4 months postpartum. Data was collected on pregnancy history, demographics, lifestyle, health care utilization, physical health, mental health, social support and parenting experience. Participants were also asked to provide permission for the research team to access their obstetrical and birth records. Eligible participants were invited to complete follow-up questionnaires were when their child was 1 and 2 years old. The 1 and 2 year follow-up questionnaires included questions about child health, child sleep, childcare environment, child development, health service utilization, community resource use, demographics, maternal lifestyle, maternal mental health, maternal social support, stressful life events, work status and parenting experience.

Highlighted Results

Maternal characteristics

All Our Babies (AOB) participants, in general, represent the medically and socio-demographic low risk pregnant and parenting population in Calgary. Nearly all participants were 25 years or older (98%), were married or in a common law relationship (96%) and were living in two parent households with their child's biological father (96%). Most participants had some post secondary education (92%), had household incomes above $80,000 (69%), were born in Canada (81%) and described their ethnicity as White or Caucasian (79%).

More than two thirds of families resided in households where both parents worked or studied (70%). Among mother's who worked, 31% worked between 1-20 hours per week, 58% worked between 21-40 hours per week and 11% were working more than 40 hours per week. Few participants were students (8%). Of these, 81% were studying part-time for 1-20 hours a week and 19% were studying more than 20 hours per week.

Mental health characteristics were assessed using standardized tools (Appendix A). Using the Centre for Epidemiologic Studies Depression Scale (CES-D), 13% of women displayed symptoms of depression at 2 years postpartum. Anxiety was measured using the State Anxiety subscale of the Spielberger State-Trait Anxiety Inventory (SAI). At 2 years postpartum, 15% of women displayed symptoms of anxiety on the SAI. The RAINE

Stressful Life Events (RAINE) scale was used to assess participants' exposure to stressful life events. In the past year, 44% of women experienced at least 2 stressful life events.

Over half of participants used a recreation, fitness or leisure center (85%), their local library (60%) and attended informal playgroups (59%) in the past year. Fewer participants accessed other community resources such as organized parenting groups (21%), drop-in child cares (16%) and drop-in parenting programs (13%).

Nearly all families accessed health care services for their child in the past year as 90% had taken their child to a family doctor and 72% had taken their child to a community health clinic. Approximately a third of families had accessed walk-in clinic physician care (34%) and the emergency department (32%) for their child in the past year.

Child characteristics

Nearly all mothers rated their child's health as excellent, good or very good (99%). At 2 years of age, 3% of children had been diagnosed with a long-term health condition, 3% had a developmental delay, 10% had an allergy and 5% had asthma. By the age of 2, nearly a third of children had experienced at least 1 ear infection (31%).

The majority of children were able to fall asleep in 30 minutes or less (85%), slept alone in a separate bedroom (78%) and napped an average of 1-3 hours per day (93%). Most children began sleeping through the night before 1 year (62%); while 28% began sleeping through between 1 and 2 years and 10% still weren't sleeping through the night at 2 years of age. More than half of children were waking in the night less than once a week (63%), while 14% were waking 1-2 times per week and 22% were waking more than 3 times a week.

Most children are watching some television or movies/DVD's at 2 years of age (81%). Over half of children were using a tablet or computer at 2 years of age (56%). Combining all screen time (television, movies/DVD's, computer/tablet), 5% of children had no screen time, 47% had less than one hour or not more than one hour on any type of media and 48% spent at least 1 hour on at least 1 type of media.

Two thirds of women reported their 2 year old child was spending at least 3 hours a day playing, walking, running, jumping, climbing, dancing etc. The majority of women reported daily reading (73%), daily playing imitation games (64%) and daily singing (78%) with their child at 1 and 2 years. More than half of women reported pretending with their child daily (72%), drawing with their child daily (56%) and playing with educational toys with their child daily (56%) when their child was 2 years old.

Childcare arrangement

At 2 years of age, nearly half of children were being cared for primarily by their parents (46%). Twenty two percent of children were being cared for at a day home, 14% at a childcare center, 12% by a relative and 6% by a nanny at 2 years of age.

Child development outcomes

Five domains of child development (communication, gross motor, fine motor, problem solving and personal social) were assessed using the Ages and Stages Questionnaire (ASQ). The risk category of each domain was defined as scoring 1 standard deviation below the mean of the normative data.

Based on maternal report on the ASQ:

- 14% had a communication delay
- 14% had a gross motor delay
- 12% had a fine motor delay
- 14% had a problem solving delay
- 16% had a personal social delay

A composite risk of developmental delay was used in the present study, operationalized as scoring below one standard deviation below the mean of normative data on at least two of the five developmental domains. Based on this definition, 18% of children were categorized as delayed.

The Brief Infant-Toddler Social and Emotional Assessment (BITSEA) was used to measure child social-emotional development (empathy, pro-social behaviors and compliance) and behavioral problems (aggression, defiance, over-activity, negative emotionality, anxiety and withdrawal). Based on maternal report on the BITSEA, 15% were identified with social-emotional/behavioral problems and 13% had delayed social emotional abilities.

The Modified Checklist for Autism in Toddlers (M-CHAT) was used to screen for children with a possible autistic spectrum disorder. In our sample, 4% of children were identified with possible symptoms of Autistic Spectrum Disorder.

Impact of low income (family income <$80,000 per year)

When their child was one year old, women were asked the total income, before taxes and deductions, for all household members from all sources in the past year. Participants were categorized into two income categories: 1) Total household incomes less than $80,000 and 2) Total household incomes of $80,000 or greater. Child physical health, child sleep habits, child screen time, activities with child, child development and family life/parenting outcomes were compared for families with incomes less than $80,000 to families with incomes of at least $80,000. These results are summarized below.

Child sleep

Compared to children in families with total household incomes of at least $80,000, children in families with total household incomes below $80,000:
- were more likely to take at least 30 minutes to fall asleep
- were more likely to be given a bottle to fall asleep at night
- were more likely to wake at night at least 3 times a week
- were less likely to sleep alone in a separate bedroom

Child screen time

Compared to children in families with total household incomes of at least $80,000, children in families with total household incomes below $80,000:
- were more likely to watch television or movies/DVD's for at least one hour on a typical weekday
- were less likely to use a computer or tablet
- were more likely to have at least one hour of any screen time (television, movies/DVD's, computer/table)

Activities with child

Compared to children in families with total household incomes of at least $80,000, children in families with total household incomes below $80,000:
- were less likely to have a parent read to them daily at both 1 and 2 years
- were less likely to have a parent engage in imitation play with them daily at 1 and 2 years
- were less likely to have a parent engage in pretend play with them at 2 years

Child development

Compared to children in families with total household incomes of at least $80,000, children in families with total household incomes below $80,000:
- were more likely to have delayed personal social development on the ASQ
- were more likely to have behavioral problems on the BITSEA
- were more likely to have delayed social emotional abilities on the BITSEA
- were more likely to show symptoms of Autistic Spectrum Disorder on the M-CHAT

Family life/parenting outcomes

Compared to mothers in families with total household incomes of at least $80,000, mothers in families with total household incomes below $80,000:
- were more likely to report it is difficult most or all of the time to fulfill family, work or other responsibilities
- were more likely to report low parenting self-efficacy

Impact of childcare arrangement

When their child was 2 years old, mothers were asked about their current childcare arrangements. Childcare arrangement was grouped to compare 1) children cared for primarily by a parent, a relative or a nanny to 2) children cared for at a childcare center or family day home. This categorization enables comparisons between children who are primarily in family or small group settings to children who are primarily cared for in group settings with other children. Child development, family life/parenting outcomes, maternal mental health and social support outcomes were compared for children primarily cared for by a parent, relative or nanny to children cared for at a childcare centre or family day home. These results are summarized below.

Child development

Compared to children primarily cared for by a parent, relative or nanny, children who were cared for at a childcare center or family day home:
- were less likely to have delayed communication at 2 years of age
- were less likely to show symptoms of Autistic Spectrum Disorder on the M-CHAT at 2 years of age

Family life/parenting outcomes

Compared to children primarily cared for by a parent, relative or nanny, children who were cared for in a childcare or family day home:
- were more likely to have both parents working or studying
- were more likely to have a mother who was working more than halftime (>20 hours a week)
- were more likely to have a mother who reported more difficulty fulfilling family, work or other responsibilities

Maternal mental health, social support and stressful life events

Compared to children primarily cared for by a parent, relative or nanny, children who were cared for at a childcare center or family day home:
- were more likely to have a mother who experienced anxiety during pregnancy or at 2 years postpartum
- were more likely to have a mother with higher social support during pregnancy

Impact of poor maternal mental health

Participants were asked to complete the Centre for Epidemiologic Studies Depression Scale (CES-D) and the State Anxiety subscale of the Spielberger State-Trait Anxiety Inventory (SAI) when their child was 2 years old to measure symptoms of depression and anxiety respectively. Parenting outcomes were compared for mothers with and without depression on the CES-D and with and without anxiety on the SAI. These results are summarized below.

Compared to mothers who were not depressed on the CES-D, mothers with symptoms of depression on the CES-D when their child was 2 years old:
- were more likely to report more difficulty fulfilling family, work or other responsibilities
- were more likely to report lower parenting self efficacy
- were less likely to report daily parent-child interaction including reading, playing imitation games and singing when their child was 1 and 2 years old

Compared to mothers who were not anxious on the SAI, mothers with symptoms of anxiety on the SAI when their child was 2 years old:
- were more likely to be working more hours (21-40 hours or more than 41 hours) and were less likely to not be working or working part time (1-20 hours)
- were more likely to report more difficulty fulfilling family, work or other responsibilities
- were more likely to report lower parenting self efficacy
- were less likely to report daily parent-child interaction including reading, playing imitation games and singing at 1 and 2 years.

Associations between child development and maternal mental health, social support and stressful life events

The ASQ was used to provide a measure of overall child development at 2 years of age. Developmental delay was operationalized as scoring below one standard deviation below the mean of normative data on at least two of the five developmental domains (communication, gross motor, fine motor, problem solving and personal social). The BITSEA was used to measure child social-emotional development (empathy, pro-social behaviors and compliance) and behavioral problems (aggression, defiance, over-activity, negative emotionality, anxiety and withdrawal) at 2 years. The M-CHAT was used to identify children with symptoms of Autistic Spectrum Disorder (ASD).

Maternal mental health, social support and stressful life event outcomes were compared for 1) children with and without developmental delays on the ASQ, 2) with and without delayed social emotional development on the BITSEA, 3) with and without behavioral problems on the BITSEA and 4) with and without symptoms of ASD on the M-CHAT. These results are summarized below.

Overall child development (ASQ)

Compared to children with 0 or 1 delays in the 5 domains of child development, children with delays in 2 or more domains on the ASQ at 2 years:
- were more likely to have a mother who experienced depression during pregnancy or when their child was 2 years old
- were more likely to have a mother who experienced anxiety during pregnancy or when their child was 2 years old

- were more likely to have a mother with lower social support during pregnancy, at 4 months postpartum, when their child was 1 year old or when their child was 2 years old

Social-emotional development (BITSEA)

Compared to children without delayed social-emotional abilities, children with delayed social-emotional abilities on the BITSEA at 2 years:
- were more likely to have a mother who had experienced depression during pregnancy, when their child was 1 year old or when their child was 2 years old
- were more likely to have a mother who had experienced anxiety during pregnancy, at 4 months postpartum, when their child was 1 year old or when their child was 2 years old
- were more likely to have a mother with lower social support during pregnancy, at 4 months postpartum, when their child was 1 year old or when their child was 2 years old

Behavioral development (BITSEA)

Compared to children without behavioral problems, Children with behavioral problems on the BITSEA at 2 years:
- were more likely to have a mother with a history of poor mental health
- were more likely to have a mother who had experienced abuse
- were more likely to have a mother who had experienced depression during pregnancy, when their child was 1 year old or when their child was 2 years old
- were more likely to have a mother who had experienced anxiety during pregnancy, when their child was 1 year old or when their child was 2 years old
- were more likely to have a mother with lower social support during pregnancy, at 4 months postpartum, when their child was 1 year old or when their child was 2 years old
- were more likely to have a mother who had experienced 2 or more stressful life events in the past year

Autistic spectrum disorder (M-CHAT)

Compared to children without symptoms of autistic spectrum disorder, children identified with symptoms of autistic spectrum disorder on the M-CHAT at 2 years:
- were more likely to have a mother who had a history of poor mental health
- were more likely to have a mother who experienced depression during pregnancy
- Were more likely to have a mother who experienced anxiety at 4 months postpartum
- were more likely to have a mother with lower social support during pregnancy, at 4 months postpartum, when their child was 1 year old or when their child was 2 years old

Protective factors for child development

Multivariate logistic regression modeling was conducted to identify important protective factors for each of the 3 child development outcomes; 1) overall child development (ASQ); 2) social-emotional development (BITSEA); and 3) behavioral development (BITSEA). A summary of the results follows.

Overall child development (ASQ)

Protective factors for overall child development (ASQ) included:
- being born at term (37 weeks gestation)
- being a girl
- having a mother with higher social support when their child was 2 years old
- having a mother who reported higher parenting self efficacy when their child was 2 years old
- being read to daily at 1 and 2 years

Social-emotional development (BITSEA)

Protective factors for social-emotional development (BITSEA) included:
- maternal age less than 35 years
- having a mother who reported higher social support when their child was 2 years old
- having a mother who reported higher parenting self efficacy when their child was 2 years old
- being engaged in daily imitation play at 1 and 2 years

Behavioral development (BITSEA)

Protective factors for behavioral development (BITSEA) included:
- family income of at least $80,000 a year
- having a mother who reported higher optimism during pregnancy
- having a mother who reported less difficulty balancing family, work and other responsibilities when their child was 2 years old
- not being exposed to a second language on a regular basis at 2 years old

Resilience analysis: protective factors for child development in the presence and absence of maternal mental health risk

Protective factors for child development separately in the contexts of *low maternal mental health risk* and *higher maternal mental health risk* were identified and compared.

Maternal Mental Health Risk was defined as experiencing any two of the following:
1. History of abuse
2. History of any mental health condition, including depression, anxiety, bipolar disorder, schizophrenia or obsessive compulsive disorder
3. Depression during mid-pregnancy measured by the Edinburgh Postnatal depression Scale (EPDS ≥13)
   or

Anxiety during mid-pregnancy measured by the Spielberger State Anxiety Scale (SAI ≥40)

4. Depression at 4 months postpartum measured by the EPDS (≥13)
or
Anxiety at 4 months postpartum measured by the SAI (≥40)

5. Depression at 1 year postpartum measured by the CES-D Depression Scale (CES-D ≥16)
or
Anxiety at 1 year postpartum measured by the SAI (≥40)

Multivariate logistic regression modeling was conducted to identify important protective factors for each of the 3 child development outcomes; 1) overall child development (ASQ); 2) social-emotional development (BITSEA); and 3) behavioral development (BITSEA). A summary of the results follows.

Overall child development (ASQ)

Among children with mothers with *low maternal mental health risk*, protective factors for overall child development measured by the ASQ included:
- being a girl
- having a mother who reported higher social support when their child was 2 years old
- having a mother who reported higher parenting self efficacy when their child was 2 years old
- being read to daily at 1 and 2 years

Among children with mothers with *high maternal mental health risk,* protective factors for overall child development measured by the ASQ included:
- having a mother with higher social support during pregnancy
- having a mother who reported more happiness in their relationship with their partner at 1 year postpartum
- having a mother who reported higher parenting self efficacy when their child was 2 years old

Social-emotional development (BITSEA)

Among children with mothers with *low maternal mental health risk,* protective factors for social-emotional development measured by the BITSEA included:
- maternal age younger than 35 years
- having a mother who reported higher social support when their child was 2 years old
- being engaged in daily imitation play at 1 and 2 years
- participating in 3 or more hours of active play or movement per day
- having a mother who attended informal playgroups when their child was between 1 and 2 years old

Among children with mothers with *high maternal mental health risk,* protective factors for social-emotional development measured by the BITSEA included:

- having a mother who reported more happiness in their relationship with their partner at 1 year postpartum
- having a mother who reported higher parenting self efficacy when their child was 2 years old

Behavioral development (BITSEA)

Among children with mothers with *low maternal mental health risk,* protective factors for behavioral development measured by the BITSEA included:
- combined family income of at least $80,000 a year
- having a mother who reported higher optimism during pregnancy
- being a boy
- having a mother who reported higher co-parenting agreement with their partner at 1 year postpartum
- having a mother who reported less difficulty balancing family, work and other responsibilities when their child was 2 years old
- not being exposed to a second language on a regular basis at 2 years old

Among children with mothers with *high maternal mental health risk,* protective factors for behavioral development measured by the BITSEA included:
- having a mother who reported higher social support during pregnancy
- having a mother who reported less difficulty balancing family, work and other responsibilities when their child was 2 years old
- having a mother who attended a recreation facility or used drop-in childcare when their child was between 1 and 2 years old

Common protective factors

Common protective factors that were identified in at least 2 models for at least 2 child development outcomes included:
- Having a mother who reported higher social support during pregnancy
- Having a mother who reported more happiness in their relationship with their partner at 1 year postpartum
- Having a mother who reported higher social support when their child was 2 years old
- Having a mother who reported higher parenting self-efficacy when their child was 2 years old

Conclusions

At two years of age, 18% of children were identified as delayed on two or more domains of development on the ASQ, 15% of children were identified with behavioral problems on the BITSEA and 13% had delayed social emotional abilities on the BITSEA.

Poor maternal mental health and low social support were consistently associated with delayed child development on the ASQ and BITSEA.

Mother's experiencing poor mental health when their child was two years old were more likely to have lower self parenting efficacy, were less likely to engage in daily parent-child interaction, were more likely to report more difficulty fulfilling family, work or other responsibilities and were more likely to be working at least 20 hours a week.

Children in families with lower incomes, defined as less than $80,000 per year, were more likely to have sleeping issues, more screen time, less consistent daily parent-child interaction, more behavioral problems, delayed social emotional development and more likely to show symptoms of autistic spectrum disorder. Mothers in families with lower incomes were more likely to report more difficulty fulfilling family, work or other responsibilities and more likely to report lower parenting self-efficacy.

Children cared for at a childcare center or day home were less likely to have delayed communication and were less likely to show symptoms of Autistic Spectrum Disorder. Mothers of children cared for at a childcare center or day home were more likely to experience anxiety and were more likely to report more difficulty fulfilling family, work or other responsibilities.

Strategies aimed at increasing mother's social support networks, supporting new parents relationships and supporting mothers to improve their confidence and sense of competence as new parents may positively influence child development at age two.