Intergenerational Impacts of Family Violence - Mothers and Children in a Large Prospective Pregnancy Cohort Study

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ABSTRACT

Background: Violence and other adversities commonly co-occur, yet are usually investigated individually. The primary objectives of this paper are to investigate: (i) the relationship between maternal exposure to violence (including childhood abuse and intimate partner violence) and postpartum mental and physical health; and (ii) the extent to which exposure to violence and poor maternal mental and physical health are associated with children's emotional-behavioral difficulties.

Methods: Prospective pregnancy cohort (n = 1507) followed up to 4 year postpartum. Validated measures used: Composite Abuse Scale; Edinburgh Postnatal Depression Scale, SF-36, Child Maltreatment History Self Report; Strengths and Difficulties Questionnaire. Logistic regression was used to investigate associations between maternal childhood abuse, intimate partner violence (IPV), maternal health and child emotional and behavioral difficulties at age 4.

Outcomes: Two out of five women (41%) reported abuse in childhood, and almost one in three (29%) reported IPV during the first four years of motherhood. Women reporting both physical and sexual childhood abuse had markedly raised odds of IPV and poor physical and mental health at all time points (pregnancy, first year postpartum and four year postpartum). For the index child, violence exposures (maternal childhood abuse or IPV) and poor maternal physical or mental health were associated with higher odds of emotional/behavioral difficulties at age four. In multivariable models (adjusted for child gender and maternal age), cumulative exposures (multiple violence exposures or poor maternal mental or physical health at multiple time points) each independently added to increased odds of emotional-behavioral difficulties. Children of mothers who reported a history of childhood abuse but were not exposed to IPV had odds of difficulties similar to children of mothers not reporting any violence exposure, suggesting resilient outcomes where violence experiences are not repeated in the next generation.

Interpretation: The clustering of risk (child and adult violence experiences) and the accumulation of risk within families (IPV, poor maternal health, child difficulties) highlight the need for effective early intervention to limit or ameliorate the impact of violence across the lifespan, and to break the intergenerational cycle of disadvantage.

1. Background

Preventing the long-term health effects of violence on children is an international public health priority. While prevalence estimates vary, it is estimated that one in four children in high income countries are exposed to intimate partner violence (IPV) between their caregivers [1,2]. Children exposed to IPV are at increased risk of physical and mental health problems across the life course [2,3]. It is increasingly recognized that the impacts of IPV on children is not limited to witnessing abusive behaviors. IPV also impacts on child mental health, development and functioning through a family atmosphere of control and/or fear, the active undermining of the parent-child relationship by the violent partner, impaired parenting by both caregivers, isolation of the family unit and an increased likelihood of child abuse or neglect and social adversity [4–11]. Research to date has primarily focused on understanding

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Research in context

Evidence before this study

Violence against women and children is common and known to have detrimental effects on both mental and physical health. Different types of family violence and other social adversities such as poverty and poor health commonly co-occur, and reoccur over time and across generations. However, the majority of research studies focus on single exposures, such as childhood abuse or intimate partner violence. Few studies have the capacity to explore intergenerational experiences. We searched EBSCO, PsychInfo and Medline for (Intimate Partner Violence or Domestic Violence or Exposure to Violence or Violence) and (child abuse or child neglect or child maltreatment) and (Health or Maternal Health) and (Infant or Child Health or Child* or Child, Preschool) in January 2019. After removal of duplicates and manual screening, we identified two papers that investigated exposure to maternal childhood abuse and IPV and reported on maternal and child health outcomes. Both studies reported some association between maternal violence exposures, poor maternal mental health and poor child outcomes, with mixed results for specific aspects investigated. However, both studies involved targeted recruitment (from IPV services and a child psychiatric outpatient service), measured child outcomes across a wide range of developmental ages (e.g. 1.5–15 years), and neither study included maternal physical health. Population level data is required to encompass the broad range of families impacted by family violence.

Added value of this study

This paper reports findings of a large prospective pregnancy population cohort incorporating validated measures of maternal childhood abuse, intimate partner violence and maternal and child outcomes over the first four year postpartum. Few studies have the capacity to explore multiple violence exposures, maternal physical and mental health and child outcomes. This paper reflects 'real world' complexity in a field that has focused on measuring associations between single exposures and outcomes. This added complexity supports the identification of factors which may be amenable to intervention to reduce the impacts of family violence across generations. The study provides population-based evidence for community level associations between maternal experiences of childhood abuse, IPV and poor maternal mental and physical health that have previously been identified in smaller shelter and service samples. For the index child, cumulative exposures (multiple violence exposures or poor maternal mental or physical health at multiple time points) each independently added to the odds of poor outcomes at age four.

Implications of all the available evidence

Much of the evidence for the prevalence and impacts of IPV on women and children has come from smaller samples recruited through relevant services (e.g. child protection) or refuge samples. These families represent a specific and small proportion of the families experiencing violence in the general population. Many families experiencing family violence do not disclose or come to the attention of family violence services. Women and children whose adverse exposures are limited in severity or time show outcomes similar to those not exposed. A better understanding of how the cumulative patterns of maternal history of childhood abuse, exposure to intimate partner violence and poor maternal physical and psychological health affect children's health is needed to inform the development of tailored prevention and early intervention approaches for both women and children.

the health outcomes for children exposed to IPV, with little consideration for the often complex violence and mental health history of women affected by IPV. A better understanding of how the cumulative patterns of maternal history of childhood abuse, exposure to intimate partner violence and poor maternal physical and psychological health affect children's health is needed to inform the development of tailored prevention and early intervention approaches for both women and children.

Population-based studies indicate that around one in four women report a history of childhood physical and/or sexual abuse, with varying prevalence estimates depending on definition and measurement approaches [12,13]. Childhood is a critical time where insults to child development such as abuse or violence exposure affect emerging brain architecture, with significant implications for long-term health and functioning [14]. Childhood abuse is associated with increased risks for physical health problems in adulthood including headaches, gastrointestinal problems, respiratory problems, diabetes and heart disease [6,7], as well as mental health problems such as depression, post-traumatic stress disorder, substance use, self-harm and suicidality [3,6,7,15]. Childhood abuse experiences are also associated with poor educational outcomes [16] and an increased likelihood of IPV in adulthood [17,18]. Although the vast majority of studies focus primarily on physical IPV [19], emotional or psychological abuse such as humiliation, intimidation and controlling behaviors are also common forms of IPV [13,20]. Both physical and emotional violence are associated with symptoms of post-traumatic stress, depression, anxiety, self-harm, and substance abuse [21,22], and experiencing more than one form of violence has been associated with greater physical and mental health burden for women [23,24].

Evidence suggests that women who have experienced childhood abuse are more likely to experience IPV and poor health in adulthood [24–27], however research into the potential intergenerational impacts on children has focused on exposures to childhood abuse, IPV or maternal mental health problems in isolation. For instance, maternal childhood abuse has been associated with poor child health and development including preterm birth, being born small for gestational age [28], depression, anxiety, behavioral problems, and developmental delays [24,29–31]. Exposure to IPV has been associated with child mental health problems, conduct disorders, learning difficulties, substance use, poor health and relationship problems [2,6,17]. Research has also shown that the poor maternal mental health associated with experiences of childhood abuse and/or IPV is one of the mechanisms contributing to intergenerational impacts on children [30,32]. Despite this body of research, studies examining the contribution of poor maternal physical health are scarce, and few population-based longitudinal studies have explored how cumulative patterns of maternal adversity (childhood abuse, IPV, poor physical and mental health) over time affect children's health and development.

Utilizing data from a population-based pregnancy cohort of over 1500 first time mothers in Australia, we aimed to: (a) investigate the prevalence of maternal exposure to childhood abuse and IPV (violence exposures); (b) assess the relationships between violence exposures and maternal mental and physical health; and (c) investigate the extent to which violence exposure and poor maternal mental and physical health during and after pregnancy are associated with children's emotional-behavioral functioning at age four.

2. Method

2.1. Sample

Nulliparous women booking to give birth at six metropolitan public hospitals with a mix of high and low risk perinatal services

in Melbourne, Australia were recruited between 2003 and 2005. To be eligible women needed to: be nulliparous; have an estimated gestation of ≤ 24 weeks, be ≥ 18 years; and have sufficient proficiency in English to complete questionnaires. Follow-up was scheduled at 30–32 weeks gestation, and at 3, 6, 9, 12 and 18 month and 4 year postpartum using a combination of self-administered questionnaires and computer assisted telephone interviews. With the frequent follow up and the potentially intrusive nature of some of the questions (e.g. bowel and sexual health symptoms) we anticipated and powered the study for a response fraction between 20 and 40%. Ethics approval was granted by La Trobe University, the Royal Children's Hospital and the six participating hospitals.

Recruitment was by mailed invitation with each of the 6 hospitals independently managing the identification of eligible women and the mail out of invitation packages. The invitation package included a copy of the baseline questionnaire, and was followed up by a single mailed reminder postcard. Women were invited to return the questionnaire, signed consent papers and contact information in a reply paid envelope. Due to privacy laws, no information was available to the researchers as to the characteristics of the women who were mailed the invitation package, nor the characteristics of non-responders.

Of 1535 women who enrolled in the study, 28 were excluded after enrolment - 11 were not sufficiently fluent in English, 10 had a miscarriage, two had a termination, and five women were not nulliparous - leaving 1507 women. The exact response figures were not available as each hospital independently identified eligible women and sent invitations. We conservatively estimate that the final response fraction was around 30%, but it may have been higher. Australian privacy legislation and the conditions of our ethics approval prevented us from following up non-responders or accessing personal information for comparison of responders and non-responders.

The representativeness of the cohort was assessed using routinely collected Victorian Perinatal Data for nulliparous women giving birth as public patients during the recruitment period [33]. Participants were representative in terms of method of birth and infant birthweight, but included fewer young women (18–24 years, 15·5% versus 29·9%), and fewer women born overseas of non-English speaking background (16·2% versus 21·0%). Further details regarding the study protocol and characteristics of the cohort are available in previous publications [33–35].

2.2. Measures and Definitions

Childhood history of physical and sexual abuse was assessed retrospectively at four year postpartum using the Child Maltreatment History Self Report which inquires about experiences up to the age of 15 years [12,36]. The measure includes items which ask about childhood physical abuse (e.g. being pushed, shoved or grabbed) and childhood sexual abuse (e.g. tried to have sex with you or sexually attacked you, repeated indecent exposure). Women were asked to indicate how often these experiences happened to them before they turned 16, with response options of never, rarely, sometimes or often, scored 0–3 respectively. Childhood physical abuse was defined as a score of 1 or more on the physical abuse items, and childhood sexual abuse by a score of 1 or more on the sexual abuse items. The physical abuse items include an item which asks about being 'slapped or spanked'. This item was excluded from scoring as recommended by MacMillan et al. [36]

Intimate partner abuse was assessed using the short 18 item form of the Composite Abuse Scale (CAS) at one and four year postpartum [37,38]. The scale includes items about emotional abuse (e.g. "Blamed me for their violent behavior") and physical abuse (e.g. "Pushed, grabbed or shoved me"). Women are asked to report on how often these actions by a current or former intimate partner happened in the previous 12 months, providing a 12 month period prevalence of intimate partner abuse exposure. Response options were: never, only once, several times, once per month, once per week and daily and are scored from 0 to 5 respectively. Physical abuse was defined as a score ≥ 1 on the physical scale and emotional abuse as ≥ 3 on the emotional scale [37].

Child emotional-behavioral functioning at age four was measured using the parent report Strengths and Difficulties Questionnaire (SDQ) [39], a 25 item measure of behavioral and emotional problems in 4–16 year olds. Attributes are rated as not true, somewhat true or certainly true. The SDQ comprises five subscales and a total difficulties score. It has been validated for use with Australian children [40,41]. A cut off score of ≥ 15 on the total difficulties score was used to identify children with emotional and/or behavioral difficulties [40].

Maternal depressive symptoms were assessed in pregnancy and at 3, 6, 12 month and 4 year postpartum with the Edinburgh Postnatal Depression Scale (EPDS), a 10 item scale validated for use in pregnancy, the postnatal period and beyond [42,43]. The recommended cut off score of ≥ 13 was used to identify probable major depression [42,43]. Women reporting depressive symptoms at 3, 6, and/or 12 month postpartum were classified as reporting depression in the first 12 month postpartum.

Maternal anxiety symptoms were assessed in pregnancy and at 3, 6, 9, 12 month and at 4 year postpartum. It was measured by a single item question which asked "In the LAST THREE MONTHS have you experienced intense anxiety (e.g. panic attacks)" with response options Never, Rarely, Occasionally and Often. These responses were dichotomized into No (Never, Rarely) and Yes (Occasionally/Often). Women reporting anxiety symptoms at 3, 6, 9, and/or 12 month postpartum were classified as reporting anxiety in the first 12 month postpartum.

Maternal physical health was measured at baseline (early pregnancy), and at six month and four year postpartum using the SF-36 [44]. Higher scores indicate better health. The two mental and physical health summary component scores were calculated, transformed and then normed with Australian female population data to produce weighted scores ranging from 0 to 100, with a standardized population mean of 50 (SD = 10) [45,46]. To identify women who were reporting poorer health on the SF-36 than the majority of the cohort, poor health was defined as a score less than 1 standard deviation below the mean component scale score.

Socio-demographic data were collected in the baseline and follow up questionnaires.

2.3. Analysis

Analyses were conducted using STATA 14 [47]. Period prevalence for maternal exposure to childhood abuse up to the age of 15, and exposure of women and children to intimate partner violence in the first 12 month postpartum were calculated based on the proportion of women reporting violence divided by the total number of women with data available, and repeated with imputed data. Univariable logistic regression was used to investigate associations between 1) maternal report of violence exposures (abuse in childhood and/or IPV) and poor maternal physical or mental health during pregnancy and postpartum; and 2) socio-demographic characteristics, maternal health, violence exposures and child emotional/behavioral difficulties at age four. Odds ratios are reported with 95% confidence intervals.

To gain a better understanding of the clustering of risk and cumulative impact of violence and poor maternal health on child outcomes, a series of multivariable logistic regressions were conducted. The primary outcome of interest was child emotional/behavioral difficulties at age four. Maternal childhood abuse and report of IPV were treated as exposure variables. For the pur-

poses of these analyses, exposure to physical and emotional IPV was combined and reported dichotomously (no IPV/any IPV). To consider the impact of *cumulative exposure to violence*, we created a categorical variable with the following levels (no exposure to violence, maternal childhood abuse exposure, IPV exposure, and exposure to both maternal childhood abuse and IPV). The *cumulative exposure to poor maternal physical and mental health* was investigated by creating a variable counting across the multiple time points (pregnancy, first and fourth year) grouped into three categories (never, a single time point, or 2–3 time points). All models adjusted for child gender due to the higher prevalence of emotional/behavioral difficulties reported for boys [48,49]. An apriori decision was made not to adjust for maternal education, relationship status or income to avoid over adjustment for variables likely to be on the pathway between experiences of childhood abuse, early childbearing and IPV. Model 1 examined associations between cumulative violence exposure and child emotional/behavioral difficulties, adjusting for variables associated with child outcomes in univariable analyses. Cumulative exposure to poor maternal mental health was added in Model 2, and maternal physical health in Model 3.

Analyses were conducted for participants with complete data and then repeated on the full cohort with imputation of missing data to assess the robustness of the findings. The multiple imputation model included variables associated with attrition, variables in the analysis model and variables significantly associated with IPV, childhood abuse and maternal mental health outcomes (see Supplementary Table 1 for a description of the variables and data collection points included in the model) [50]. Repeated measures were included where available and 40 data sets were imputed using chained equation modeling [50]. Estimates derived from the 40 data sets are presented.

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3. Results

3.1. Sample

1507 pregnant women enrolled in the study with a mean gestation of 15·0 weeks (SD = 3·1, range 6–24 weeks). At enrolment, the majority of women were living with their partner and had post-secondary school education, and were Australian born (see Table 1). Women ranged in age from 18 to 50 years (mean = 31·0, SD 4·9) at the time of their first child's birth. At four year follow up, children ranged in age from 4·4 to 5·0 years, with a mean of 4·5 years (SD 0·7) and 47·3% were girls.

Participation in follow-up was high: 95% (1431/1507) at 3 month postpartum, and 93% (1400/1507), 92% (1387/1507) and 90% (1357/1507) at 6, 9, and 12 months respectively. Of the 1345 women who consented to take part in extended follow-up at 4 years, 1321 completed the questionnaire (83%).

Selective attrition was observed, with women who did NOT complete the four year follow up more likely to be younger, overseas born, not tertiary educated, in the lower income brackets, and more likely to have reported IPV or depressive symptoms in the first year postpartum (Supplementary Table 2). Analyses were con-

ducted for participants with data on violence exposures and child outcomes (1093/1507) and then repeated on the full cohort with imputation of missing data. The two approaches produced very similar results and data are presented for the full cohort with imputed data.

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3.2. Prevalence and Patterns of Maternal Childhood Abuse and IPV in Early Childbearing

One in five mothers (19.8%) reported IPV in the first year after having their first baby, with a similar proportion (21.9%) reporting IPV at four year postpartum (see Table 1). Overall, more than one in four mothers reported IPV in the first 4 years after having their first baby (29·2%).

The most common form of IPV reported was emotional IPV alone (51.2% and 61.0% of women reporting IPV in the first and fourth year respectively). Physical IPV alone was rarely reported (see Table 1) and was combined with emotional and physical abuse in all further analyses.

Two out of five women reported physical and/or sexual abuse in their own childhoods (41.3%, 95%CI 38·1–44·4) and one in ten women reported both physical and sexual abuse (see Table 1). Report of childhood abuse was not associated with maternal country of birth or age at first birth. Report of both physical and sexual abuse in childhood was associated with raised odds of being in the lowest income category in early pregnancy compared to women not reporting abuse (OR = 2·2 95%CI 1·5–3·4). Women who experienced childhood sexual abuse (OR = 1·9 95%CI 1·1–3·4) or both sexual and physical abuse (OR = 2·3 95%CI 1·3–4·2) were more likely not to have completed secondary schooling. There was no association between childhood physical abuse alone and educational attainment (OR = 0.8, 95%CI 0.4–1.6).

Women who began childbearing with a history of childhood physical and/or sexual abuse were between 2 and 4 times more likely to report IPV compared to women who did not have a history of child abuse (see Table 2). For example, women who reported childhood physical and sexual abuse had odds 4.3 times higher than women not reporting abuse of experiencing IPV in the first year postpartum.

3.3. Maternal Childhood Abuse, IPV and Maternal Health

Almost one in ten women reported depressive symptoms (EPDS ≥ 13) during early pregnancy, increasing to more than one in ten in the first and fourth year postpartum (see Table 1). One in 10 women reported anxiety symptoms during pregnancy or at four year postpartum. Over the first year postpartum (data collected at multiple time points - 3, 6, 9 and 12 month postpartum), one in four women reported anxiety symptoms.

Around 15% of mothers reported poor mental or physical health at each time point, as defined by a score ≤ 1 standard deviation below the cohort mean score (see Table 1).

Table 2 shows the odds of reporting poor maternal physical and mental health for women who reported childhood physical abuse, sexual abuse or both, compared to women not reporting abuse.

Table 1
Socio-demographic characteristics and health of first time mothers during pregnancy and postpartum (n = 1507).

	Data collection	% [95% confidence interval]
Socio demographics		
Maternal age	Early pregnancy[a]	
18–24 years		15.5 [13.6–17.3]
25–29 years		32.2 [29.9–34.6]
30–34 years		37.1 [34.7–39.5]
35+ years		15.2 [13.4–17.0]
Relationship status	Early pregnancy	
Living with partner		95.2 [94.2–96.4]
Single/divorced/separated		4.7 [3.6–5.8]
Education qualification	Early pregnancy	
University degree		45.9 [43.4–48.5]
Certificate/diploma		26.1 [23.9–28.4]
Secondary school		18.4 [16.5–20.4]
Less than secondary school		9.5 [8.0–11.0]
Income ($AU)	Early pregnancy	
More than $70,001		13.8 [12.1–15.6]
50,001–70,000		11.3 [9.6–12.9]
30,001–50,000		42.6 [40.0–45.2]
Less than 30,001		32.3 [29.8–34.8]
Country of birth	Early pregnancy	
Australia		74.0 [71.8–76.2]
Overseas		26.0 [23.8–28.2]
Number of children in family	4 years	
One child		27.8 [25.0–30.6]
2 or more children		72.2 [69.4–75.0]
Relationship transitions	4 years	
No		84.4 [82.2–86.6]
Yes		15.6 [13.4–17.8]
Violence exposures		
Mother report of childhood abuse (retrospective)	4 years	
No		58.7 [55.5–61.9]
Sexual		13.0 [10.8–15.2]
Physical		17.4 [14.9–19.9]
Both sexual and physical		10.9 [8.9–12.8]
Intimate partner violence (CAS)		
First year postpartum	12 months	
Not reported		80.2 [78.0–82.3]
Emotional abuse alone		10.2 [8.6–11.9]
Physical abuse alone		2.4 [1.6–3.3]
Both emotional and physical		7.2 [5.7–8.6]
Any abuse (emotional &/or physical abuse)		*19·8 [17·7–22·0]*
Fourth year postpartum	4 years	
Not reported		78.1 [75.5–80.8]
Emotional abuse alone		13.3 [11.0–15.7]
Physical abuse alone		1.4 [0.6–2.2]
Both emotional and physical		7.1 [5.3–8.8]
Any abuse (emotional &/or physical abuse)		*21·9 [19·2–24·5]*
Poor physical health		
SF-36 Physical Component Score (< 1SD below mean)		
Pregnancy	Early pregnancy	16.5 [14.6–18.4]
6 months	6 months	14.2 [12.4–16.0]
4 years	4 years	15.9 [13.8–17.9]
Poor mental health		
SF-36 Mental Component Score (< 1SD below mean)		
Pregnancy	Early pregnancy	16.0 [14.1–17.8]
6 month postpartum	6 months	17.1 [15.1–19.1]
4 year postpartum	4 years	17.4 [15.3–19.5]
Depressive symptoms (EPDS)		
Pregnancy	Early &/or late pregnancy[b]	8.8 [7.4–10.2]
First year postpartum	3, 6, 12 months	18.4 [16.4–20.4]
4 year postpartum	4 years	14.5 [12.3–16.6]
Anxiety symptoms (single item)		
Pregnancy	Early &/or late pregnancy	13.7 [12.0–15.5]
First year postpartum	3, 6, 9, 12 months	26.7 [24.4–29.0]
4 year postpartum	4 years	11.9 [9.9–13.9]

[a] Cohort enrolment in early pregnancy at ≤ 24 weeks gestation.
[b] Follow up in late pregnancy at around 32 weeks gestation.

Table 2
Maternal report of childhood abuse and intimate partner violence, physical and mental health in the first four years of childbearing (n = 1507).

	No childhood abuse 58·7%		Sexual abuse alone 13·0%		Physical abuse alone 17·4%		Physical and sexual abuse 10·9%	
	Percent	OR [95%CI][a]	Percent	OR [95%CI]	Percent	OR [95%CI]	Percent	OR [95%CI]
Intimate partner violence (CAS)								
First year	13·9	1·0 [ref]	20·6	1·6 [1·0–2·6]	25·8	2·1 [1·5–3·2]	41·2	4·3 [2·8–6·7]
Fourth year	15·4	1·0 [ref]	24·1	1·7 [1·1–2·8]	28·7	2·2 [1·5–3·3]	43·3	4·2 [2·6–6·7]
Poor physical health (SF-36 PCS)[b]								
Pregnancy	14·4	1·0 [ref]	17·4	1·2 [0·8–2·0]	18·5	1·3 [0·8–2·1]	23·3	1·8 [1·1–3·0]
6 month postpartum	11·2	1·0 [ref]	13·7	1·3 [0·8–2·1]	18·6	1·8 [1·2–2·8]	24·1	2·5 [1·5–4·2]
4 year postpartum	14·1	1·0 [ref]	14·0	1·0 [0·6–1·7]	19·2	1·4 [0·9–2·2]	22·5	1·8 [1·1–2·9]
Poor mental health (SF-36 MCS)[c]								
Pregnancy	12·7	1·0 [ref]	18·2	1·5 [0·9–2·5]	19·9	1·7 [1·1–2·6]	24·6	2·2 [1·4–3·6]
6 month postpartum	12·8	1·0 [ref]	16·7	1·4 [0·8–2·2]	25·9	2·4 [1·6–3·5]	26·5	2·4 [1·5–4·0]
4 year postpartum	13·8	1·0 [ref]	13·3	1·0 [0·5–1·7]	23·7	1·9 [1·3–2·8]	31·6	2·9 [1·9–4·5]
Depressive symptoms (EPDS)								
Pregnancy	5·8	1·0 [ref]	8·8	1·6 [0·8–3·1]	14·2	2·7 [1·6–4·5]	16·1	3·1 [1·7–5·6]
First year (3, 6, or 12 months)	13·6	1·0 [ref]	18·2	1·4 [0·9–2·3]	25·4	2·2 [1·5–3·2]	33·2	3·1 [2·0–4·9]
Fourth year	11·2	1·0 [ref]	10·0	0·9 [0·4–1·7]	19·6	1·9 [1·3–3·0]	28·9	3·2 [2·0–5·1]
Anxiety (single item)								
Pregnancy	9·5	1·0 [ref]	16·0	1·8 [1·1–3·0]	18·6	2·2 [1·4–3·5]	26·1	3·4 [2·0–5·7]
First year (3, 6, 9, or 12 months)	20·1	1·0 [ref]	27·0	1·5 [1·0–2·2]	35·9	2·2 [1·5–3·2]	47·2	3·6 [2·4–5·3]
Fourth year	9·8	1·0 [ref]	9·6	1·0 [0·5–1·9]	16·5	1·8 [1·1–2·9]	18·5	2·1 [1·1–3·8]

[a] 95%CI = 95% Confidence Interval. Logistic regression with the odds ratios being the odds of reporting the dichotomous (yes/no) IPV or health outcome at each time point.
[b] Poor health defined as SF-36 Physical Component Score < 1SD below mean.
[c] Poor health defined as SF-36 Mental Component Score < 1SD below mean.

Table 3
Maternal report of childhood abuse, intimate partner violence or both and mental and physical health in the first four years of childbearing (n = 1507).

	No report of violence (46.2%)		Childhood abuse alone (24.5%)		IPV alone (12.5%)		Childhood abuse and IPV (17.7%)	
	Percent	OR [95%CI][a]	Percent	OR [95%CI]	Percent	Percent	Percent	OR [95%CI]
Poor physical health (SF-36 PCS)[b]								
Pregnancy	13·5	1·0 [ref]	16·4	1·3 [0·8–1·9]	17·7	1·4 [0·8–2·4]	23·9	2·0 [1·3–3·1]
6 month postpartum	10·0	1·0 [ref]	16·9	1·8 [1·2–2·8]	15·5	1·6 [1·0–2·8]	20·9	2·4 [1·5–3·7]
4 year postpartum	13·7	1·0 [ref]	16·0	1·2 [0·8–1·8]	15·7	1·2 [0·7–2·0]	22·0	1·8 [1·1–2·8]
Poor mental health (SF-36 MCS)[c]								
Pregnancy	10·6	1·0 [ref]	14·2	1·4 [0·9–2·2]	20·6	2·2 [1·4–3·5]	30·0	3·6 [2·4–5·5]
6 month postpartum	10·2	1·0 [ref]	16·3	1·7 [1·1–2·6]	22·6	2·6 [1·6–4·1]	33·3	4·4 [2·9–6·7]
4 year postpartum	10·7	1·0 [ref]	13·8	1·3 [0·9–2·0]	25·0	2·8 [1·7–4·4]	35·3	4·5 [3·0–6·8]
Depressive symptoms (EPDS)								
Pregnancy	3·9	1·0 [ref]	7·1	1·9 [1·0–3·9]	13·1	3·8 [1·9–7·4]	21·6	6·9 [3·8–12·4]
First year (3, 6, 12 months)	10·0	1·0 [ref]	16·8	1·8 [1·2–2·7]	27·1	3·4 [2·1–5·3]	37·4	5·4 [3·6–8·1]
Fourth year	7·5	1·0 [ref]	10·6	1·5 [0·9–2·4]	24·8	4·0 [2·5–6·7]	31·4	5·6 [3·6–8·8]
Anxiety (single item)								
Pregnancy	7·7	1·0 [ref]	15·5	2·2 [1·4–3·5]	16·1	2·3 [1·3–4·1]	26·0	4·2 [2·7–6·6]
First year (3, 6, 9, 12 months)	16·7	1·0 [ref]	29·8	2·1 [1·5–2·9]	32·6	2·4 [1·6–3·7]	45·3	4·1 [2·8–6·0]
Fourth year	7·5	1·0 [ref]	9·7	1·3 [0·8–2·2]	18·3	2·8 [1·6–4·8]	22·4	3·6 [2·1–6·0]

[a] 95%CI = 95% confidence interval. Logistic regression with the odds ratios being the odds of reporting the dichotomous (yes/no) health outcome at each time point.
[b] Poor health defined as SF-36 Physical Component Score < 1SD below mean.
[c] Poor health defined as SF-36 Mental Component Score < 1SD below mean.

Women with a history of childhood physical abuse or both physical and sexual abuse had 2–4 times higher odds of reporting poor general physical and mental health, depressive symptoms or anxiety during pregnancy and the first four year postpartum compared to women not reporting childhood abuse. Women reporting childhood sexual abuse alone had twice the likelihood of experiencing anxiety symptoms during early pregnancy and the first year postpartum compared with women not reporting abuse.

Women's cumulative exposure to violence is presented in Table 3, with women grouped into *no violence exposure*, *exposure to childhood abuse alone*, *IPV alone* or *both childhood abuse and IPV*. Logistic regressions were used to investigate dichotomous health outcomes at each time point (pregnancy, 1 and 4 year postpartum). Women who reported IPV and women who reported both IPV and a history of childhood abuse were 2–7 times more likely to report poor mental and physical health at each time point compared to women not reporting violence. Women reporting both IPV and a history of childhood abuse had the highest odds of reporting poor health.

At four year postpartum, women reporting childhood abuse alone (not IPV) had odds of reporting poor physical or mental health similar to women not reporting violence exposure.

Children's emotional-behavioral functioning.

One in ten children (11·0%) were identified as having emotional and/or behavioral difficulties at age four according to maternal report on the SDQ. A higher proportion of boys were classified as having difficulties compared to girls (12.9% and 8.9% respectively). As shown in Table 4, child emotional and/or behavioral difficulties at age 4 were more likely in families that had experienced relationship transitions (i.e. mother had moved in or out of a relationship) and when mothers were younger, in the lowest income bracket, had not finished secondary school or were single during early pregnancy.

All violence exposures were associated with higher odds of child emotional and/or behavioral difficulties at age four (see Table 4). For example, children of mothers who had experienced both physical and sexual abuse in their own childhoods had three times

Table 4
Socio-demographic factors, maternal childhood abuse, intimate partner violence and child emotional and/or behavioral difficulties at age four (n = 1507).

	Cohort	Children with emotional/behavioral difficulties (SDQ ≥ 15)	
	%	% [95%CI][a]	Odds ratio [95%CI]
Early pregnancy (≤24 weeks gestation)			
Maternal age			
18–24 years	15.5	24.1	3·7 [2·2–6·3]
25–29 years	32.2	9·7	1·2 [0·7–2·1]
30–34 years	37.1	7·9	1·0 [ref]
35+ years	15.2	7·9	1·0 [0·5–2·0]
Country of birth			
Australia	74.0	11·5	1·0 [ref]
Overseas	26.0	9·7	0·8 [0·5–1·4]
Relationship status			
Living with partner	95.2	10·3	1·0 [ref]
Single/divorced/separated	4.7	26·2	3·1 [1·5–6·4]
Income ($AU)			
>$70,001	13.8	5·6	1·0 [ref]
50,001–70,000	11.3	6·3	1·1 [0·3–3·8]
30,001–50,000	42.6	8·1	1·5 [0·6–3·8]
≤30,000	32.3	18·7	4·0 [1·6–9·8]
Highest qualification			
University degree	45.9	5·6	1·0 [ref]
Certificate/diploma	26.1	6·3	1·1 [0·3–3·8]
Completed secondary school	18.4	8·1	1·5 [0·6–3·8]
Less than secondary school	9.5	18·7	4·0 [1·6–9·8]
Child gender			
Female	47.3	8·9	1·0 [ref]
Male	52.7	12·9	1·5 [1·0–2·3]
Four year postpartum			
Number of children in family			
One child	27.8	11·1	1·0 [ref]
2 or more children	72.2	11·0	1·0 [0·6–1·7]
Relationship transitions			
No	84.4	9·4	1·0 [ref]
Yes	15.6	19·6	2·3 [1·4–3·9]
Maternal health (SF-36)			
Poor physical health (SF-36 PCS)[b]			
Pregnancy	16.5	17·6	2·0 [1·3–3·1]
6 month postpartum	17.1	15·0	1·5 [0·9–2·5]
4 year postpartum	17.4	17·0	1·9 [1·2–3·0]
Poor mental health (SF-36 MCS)[b]			
Pregnancy	16.0	21·2	2·7 [1·7–4·2]
6 month postpartum	17.1	20·5	2·6 [1·7–4·0]
4 year postpartum	17.4	23·3	3·3 [2·1–5·1]
Violence exposures			
Mother reported childhood abuse			
No	58.7	7·8	1·0 [ref]
Sexual	13.0	13·1	1·8 [1·0–3·3]
Physical	17.4	14·5	2·0 [1·2–3·5]
Both sexual and physical	10.9	20·2	3·0 [1·6–5·4]
IPV in first year of life (CAS)			
No	80.2	8·1	1·0 [ref]
Emotional abuse alone	10.2	17·9	2·4 [1·4–4·4]
Emotional and physical abuse	9.6	27·5	4·3 [2·5–7·3]
IPV in fourth year of life			
No	78.1	7·6	1·0 [ref]
Emotional abuse alone	13.3	23·4	3·7 [2·2–6·3]
Emotional and physical abuse	8.5	22·5	3·5 [1·9–6·3]
Total		11·0	

[a] [95%CI] = 95% confidence interval.
[b] Poor health defined as SF-36 Component Score < 1SD below mean.

the odds of emotional and/or behavioral difficulties compared to children of mothers not reporting childhood abuse. Children exposed to IPV in their first or fourth year of life had between 2 and 4 times the likelihood of difficulties compared to children not exposed to IPV (see Table 4).

Children of mothers who reported poor mental or physical health also had higher odds of having emotional and/or behavioral difficulties (see Table 4).

3.4. Cumulative Exposure to Violence and Poor Maternal Health and Child Outcomes

To gain a better understanding of the impact of cumulative exposure to violence and poor maternal health on child emotional and behavioral difficulties, a series of multivariable logistic regressions were conducted. For cumulative exposure to violence we created a categorical variable with four levels - no exposure to violence, maternal childhood abuse exposure, IPV exposure, and exposure to both maternal childhood abuse and IPV. Cumulative exposure to poor maternal health was the number of time points a women reported poor mental or physical health in pregnancy and the first and fourth year postpartum (never, a single time point, or 2–3 time points). Model 1 shows the cumulative exposure to the different types of violence. Model 2 adds poor maternal mental health, and Model 3 includes both maternal mental and physical health. All models adjust for maternal age at the time of the index birth and child gender.

In Model 1, exposure to IPV alone and both maternal childhood abuse and IPV were associated with higher odds of emotional/behavioral difficulties at age four (see Table 5, Model 1). With the addition of poor maternal mental health in Model 2, the associations between violence exposures and child difficulties were attenuated. However exposure to IPV and maternal childhood abuse, or poor maternal mental health at more than one time point, were each associated with raised odds of child difficulties. A similar pattern of associations was observed in Model 3 for maternal physical health.

In summary, where there was cumulative exposure (i.e. more than one type of violence exposure or poor maternal health at multiple time points) children had higher odds of emotional/behavioral difficulties. Each 'cumulative exposure' (i.e. violence, poor maternal health) remained significant in the full model, indicating that each contributed to increasing the odds of child difficulties, over and above the other exposures. This highlights the added impacts for children where there is a clustering of multiple risks in families.

4. Discussion

In this Australian cohort of first-time mothers, representative of the population from which the cohort was drawn, family violence was common. More than one in four women reported emotional and/or physical IPV in the first four years after the birth of their first child and two in five women retrospectively reported physical or sexual abuse in their own childhoods. Mothers experiencing childhood abuse were more likely to have poorer socio-economic outcomes and experience partner violence in their early childbearing years, and the violence exposures were associated with poor mental and physical health. For their children, cumulative exposures (multiple violence exposures or poor maternal health at multiple time points) each independently added to the odds of emotional and behavioral difficulties. These findings highlight a clustering of risk that reflects more than simple comorbidity and has been described as a 'syndemic'. A co-occurrence and clustering of exposures and outcomes, interacting with social, environmental and economic factors that shape the interactions between them [51]. Our findings illuminate the multifaceted and intergenerational impacts of family violence, and the complex intersections between maternal and child health across the lifespan.

The strengths of this study include the large general population cohort, multiple imputation of missing data to address selective attrition, the assessment of multiple risk exposures over time using standardized measures, and the mapping of the intergenerational accumulation of risk and impacts in families. Few population studies have been able to explore intergenerational effects

Table 5
Maternal report of childhood abuse, intimate partner violence or both (violence exposure), maternal health and child emotional and/or behavioral difficulties at age four (n = 1507).

Maternal report	Cohort	Univariable model	Multivariable models[b]		
		Child emotional/behavioral difficulties (SDQ ≥ 15)	Model 1.	Model 2.+ Mental health	Model 3.+ Mental+ Physical health
	%	Unadj.OR [95%CI][a]	Adj,OR [95%CI][c]	Adj. OR [95%CI]	Adj. OR [95%CI]
Violence exposure					
None	46·2	1·0 [ref]	1·0 [ref]	1·0 [ref]	1·0 [ref]
Mother childhood abuse alone	24·5	1·4 [0·8,2·6]	1·4 [0·8,2·6]	1·3 [0·7,2·5]	1·3 [0·7,2·4]
Intimate partner violence alone	12·5	2·6 [1·4-4·9]	2·3 [1·2,4·5]	2·0 [1·0,3·9]	1·9 [1·1,3·8]
Mother childhood abuse & IPV	16·7	5·6 [3·3-9·4]	5·0 [2·9,8·6]	3·7 [2·1,6·7]	3·5 [1·9,6·3]
Poor maternal mental health[d]					
None	65·5	1·0 [ref]		1·0 [ref]	1·0 [ref]
One time point	22·0	2·1 [1·3-3·5]		1·5 [0·9,2·6]	1·5 [0·9,2·6]
Two or three time points	12·5	4·8 [2·9-8·1]		3·1 [1·7,5·6]	3·0 [1·7,5·4]
Poor maternal physical health[d]					
None	65·5	1·0 [ref]			1·0 [ref]
One time point	24·5	1·4 [0·9-2·3]			1·2 [0·7,2·0]
Two or three time points	10·1	2·6 [1·5-4·4]			1·9 [1·1,3·4]

[a] Unadjusted odds ratio [95% confidence interval].
[b] All multivariable models also adjust for maternal age and child gender.
[c] Adjusted odds ratio [95% confidence interval].
[d] Poor health defined as SF-36 component Score < 1SD below mean score.

in this way, and none to our knowledge have explored effects in a prospective cohort of first time mothers. The findings from this study are likely to be applicable to the wider global population in higher income countries, where some evidence already exists for the accumulation of risk and poor health outcomes both within families and communities [6,24,52]. Limitations of the study include a lag between data collection (2008–2010) and publication of this paper, selective attrition of the cohort over time, including lower response rates at four year postpartum of mothers who reported poor mental health and/or IPV in earlier follow ups. Assessment of child outcomes using maternal report may introduce bias. Women who are experiencing IPV or poor mental health may also report poorer child functioning due to a greater sensitivity or expectation of negative outcomes [53,54].

Prevalence estimates for childhood physical and sexual abuse in this cohort are consistent with estimates reported in a recent meta-analysis combining data from 244 studies [55] [56]. The findings add to the existing evidence from smaller studies, primarily conducted in shelter or refuge samples [57,58] showing that women who experience physical or sexual abuse in childhood are more likely to report adult experiences of IPV. In the current study, women who reported physical and/or sexual abuse as children were two to four times more likely to report IPV than women not reporting abuse in childhood.

The literature on child abuse has tended to focus on child sexual abuse and on mental health or behavioral outcomes, with limited examination of physical health outcomes in adulthood [7]. Other studies use the number of Adverse Childhood Experiences (ACES) which include childhood abuse, with greater number of experiences associated with poorer outcomes [3,6,24]. In this study, women who had experienced childhood physical abuse or both physical and sexual abuse had higher odds of reporting both poor physical and mental health in pregnancy and after birth.

In all cases, the report of more than one type of violence was associated with the highest odds of poor outcomes for both mothers and children. Report of IPV alone was associated with poor maternal mental and physical health in early pregnancy, at 6 month postpartum and at 4 year postpartum. Maternal report of both a history of childhood abuse and IPV in the early childbearing years was associated with the highest odds of reporting poor maternal health. Similarly, the children of mothers reporting a history of childhood abuse who were also exposed to IPV in their first four years of life had the highest odds of emotional/behavioral difficulties. This supports other studies reporting that experience of multiple forms of violence is associated with greater impacts [59,60]. Also reflecting this relationship but in the obverse - children of mothers who reported a history of childhood abuse but who were not exposed to IPV had similar outcomes to children not exposed to either type of violence. This highlights resilient child outcomes where violence experiences are not repeated in the next generation.

Indeed, it is important to note that many of the children in this cohort who had violence exposures (maternal childhood abuse or IPV) were not identified as having emotional and/or behavioral difficulties. It is possible that some mothers may under-report difficulties that children are experiencing, but equally possible that some families, schools and health services are effectively supporting these children [61–63]. More evidence is needed as to how and why some children and families do well despite their exposure to trauma and adversity.

Such results highlight an opportunity for effective early intervention to limit or ameliorate the impact of violence across the lifespan and to break the intergenerational cycle of violence and disadvantage. The children of mothers who experienced childhood abuse but did not go on to report IPV had similar outcomes to children of mothers not exposed to childhood violence. Furthermore,

in a previous publication, children whose exposure to IPV was limited to their first year of life had outcomes at age four similar to children not exposed to violence [2]. Better support of mothers with a history of violence in childhood, and/or exposure to violence during pregnancy or in early parenting, has the potential to disrupt the intergenerational experiences of violence and profoundly influence the lives of women, children and families [19]. While the problem is complex, there is some evidence of health benefits for a range of interventions including advocacy [64], home visiting programs [65], and screening and counseling in primary health care [66].

Our findings draw attention to both the clustering of risk and cumulative impact of exposure to violence across the lifecourse, and across generations, with clear evidence of health impacts for both mothers and their children. Strengthening the capacity of health professionals to recognize and respond to family violence and building stronger evidence for effective and timely interventions involving the health sector are critical priorities for safeguarding the health of future generations.

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Contribution to Authorship

All authors have significantly contributed to this article and approved the final version of the manuscript. DG was involved in data collection, conducted literature searches, completed data analyses and interpretation, and wrote the paper. RG was involved in data collection, analysis and interpretation of the data, conducted literature searches and co-wrote the manuscript. SB was responsible for the study concept and design, data analysis and interpretation, and critical revisions of the manuscript. FM advised on data analysis and interpretation, and critical revision of the manuscript. HW assisted in data collection, data analysis and interpretation, and critical revisions of the manuscript.

Details of Ethics Approval

The study was approved by the relevant ethics committees in all participating hospitals, and the ethics committee of La Trobe University and the Royal Children's Hospital. Written informed consent was obtained from all participants.

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Declaration of Competing Interest

There are no potential conflicts of interest.

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