Life Course Centre

Maternal Health and Child Socio-Emotional Development
Findings from the Growing Up in New Zealand Study

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Research Summary

Why was the research done?

This research was done to understand the influence of maternal chronic illness and disability on the socio-emotional development of children across early to mid-childhood in New Zealand.

What were the key findings?

Our results show a negative link between maternal chronic illness and disability and child socio-emotional outcomes at eight years of age, but not at earlier ages. We also find that the relationship between maternal health and child socio-emotional outcomes can be explained by parenting style in early childhood, but not in mid-childhood, after commencement of formal education.

What does this mean for policy and practice?

Our results highlight the role of maternal health for the formation of skills in childhood that influence future life chances. Our study informs social policy, by highlighting the need to support families with young and middle-age children that are affected by maternal chronic illness and disability, to counteract its contribution to inequality of opportunity arising in childhood.

Citation

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Maternal Health and Child Socio-Emotional Development: Findings from the Growing Up in New Zealand Study

Abstract. We study the influence of maternal chronic illness and disability on the socio-emotional development of children across early to mid-childhood using the Growing Up in New Zealand study. Controlling for a host of relevant maternal, household and child characteristics, our results show a negative link between maternal chronic illness and disability and child socio-emotional outcomes at eight years of age, but not at earlier ages. We also find that the relationship between maternal health and child socio-emotional outcomes is mediated by parenting style in early childhood, but not in mid-childhood, after commencement of formal education. Our results highlight the role of maternal health for the formation of skills in childhood that influence future life chances.

1. Introduction

In OECD countries, on average, more than a third of adults report living with a chronic illness and one in seven adults report living with disability (OECD, 2021). The prevalence of chronic illness in the population is expected to become even larger in the future and increasingly affect young adults (Chowdhury et al., 2023). Living with chronic illness or disability can influence one's life outcomes as well as those of family members, including children. Parental health might influence the development of children's socio-emotional or behavioural skills that are key predictors of life outcomes, including education and labour market success (Borghans et al., 2008). Given the high and increasing prevalence of long-term health conditions among young adults, it is important to examine the extent to which the developmental trajectory of behavioural skills among young children is affected when their primary caregiver suffers from a long-term illness or disability.

In this paper, we conduct the first investigation on the link between maternal chronic illness and disability and the development of socio-emotional skills of New Zealander children. Like other OECD nations, New Zealand has a high prevalence of chronic illness and disability in the adult population, which makes our investigation timely and relevant.[1] We use the Growing Up in New Zealand (GUiNZ) study, which is a representative longitudinal study of child health and well-being that follows pregnant mothers and their future born children across their childhood. The GUiNZ study includes information on maternal health and repeated standard measurements of child socio-emotional outcomes from early to mid-childhood, and after commencement of formal education, at ages 2, 5 and 8. This allows us to examine the influence of maternal health on child socio-emotional outcomes at different developmental stages, on a large representative cohort panel sample while accounting for other relevant household, maternal and child characteristics. Child socio-emotional outcomes are proxied by repeated measurements of the widely used and cross-nationally validated Strengths and Difficulties Questionnaire (Woerner et al., 2004; Vostanis, 2006).

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[1] Of New Zealander adults, one in ten adults report having medicated high cholesterol, 17 percent report having medicated high blood pressure (Ministry of Health, 2021), one in four report experiencing multimorbidity (Stanley et al., 2018), and one in four adults report living with a disability (Statistics New Zealand, 2014).

Our results suggest that maternal chronic illness or disability is consistently linked with poorer child socio-emotional outcomes at age 8. At ages 2 and 5 the evidence of a relationship between poor maternal health and child socio-emotional outcomes is weaker. Moreover, we find that parenting style fully mediates the relationship between maternal health and child socio-emotional outcomes at ages 2 and 5, implying that any small negative effects of poor maternal health in early childhood occur through parenting. At age 8, and after commencement of formal education, our results suggest that parenting style no longer mediates the stronger relationship between poor maternal health and child socio-emotional outcomes.

Our study contributes to the literature on the influence of parental health on the formation of child behaviour skills. Several studies using data from different countries including Australia, the Netherlands, Germany, the United States, and the United Kingdom report that parental illness has a negative influence on child socio-emotional outcomes, including higher internalising symptoms and externalising behaviour[2], lower self-esteem and social competence, and higher emotional and conduct problems and hyperactivity (Chen 2017; Haker et al., 2022; Morris et al., 2016; Pakenham & Cox, 2014; Visser et al., 2004; Visser et al 2007; Umberger, 2014; Mühlenweg et al. 2016). Past research also suggests that maternal—relative to paternal—physical illness is more consistently associated with increased socio-emotional symptoms for children (Mühlenweg et al. 2016; Watson et al., 2006). Of this literature, the paper by Mühlenweg et al. (2016) is the one most closely related to our study because it examines the impact of parental health on the same measures of child socio-emotional skills as our study and is based on a representative population study. The authors find that a decrease in maternal self-reported health satisfaction and an increase in the number of nights spent at the hospital leads to higher emotional symptoms, conducts problems and hyperactivity, and has no influence on peer problems or prosociality, among six-year-old German children. One key distinct feature of our study is that we classify maternal health based on self-reports of living with a chronic illness or disability. Awareness of living with chronic illness or disability typically involves a clinical diagnosis, which increases the objectivity of our maternal health proxy relative to self-reports of health satisfaction. Another distinct feature in our study is that we examine the influence of maternal health on the developmental trajectory of socio-emotional skills from early to mid-childhood and after commencing formal education, by looking at the effects at age 2, 5 and 8 years.

Previous studies that use data from New Zealand have focussed on the consequences of poor maternal mental health on children, rather than chronic illness and disability more generally. Furthermore, they were cross-sectional in research design. For instance, in a study of Pacific Islander families, Gao et al. (2007) found a negative effect on internalising behaviour (but not externalising behaviour) among two-year-old children. Past research using the GUiNZ study also found that children whose mother reported more severe prenatal and postnatal psychological distress experienced more behavioural difficulties in early childhood

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[2] Internalising symptoms include experiencing sadness, anxiety, fear, and social withdrawal while externalizing behaviours include aggression, hyperactivity, and hostility (Eisenberg et al., 2001).

(D'Souza et al., 2019). To our knowledge, no research using a New Zealand cohort has examined how long-term conditions influence socio-emotional development of children over a prolonged period of time, such as from early to mid-childhood.

There is, however, no consensus in the literature on the role that parental illness plays for child developmental outcomes. A meta-analysis of previous studies suggests that the effects, particularly for internalising symptoms and externalising behaviour are at best small (Sieh et al., 2010). Other studies found that parental chronic illness and disability may be associated with better or no difference in outcomes (e.g., Collings & Llewellyn, 2012; Visser et al., 2004). There is also no consensus on whether the effect of parental health on child socio-emotional outcomes depends on the child's age. A meta-analysis found that the effects were larger among younger children (Sieh et al., 2010). In contrast, a meta-analysis on the relationship between maternal breast cancer and child socio-emotional outcomes did not find that child age plays a significant role (Purc-Stephenson & Lyseng, 2016). Similarly, a review on parental multiple sclerosis and child development found no effect in socio-emotional development in early childhood (Haker et al., 2022).[3] Together, these findings call for more clarity on how and when parental illness influences child socio-emotional development. Our study adds to the evidence on the role of child age for the consequences of maternal health on child socio-emotional outcomes, by examining the link between maternal chronic illness and disability and children's outcomes using repeated measurements at ages 2, 5 and 8. Our results suggest that the negative relationship between poor maternal health and child socio-emotional outcomes varies by child age, demonstrating that it is small in early childhood and larger in mid-childhood.

Several factors can affect the relationship between maternal health and child socio-emotional outcomes. A potential mediating factor is parenting style. Mothers living with chronic illness or disability might face more stress, a factor that is likely to lead to less positive and more harsh parenting (Umberger, 2004). Studies have shown that families with ill parents engage in more negative parenting styles, such as inconsistent and harsh parenting, leading to higher internalising and externalising problems, and conduct disorders in children (Masarik & Conger, 2017).[4] Conversely, positive parenting has been identified as inversely related to the negative socio-emotional consequences of parental illness for children (Chen, 2017; Chen & Fish, 2013; Kotchik et al., 1997).[5] Our study makes use of the parenting styles reported by mothers at various ages of a child's early to mid-childhood development included in the GUiNZ study to examine the mediating effect of parenting on the link between maternal health and child socio-emotional outcomes. Our results show that while parenting style fully mediates the weak relationship between maternal health and child socio-emotional outcomes in early childhood, it no longer explains the stronger relationship between maternal

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[3] Möller et al., (2014) found that emotional and behavioural symptoms of children of parents with cancer were higher for children aged 6-10 compared to adolescents. Contrastingly, another study on parental cancer found that older adolescent children with an ill parent reported worse outcomes compared to younger adolescent children (Rainville et al., 2012).

[4] See also Möller et al., 2014,

[5] See also Armistead et al., 1995; Conrad & Hammen, 1993.

health and child outcomes observed in mid-childhood, after commencement of formal education.

The contribution of our study is twofold. First, we contribute to the literature by adding knowledge on the factors that affect the formation of key behavioural skills in childhood known to affect long-run outcomes (Smithers et al., 2018). The key innovation in our study is to document the relationship between maternal chronic illness and disability diagnosis and the development of child socio-emotional outcomes from early to mid-childhood, and shed light on the role of parenting as an underlying transmission channel.[6] Second, our study informs social policy, by highlighting the need to support families with young and middle-age children that are affected by maternal chronic illness and disability, to counteract its contribution to inequality of opportunity arising in childhood.

The paper proceeds as follows. In Section 2 we describe the GUiNZ dataset and the specific measures used in our analysis, present descriptive statistics and our method. In Section 3 we present our results and in Section 4 we discuss the implications of our findings and conclude.

2. Data and Method

2.1. Data

2.1.1. Growing Up in New Zealand Dataset

We use data from the Growing Up in New Zealand (GUiNZ) study, a child-focused longitudinal and representative study of New Zealand families. The GUiNZ study aims to understand the pathways leading to equitable and healthy child development in New Zealand. It commenced in 2009/10 and families were recruited during the cohort's mothers' pregnancy (Growing Up in New Zealand, 2020). A cohort of 6,853 children were included in the study. At the time of this study, the GUiNZ study has collected data for their cohort up to eight years of age.

We use data from five waves of the study, which includes the antenatal wave, and each wave corresponding to the data collection at 9 months, age 2, 5, and 8 years of age. At the 9-month wave, the GUiNZ study includes 6,847 children and at the age 8 wave, the study includes 5,004 children (the gap is due to sample attrition). Below, we will describe the measures used in our analysis, present descriptive statistics and explain our empirical method.

2.1.2. Measures of Maternal Health and Socio-Demographic Characteristics

We obtain our measures of maternal chronic illness and disability using the 9-month survey wave. This is the single time in which mothers were specifically asked about their chronic

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[6] Past research on a similar child developmental period used subjective measures of health (e.g., Le & Nguyen, 2017) whereas our study uses self-reported diagnosis of long-term health conditions as a measure of maternal health status.

illness and disability status. To identify mothers with a chronic illness, we used their responses to the question "*Do you currently have an illness that is long term, lasting 6 months or more?*".[7] In the full sample, out of 6,455 mothers, 662 reported having a chronic illness. To identify mothers with a disability, we used their responses to the question "*Do you currently have a disability that is long term, lasting 6 months or more?*".[8] In the sample, 266 mothers reported a disability (this group included 82 mothers who also had a chronic illness). A total of 846 mothers in the sample reported living with chronic illness or disability.[9]

We present sociodemographic characteristics of the mothers included in our sample in Table 1, separately for three groups: 1) mothers with chronic illness, 2) mothers with disability, 3) and the reference group, including mothers who did not report a chronic illness or disability.[10] On average, mothers in the three groups are around 31 years old. Mothers with disability tend to have lower socioeconomic advantage, measured by educational attainment and household income, compared to the reference group (although only the difference in household income is statistically significant). There are no statistically significant differences in socioeconomic advantage measures between mothers with chronic illness and the reference group, or in the propensity to reside in an urban versus rural area between any of the groups. Fewer mothers with a disability are in a relationship relative to the reference group whereas there is no statistically significant differences in relationship status between mothers with chronic illness group and the reference group.

With regards to maternal depression, we observe that mothers with chronic illness or disability are 6 and 10 percentage points more likely to suffer from depression compared to the reference group, respectively (differences are statistically significant at conventional levels).[11] Finally, the distribution in pre-pregnancy body mass index (BMI) is reflective of poorer physical health, on average, among mothers with chronic illness or disability compared to the reference group (differences are statistically significant at the 5-percent level). We also note that both health measures, depression and BMI, have a large share of missing values (14-15 percentage and 10-12 percentage points, respectively). Given the differences in maternal and household characteristics between the group of mothers with

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[7] Responses included the options Yes, No, Refused, and Don't know. Although not disaggregated in this study, respondents provided exact diagnoses which were classified according to International Classification of Diseases Version 10 chapters.

[8] Responses included the options Yes, No, Refused, and Don't know.

[9] We checked whether reports of chronic illness at the nine-month wave were related to short-term pregnancy-related illness, using the data from the antenatal wave. Only 88 mothers who reported having a chronic illness at the nine-month wave also reported a pregnancy-related condition in the antenatal wave (13% of the sample of mothers with chronic illness). This small number suggests that our measure of chronic illness is not capturing short-term pregnancy-related health issues, but rather long-lasting conditions that have a larger potential to influence child development.

[10] Mothers in the second listed group may also report having a chronic illness in addition to a disability, but they are not included in the exclusively chronically ill group.

[11] Maternal depression was measured using the Edinburgh Depression Scale (Cox et al., 1987) at the 9-month wave and the Patient Health Questionnaire 9 (Kroenke & Spitzer, 2002) at the age 5 and 8 waves. Maternal depression is identified by scores above the cut-off points for each measure.

chronic illness, disability and the reference group, we will control for maternal and household characteristics in our main analysis.

Table 1. *Demographic characteristics of mothers in our sample by health status at child age 2.*

	Chronic illness (n=563)	Disability (n=258)	Reference group (n=5145)
	(1)	(2)	(3)
Age			
Mean (SD)	30.66[a] (5.72)	30.81[b] (6.26)	30.14[ab] (5.80)
Median	31	31	31
(Missing)	< .01	< .01	< .01
	Percentage of the Sample		
Education			
No secondary school	6.39	12.40	5.99
Secondary school	22.38	18.60	22.87
Diploma/Trade	31.79	34.11	30.14
Bachelor	22.38	18.99	24.06
Higher Degree	16.70	15.12	16.58
(Missing)	0.36	0.78	0.36
Household income[12]			
Less than $20,000	2.13	6.20	3.19
$20,000-$30,000	6.04	6.59	5.75
$30,000-$50,000	16.34	19.38	16.41
$50,000-$70,000	17.05	20.54	15.89
$70,000-$100,000	20.07	14.34	18.87
$100,000-$150,000	21.67	12.40	17.82
More than $150,000	9.06	10.47	14.10
(Missing)	7.64	10.08	7.96
Rurality			
Urban	90.23	88.76	90.10
Rural	8.53	10.08	8.08
(Missing)	1.24	1.16	1.82
Maternal relationship status[13]			
No partner	9.06	15.50	9.46
Partnered	90.94	84.50	90.52
(Missing)	0.0	0.0	< .01
Maternal depression			
No depression	68.56	65.12	75.25

[12] Currency is in New Zealand Dollars.
[13] Although there are no missing data at the age 2 years wave, this variable was 0.21% missing for the reference group (none for chronic illness and disability groups) at age 5 and 7.59% for the chronic illness group, 6.86% for the disability group, and 8.44% for the reference group at age 8 years.

Depression	16.70	20.54	10.35
(Missing)[14]	14.74	14.40	14.40
Pre-pregnancy BMI			
Underweight	2.13	5.04	3.53
Normal weight	45.65	43.02	49.62
Overweight	22.56	17.83	20.17
Obese	19.54	24.42	14.29
(Missing)	10.12	9.69	12.39

Two-sample Kolmogorov-Smirnov test[15]	p-value	p-value
Education	> .999	0.255
Household income	.150	< .001
Rurality	> .999	> .999
Maternal relationship status	.150	< .001
Maternal depression	.015	.005
Pregnancy BMI	.012	.012

[a] Significant difference between chronic illness group and reference group.

[b] Significant difference between disability group and reference group.

2.1.3. Measures of Parenting Style

For parenting style, we use the measures available in each wave of the GUiNZ study, up to the age 8 wave. From the 9-month wave, we use a measure of interest in the baby, constructed based on the mother's responses to twelve survey items (e.g. *"I talk to my baby in a warm and affectionate way"*) (Davies et al., 2002). From the age 2 wave, we use the measures of confidence in parenting and parenting enjoyment. The first measure is based on the mother's answer to the question *"Overall, do you feel that as a parent you are: Not very good at being a parent, A person who has some trouble being a parent, An average parent, A better than average parent, A very good parent".* The measure of parenting enjoyment consists of the sum of the responses to four survey items (e.g. *"On the whole, I enjoy being a parent"*) (Martin, 2003). From the age 5 and 8 waves, we use the measures of warm, authoritarian and hostile parenting, and efficacy in parenting (Paterson & Sanson, 1999). The measures of warm and hostile parenting each consist of the sum of the responses to eight survey items (e.g. *"I am responsive to his/her feelings and needs"* for warm parenting, and *"I guide him/her by punishment more than by reason"* for hostile parenting). The measure of authoritarian parenting consists of the sum of the responses to six survey items (e.g. *"There should be a clear line of authority within the family and no doubt about who decides"*). Finally, the measure of parenting efficacy consists of the sum of the responses to five survey items (e.g. *"I am afraid that disciplining my child for misbehaviour will cause him/her to not like me"*).

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[14] Although there are missing data for the age 2 years wave, there are no missing data for maternal depression at age 5 and 8 years.

[15] Testing against the reference category.

We also constructed a positive parenting index (ranging between 0 and 1), based on a weighted average of all parenting measures.[16] Our positive parenting index is a cumulative aggregate index of all parenting measures collected up until that wave. For example, for the age 2 wave, parenting measures from the antenatal wave up to the age 2 wave were combined and weighted based on the number of measures included in the index. A list of all parenting variables included in our positive parenting index is in Appendix 1.

We show in Table 2 the means, standard deviations, and statistically significant differences across groups in parenting measures. Both mothers who have a chronic illness and those with a disability report significantly lower parenting efficacy (age 5) relative to the reference group. Mothers with a chronic illness also report significantly lower parenting enjoyment (age 2), parenting confidence (age 2), parenting efficacy (age 5 and age 8), and higher authoritarian parenting (reverse-scored; age 5), hostile parenting (age 5) relative to the reference group. This descriptive analysis suggests a negative relationship between maternal chronic illness and positive parenting that could contribute to a relationship between maternal health and child outcomes, which we will explore with a regression mediation analysis in Section 3.

Table 2. *Pairwise comparisons in parenting measures across maternal health status groups.*

	Chronic Illness (n=563)		Disability (n=258)		Reference (n=5145)	
	M	SD	M	SD	M	SD
	(1)	(2)	(3)	(4)	(5)	(6)
Interest in the baby (9 months)	0.908	0.147	0.918	0.131	0.915	0.130
Parenting enjoyment (age 2)	**0.841ª**	0.123	0.849	0.127	**0.859ª**	0.119
Parenting confidence (age 2)	**0.732ª**	0.228	0.752	0.227	**0.770ª**	0.211
Warm parenting (age 5)	0.818	0.143	0.830	0.147	0.818	0.146
Parenting efficacy (age 5)	**0.722ª**	0.155	**0.713ᵇ**	0.176	**0.740ᵃᵇ**	0.155
Authoritarian parenting (age 5)	**0.673ª**	0.135	0.689	0.141	**0.696ª**	0.134
Hostile parenting (age 5)	0.256	0.123	0.270	0.140	0.258	0.133
Warm parenting (age 8)	0.817	0.145	0.833	0.151	0.827	0.143
Parenting consistency (age 8)	0.619	0.138	0.604	0.153	0.615	0.134
Parenting efficacy (age 8)	**0.725ª**	0.182	0.741	0.192	**0.759ª**	0.167
Hostile parenting (age 8)	**0.399ª**	0.164	0.392	0.173	**0.374ª**	0.161

Notes: ª significant difference between maternal chronic illness and reference group; ᵇ significant difference between maternal disability and reference group

2.1.4. Measures of Child Socio-Emotional Outcomes

Our outcome variables include child socio-emotional outcomes, measured at ages 2, 5, and 8 years, using the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a standard psychometric measure of child socio-emotional outcomes, based on mothers' assessment and is commonly used in the measurement of psychopathologies in children. The SDQ has been

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[16] To construct the index of positive parenting, all items were transformed to be positively valenced (i.e., higher values indicated more positive parenting).

validated cross-nationally (Woerner et al., 2004; Vostanis, 2006) and is included in several major population surveys to assess child socio-emotional outcomes, including the German Socio-Economic Panel (e.g., Mühlenweg et al. 2016), the Avon Longitudinal Study of Parents and Children (MacKinnon et al., 2017), the Longitudinal Study of Australian Children (Le & Nguyen, 2017), and the UK Millennium Cohort Study (e.g., Croft et al., 2015).

We construct the subscales of the SDQ based on its original five dimensions: emotional symptoms, peer problems, hyperactivity-inattention, conduct problems, and prosociality (Goodman, 1997). The items from the SDQ were measured on a three-point scale (Normal/Borderline/Abnormal or Not true/Somewhat true/Certainly true) and summed to create each subscale. Each subscale ranges from 0 to 10. The total SDQ score is a sum of the total subscale scores for emotional symptoms, peer problems, hyperactivity-inattention, and conduct problems (full range 0 to 40).[17] The repeated inclusion of the SDQ in several waves of the survey allows us to study the link between maternal health and child socio-emotional outcomes from early to mid-childhood.

We show in Table 3 the average score in each of the five socio-emotional outcomes measured by the SDQ – emotional symptoms, conduct problems, hyperactivity-inattention, peer problems and prosociality, as well as the total SDQ score[18] –, at age 2, 5 and 8 years, respectively.[19] At age 2 children whose mother has a chronic illness have higher hyperactivity/inattention scores and lower prosociality scores relative to the reference group. Children whose mother has a disability, have higher emotional symptoms scores relative to children in the reference group. Overall, the average differences in socio-emotional outcomes at age 2 between children whose mother lives with a chronic illness or disability and the reference group are small and generally lack statistical significance. At age 5, children whose mother has a chronic illness or a disability, score statistically significantly higher in conduct problems relative to the reference group. Furthermore, children whose mother has a disability, score higher on hyperactivity/inattention, peer problems, and total SDQ scores relative to the reference group. At age 8, children whose mother has a chronic illness have higher scores in emotional symptoms, conduct problems, hyperactivity-inattention and peer problems relative to the reference group. Moreover, compared to younger ages, the gaps between the two groups are large and statistically significant. Similarly, children whose mother has a disability have higher conduct problem, hyperactivity-inattention and peer problem scores relative to the reference group. Furthermore, children with mothers with either a chronic illness or disability had significantly higher total SDQ scores relative to the reference group.

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[17] The full range of the total SDQ score at age 5 is 0 to 38 due to the unintentional omission of one item from conduct problems at that wave of data collection.

[18] Total SDQ score is the sum of the scores from emotional symptoms, conduct problems, hyperactivity-inattention, and peer problems. Higher scores indicate poorer socio-emotional outcomes.

[19] We present the average outcome separately for three groups of children: those whose mother has a chronic illness, those whose mother has a disability, and those whose mother has no chronic illness or disability.

To summarise, our descriptive analysis reveals that children whose mother has a chronic illness or disability—at various ages— score higher in conduct problems, hyperactivity-inattention, emotional symptoms, peer problems, and the overall SDQ measure compared to children whose mother does not have a long-term illness or disability.

Table 3. *Pairwise comparisons in SDQ measures across maternal health status groups.*

	Chronic illness (n=563)				Disability (n=258)				Reference (n=5145)			
	M	SD	Min-Max	% missing	M	SD	Min-Max	% missing	M	SD	Min-Max	% missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Age 2												
Conduct problems	3.178	1.913	0–10	0.18%	3.039	2.017	0–9	0.00%	3.096	1.956	0–10	0.12%
Hyperactivity-Inattention	**4.491**[a]	2.124	0–10	0.18%	4.337	2.216	0–10	0.00%	**4.284**[a]	2.125	0–10	0.12%
Emotional symptoms	1.829	1.546	0–9	0.18%	**2.027**[b]	1.839	0–8	0.00%	**1.809**[b]	1.602	0–10	0.12%
Peer problems	2.185	1.669	0–7	0.18%	2.202	1.612	0–7	0.00%	2.165	1.644	0–10	0.12%
Prosociality	**6.872**[a]	2.026	0–10	0.18%	7.182	1.863	1–10	0.00%	**7.069**[a]	1.854	0–10	0.12%
Total SDQ	11.683	5.061	0–30	0.18%	11.605	5.486	1–29	0.00%	11.355	5.094	0–31	0.12%
Age 5												
Conduct problems[20]	**2.720**[a]	1.048	0–7	0.00%	2.804	1.189	0–8	0.00%	**2.529**[a]	0.993	0–8	0.02%
Hyperactivity-Inattention	3.926	2.371	0–10	0.00%	**4.220**[b]	2.347	0–10	0.00%	**3.877**[b]	2.241	0–10	0.02%
Emotional symptoms	2.017	1.747	0–10	0.00%	2.094	1.712	0–9	0.00%	1.945	1.772	0–10	0.14%
Peer problems	**4.726**[c]	1.224	2–9	0.00%	**4.939**[c]	1.274	2–10	0.00%	4.788	1.238	0–10	0.02%
Prosociality	7.780	1.906	0–10	0.00%	7.673	1.786	2–10	0.00%	7.747	1.801	0–10	0.14%
Total SDQ	12.548	4.417	4–28	0.00%	**13.233**[b]	4.595	4–30	0.00%	**12.376**[b]	4.444	3–31	0.02%
Age 8												
Conduct problems	**2.720**[a]	1.048	1–7	10.20%	**2.804**[b]	1.189	1–8	7.35%	**2.529**[ab]	0.993	0–10	11.55%
Hyperactivity-Inattention	3.949	1.399	1–10	10.20%	3.963	1.412	1–8	7.35%	3.847	1.351	0–10	11.55%
Emotional symptoms	**1.990**[a]	2.084	1–10	10.20%	1.921	1.888	0–8	7.35%	**1.635**[a]	1.778	0–10	11.55%
Peer problems	**1.674**[a]	1.772	0–10	10.20%	**1.725**[b]	1.753	0–8	7.35%	**1.407**[ab]	1.606	0–10	11.55%
Prosociality	8.164	1.960	0–9	10.20%	8.101	1.892	2–10	7.35%	8.143	1.810	0–10	11.55%
Total SDQ	**9.104**[a]	4.397	2–27	10.20%	**9.254**[ab]	4.310	4–24	7.35%	**8.102**[ab]	3.926	0–31	11.55%

Notes: [a] significant difference between maternal chronic illness and reference group.; [b] significant difference between maternal disability and reference group.
[c] significant difference between maternal chronic illness and maternal disability groups.

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[20] Due to errors in data collection at this wave, the conduct problems subscale has four items instead of five. The highest possible score for conduct problems at age 5 is 8 rather than 10. All outcome variables across all waves are standardised for regression analyses, thereby addressing this shortcoming.

2.2. Method

We examine the link between maternal health and child socio-emotional outcomes using ordinary least squares (OLS) regression analyses. A key empirical caveat is the omitted variable bias, that is, the possibility that unobserved characteristics drive the relationship between maternal health and child outcomes. Our analysis, which relies on self-reported measures of maternal health and child outcomes, could be biased if, for instance, mothers who are more pessimistic about their health status are also more pessimistic about their children's behaviour. We believe that this problem is strongly attenuated in our study because awareness of suffering from a chronic illness or living with disability is typically not a pure self-assessment, but usually follows a clinical assessment. Therefore, our measure of maternal chronic illness or disability is likely to be an *objective* measure of maternal health. Objective or clinically assessed maternal health status has the advantage of providing a more accurate measure of health status than subjective self-reports, but it is not an exogenous shock. Therefore, it is unlikely to be independent of other individual characteristics that also affect child socio-emotional outcomes. For instance, it is possible that chronic illness or disability is more prevalent among mothers of lower socioeconomic advantage and that socioeconomic advantage affects child socio-emotional outcomes.

To account for possible omitted variable bias in our regression analysis, we control for observable maternal and household characteristics that could be related with both the incidence of maternal chronic illness or disability and child socio-emotional outcomes (for example, parenting style, maternal mental health, age, body mass index as a proxy for general health status, education, and household income).[21] In addition, we control for observable child characteristics that could be related to parenting and child outcomes (for example, child gender, number of co-residential siblings, and birth order of the child). Controlling for these variables in the regression analysis allows us to better quantify the relationship between maternal health and child socio-emotional outcomes.

We also conduct a mediation analysis to examine the extent to which parenting style explains the link between maternal health and child socio-emotional outcomes. The mediation analysis is informed by the previous literature (e.g., Masarik & Conger, 2017), and allows us to understand the role of parenting style (the mediator) as an underlying pathway for the link between maternal health and child socio-emotional outcomes (Hayes, 2013). We examine the mediating role of parenting style for the association between maternal health and child socio-emotional outcomes at ages 2, 5, and 8. Assessing the mediation at different ages allows us to examine at which ages of child development the mediation occurs and how it evolves over time. To account for omitted variable bias, we control for all available, relevant maternal, household and child characteristics (as previously listed). Our analysis, which

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[21] To account for missing data in maternal body mass index, depression, and household income, we code for missing cases in these variables and include these cases in our analyses. As shown in the Appendix, our results are robust to excluding observations with missing values.

remains primarily a descriptive exercise, provides useful guidance on the link between maternal health and child socio-emotional outcomes and its underlying mechanisms.

3. Results

We organise the presentation of our results as follows. We first examine the link between maternal health and child socio-emotional outcomes (five separate dimensions of SDQ and total SDQ) at age 2, 5, and 8, controlling for relevant other maternal, household and child characteristics (Section 3.1). We then examine the extent to which parenting style mediates the link between maternal health and child socio-emotional outcomes (Section 3.2). In the mediation analysis, regression models estimating the effect of maternal health on positive parenting and models estimating the effect of maternal health and positive parenting on child SDQ measures are estimated simultaneously.[22]

Due to the small number of mothers in the sample with a disability only, or both a chronic illness and disability, maternal health is assessed through a binary measure (living with a chronic illness or disability "1" versus not "0").[23]

3.1. Maternal health and child socio-emotional outcomes

Our first set of results show the relationship between maternal health and SDQ measures, controlling for maternal characteristics, including age, education, pre-pregnancy body mass index and depression; household characteristics, including household income, residential location (rural versus urban), area-level material deprivation and number of co-residential siblings of the study child; and child characteristics, including child gender and birth order.

We report our results in Tables 4–6 (columns 1–6). For brevity, we only report the estimated coefficients of our main variables of interest, including maternal chronic illness or disability and positive parenting, as well as key control variables including maternal depression and education, and household income (full set of results is provided in the Appendix in Tables 2A–4A). At age 2 (see Table 4) and age 5 (see Table 5), we find no statistically significant relationship between maternal chronic illness or disability and any of the SDQ measures. At age 8 (see Table 6) we find that maternal chronic illness and/or disability is statistically associated with higher scores in conduct problems (0.180 standard deviations, column 1), emotional symptoms (0.109 standard deviations, column 3), peer problems (0.091 standard deviations, column 4), and total SDQ score (0.153 standard

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[22] Maternal, household, and child control variables included in the first set of models are also included in these models.
[23] Sensitivity analyses were run using the separate binary measures of chronic illness and disability status and the results were similar to the combined illness and disability variable (results will be made available upon request).

deviations, column 6) but not hyperactivity-inattention nor prosociality (both positive coefficients).[24]

Analyses were also run separately for boys and girls. At age 2, maternal health status is related to higher hyperactivity-inattention in boys and not statistically significantly associated with SDQ measures in girls. At age 5, maternal illness and/or disability is significantly associated with higher conduct problems and higher prosociality in girls and lower prosociality in boys. Finally, at age 8, maternal health is significantly associated with higher conduct problems, emotional symptoms, prosociality, and total SDQ (but not hyperactivity-inattention and peer problems) in girls and higher peer problems and total SDQ (but not the remaining measures) for boys.[25]

In terms of our results on other predictors of child socio-emotional outcomes, we observe that maternal depression is consistently significantly associated with higher scores across all measures of the SDQ at age 2, 5, and 8 (Tables 4–6, columns 1–4, 6), a finding that is consistent with past research which has found that maternal depression is associated with higher child internalising symptoms and externalising behaviours (see Goodman et al., 2011 for a review). Maternal depression is consistently not significantly associated with prosociality (Tables 4–6, column 5). Additionally, maternal depression is consistently associated with lower positive parenting at all three ages (Tables 4–6, column 7).

In terms of household income, there are few statistically significant effects on SDQ at age 2, 5, and 8. However, there is a consistent pattern for peer problems at age 2 and 8 (but not at age 5) in that children living in households with lower household incomes (relative to the median at the time of data collection of $50–$70,000) have higher peer problems and those with higher household incomes have lower peer problems (Tables 4–6, column 4).

Our results also show a negative association between positive parenting and SDQ problems (Table 4, columns 1–4, 6) and a positive association between positive parenting and prosociality (column 5), generally consistently statistically significant at conventional levels. There is one exception in that at age 5, positive parenting is associated with *higher* peer problems (Table 5, column 4). At the same time, we observe a negative association between maternal illness/disability and positive parenting, statistically significant at 2 and 5 years of age (Tables 4–6, column 7) but no significant association at age 8.

Although we do not find a significant direct association between maternal illness/disability and SDQ for age 2 and 5, this does not preclude the presence of a mediating effect (Hayes, 2013; Zhao et al., 2010). Therefore, in the following analyses we explore the association between maternal chronic illness and/or disability *through* (i.e., mediated by) positive parenting.

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[24] Sensitivity analyses were run without coding for missing cases on body mass index, maternal depression, and household income and the results were similar (see Appendix).

[25] For brevity results tables separately by child sex are not reported in the paper and can be made available by the authors upon request.

Our second set of results show the mediating effect of positive parenting on the relationship between maternal health and child SDQ outcomes. A mediation analysis presumes two main types of effects underlying a causal process. The *direct effect* is the association between the presumed causal independent variable (maternal chronic illness or disability) and the direct dependent variable (child SDQ) (Baron & Kenny, 1986; Hayes, 2013). The *indirect effect* is the association between the independent variable *through* the mediating variable (positive parenting) on the dependent variable. The indirect effect is estimated by multiplying the coefficient estimate of the independent variable predicting the hypothesised mediating variable and the coefficient estimate of the hypothesised mediating variable predicting the dependent variable. A statistically significant direct effect is not a necessary requirement to establish a mediating effect (Hayes, 2013; Zhao et al., 2010). Instead, a mediating effect can be established as an indirect-only mediation (see Zhao et al., 2010) wherein the mediation is observed solely through the mediated effect in the absence of a significant direct effect. In this case, a significant indirect effect is used to determine a mediating effect. In this section, we present our results on the indirect effect of maternal health on child SDQ, through positive parenting.

At age 2, maternal illness/disability is statistically significantly associated with lower positive parenting. In terms of child socio-emotional outcomes, positive parenting is statistically significantly associated with lower levels of conduct problems, hyperactivity-inattention, emotional symptoms, peer problems, and total SDQ as well as higher prosociality (see Table 4, columns 1–6). Maternal illness/disability is also significantly associated with lower positive parenting (Table 4, column 7). Our mediation analysis reported in Table 7 reveals that positive parenting significantly mediates the association between maternal illness/disability and all child SDQ measures at age 2. The results suggest that maternal illness/disability is associated with higher scores in conduct problems, hyperactivity-inattention, emotional symptoms, peer problems, and total SDQ scores through its role in lowering maternal positive parenting. Similarly, children with an ill or disabled mother have lower prosociality despite receiving higher positive parenting. We find the same pattern of results for children at age 5 (Table 7, columns 1–3 and 5 and 6) in that positive parenting significantly mediates the pathway between maternal illness/disability and higher conduct problems, hyperactivity-inattention, emotional problems, total SDQ and lower prosociality. The mediation analysis also reveals that positive parenting significantly mediates the association between maternal illness/disability and *lower* peer problems.

A different pattern emerges at age 8 in which maternal health status only has a direct significant association—and not a statistically significant indirect association—with child SDQ measures. Specifically, maternal illness/disability is significantly associated with higher conduct problems, emotional symptoms, peer problems, and total SDQ (Table 6, columns 1, 2, 4, and 6). Additionally, there is no statistically significant association between maternal

illness/disability and hyperactivity-inattention and prosociality (Table 6, columns 2 and 5) nor a significantly mediating effect (Table 7, columns 2 and 5).[26]

Mediation analyses were run separately for boys and girls. For girls, significant mediating effects of positive parenting between maternal chronic illness/disability and higher child SDQ (or lower prosociality) are present at age 2 but not at age 5 and 8. For boys, there are significant mediating effects at age 8 but not at age 2 and 5 (results are available upon request).

Taken together, the results indicate that positive parenting mediates the association between maternal health status and children's socio-emotional outcomes in early childhood. In mid-childhood and following commencement of formal education, maternal health status exerts a negative impact on children's socio-emotional outcomes but not through parenting practices.

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[26] We run robustness checks in which we replicated the analysis presented, but without coding for missing cases on body mass index, maternal depression, and household income (see Appendix). The results were similar at age 2 and 5 years, but indirect effects that are significant at the 10% level emerge for emotional symptoms, peer problems, prosociality, and total SDQ at age 8.

Table 4. *Reduced regression coefficients for models estimating the relationship maternal illness/disability and child SDQ scores and positive parenting at age 2.*

Age 2	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	−0.025	0.046	0.036	−0.013	−0.028	0.017	−0.060**
	(0.039)	(0.040)	(0.039)	(0.039)	(0.041)	(0.037)	(0.017)
Maternal depression [a]	0.129**	0.101*	0.247	0.102*	−0.023	0.202***	−0.139***
	(0.041)	(0.043)	(0.041)	(0.042)	(0.043)	(0.039)	(0.019)
Household income [a] (Ref: $50–70,000)							
< $20,000	0.064	0.087	0.291**	0.281**	−0.133	0.243**	−0.100*
	(0.085)	(0.089)	(0.086)	(0.087)	(0.090)	(0.082)	(0.039)
$20–30,000	0.028	0.014	0.134*	0.211**	−0.001	0.127*	−0.080**
	(0.066)	(0.069)	(0.066)	(0.067)	(0.069)	(0.063)	(0.030)
$30–50,000	0.093*	0.066	0.083+	0.125**	−0.070	0.129**	−0.017
	(0.045)	(0.048)	(0.046)	(0.047)	(0.048)	(0.043)	(0.021)
$70–100,000	−0.029	−0.025	−0.066	−0.030	−0.009	−0.052	−0.017
	(0.044)	(0.046)	(0.044)	(0.045)	(0.046)	(0.042)	(0.020)
$100–150,000	0.015	−0.045	−0.096*	−0.082+	−0.018	−0.070	0.014
	(0.046)	(0.048)	(0.046)	(0.047)	(0.048)	(0.044)	(0.021)
>$150,000	0.036	−0.038	−0.115*	−0.103*	−0.036	−0.072	0.053*
	(0.050)	(0.053)	(0.051)	(0.052)	(0.053)	(0.048)	(0.023)
Education (Ref: Secondary school)							
Below secondary school	0.312***	0.038	0.112+	0.216***	−0.049	0.240***	−0.037
	(0.059)	(0.062)	(0.060)	(0.061)	(0.062)	(0.057)	(0.027)
Diploma/Trade	0.027	0.018	−0.065+	0.049	0.024	0.013	0.026
	(0.036)	(0.038)	(0.036)	(0.037)	(0.038)	(0.034)	(0.016)
Bachelor	−0.134**	−0.076+	−0.158***	−0.086*	−0.027	−0.160***	−0.006
	(0.040)	(0.042)	(0.041)	(0.041)	(0.042)	(0.039)	(0.018)
Higher degree	−0.231***	−0.132**	−0.136**	−0.088+	0.018	−0.214***	−0.017
	(0.046)	(0.048)	(0.046)	(0.047)	(0.048)	(0.044)	(0.021)

| | –0.439*** | –0.441*** | –0.138*** | –0.265*** | 0.526*** | –0.480*** | – |
| Positive parenting index | (0.031) | (0.033) | (0.031) | (0.032) | (0.033) | (0.030) | – |

Notes: In the interest of space, the coefficients for all control variables are omitted from this table. See Table 2A in the appendix for full results.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.01$
[a] Missing values were coded as a category for this variable but the coefficient is omitted from the table in the interest of space.

Table 5. *Reduced regression coefficients for models estimating the relationship maternal illness/disability and child SDQ scores and positive parenting at age 5.*

Age 5	Conduct Problems	Hyperactivity-Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	0.023	–0.032	0.025	–0.010	0.033	–0.002	–0.096***
Maternal illness/disability	(0.040)	(0.039)	(0.039)	(0.038)	(0.040)	(0.037)	(0.024)
	0.457***	0.341***	0.543***	0.316***	–0.011	0.617***	–0.199
Maternal depression	(0.051)	(0.050)	(0.050)	(0.049)	(0.050)	(0.047)	(0.030)
Household income [a] (Ref: $50–70,000)							
	–0.024	0.063	0.068	–0.074	–0.190	0.031	–0.124
< $20,000	(0.136)	(0.134)	(0.133)	(0.131)	(0.135)	(0.126)	(0.081)
	0.066	0.012	0.123	0.110	0.045	0.106	0.000
$20–30,000	(0.091)	(0.089)	(0.089)	(0.087)	(0.090)	(0.084)	(0.054)
	0.080	0.135*	0.066	0.089+	–0.071	0.145**	0.001
$30–50,000	(0.056)	(0.055)	(0.055)	(0.054)	(0.056)	(0.052)	(0.033)
	–0.028	(0.025	–0.087+	–0.005	0.000	–0.032	0.014
$70–100,000	(0.048)	(0.048)	(0.047)	(0.046)	(0.048)	(0.045)	(0.029)
	–0.070	–0.009	–0.070	–0.034	0.057	–0.063	0.073*
$100–150,000	(0.049)	(0.048)	(0.048)	(0.047)	(0.049)	(0.045)	(0.029)
	–0.031	–0.008	–0.125*	–0.056	0.059	–0.078	0.057+
>$150,000	(0.052)	(0.051)	(0.051)	(0.050)	(0.052)	(0.048)	(0.031)
Education (Ref: Secondary school)							
	0.088	0.119+	0.061)	–0.009	0.048	0.108+	–0.036
Below secondary school	(0.064)	(0.063)	(0.063)	(0.062)	(0.064)	(0.059)	(0.038)

	0.003	–0.019	0.018	0.001	0.007	–0.002	0.037
Diploma/Trade	(0.038)	(0.037)	(0.037)	(0.036)	(0.038)	(0.035)	(0.023)
	–0.167***	–0.231***	–0.070+	–0.173***	–0.078+	–0.244***	–0.052*
Bachelor	(0.042)	(0.041)	(0.041)	(0.040)	(0.042)	(0.039)	(0.025)
	–0.172***	–0.293***	0.021	–0.151**	–0.011	–0.234***	–0.077+
Higher degree	(0.047)	(0.046)	(0.046)	(0.045)	(0.047)	(0.044)	(0.028)
	–0.272***	–0.190***	–0.058*	0.128***	0.448***	–0.166***	–
Positive parenting index	(0.024)	(0.023)	(0.023)	(0.023)	(0.024)	(0.022)	–

Notes: In the interest of space, the coefficients for all control variables are omitted from this table. See Table 3A in the appendix for full results.
$+ p < 0.1$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$
[a] Missing values were coded as a category for this variable but the coefficient is omitted from the table in the interest of space.

Table 6. *Reduced regression coefficients for models estimating the relationship maternal illness/disability and child SDQ scores and positive parenting at age 8.*

Age 8	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	0.180***	0.053	0.109*	0.091*	0.029	0.153**	–0.055
Maternal illness/disability	(0.047)	(0.047)	(0.046)	(0.044)	(0.045)	(0.044)	(0.038)
	0.439***	0.214**	0.590***	0.316***	0.000	0.593***	–0.236***
Maternal depression	(0.068)	(0.068)	(0.067)	(0.064)	(0.065)	(0.064)	(0.055)
Household income [a] (Ref: $50–70,000)							
	0.336**	0.343**	0.088	0.334**	–0.362***	0.386***	–0.119
< $20,000	(0.106)	(0.106)	(0.103)	(0.099)	(0.102)	(0.100)	(0.085)
	0.143)	0.016	–0.111	0.182+	–0.108	0.067	–0.018
$20–30,000	(0.115)	(0.116)	(0.113)	(0.108)	(0.111)	(0.109)	(0.093)
	0.007	–0.021	–0.059	0.058	–0.127+	–0.008	–0.062
$30–50,000	(0.077)	(0.078)	(0.075)	(0.072)	(0.074)	(0.073)	(0.062)
	0.006	–0.001	–0.080	–0.066	–0.151*	–0.064	0.051
$70–100,000	(0.064)	(0.064)	(0.063)	(0.060)	(0.062)	(0.061)	(0.052)
	0.018	–0.062	–0.084	–0.089	–0.076	–0.093	0.208***
$100–150,000	(0.063)	(0.063)	(0.061)	(0.059)	(0.060)	(0.059)	(0.050)

>$150,000	−0.026 (0.063)	−0.042) (0.063)	−0.117+ (0.062)	−0.136* (0.059)	−0.127* (0.061)	−0.132* (0.060)	0.188*** (0.051)
Education (Ref: Secondary school)							
Below secondary school	−0.030 (0.087)	−0.125 (0.087)	−0.084 (0.084)	0.109 (0.081)	−0.077 (0.083)	−0.045 (0.082)	0.028 (0.069)
Diploma/Trade	−0.062 (0.046)	−0.001 (0.047)	−0.062 (0.045)	0.023) (0.043)	0.026 (0.045)	−0.036 (0.044)	0.104** (0.037)
Bachelor	−0.047 (0.049)	−0.080 (0.049)	−0.084+ (0.048)	−0.071 (0.046)	−0.032 (0.047)	−0.109* (0.046)	0.019 (0.039)
Higher degree	−0.047 (0.055)	−0.002 (0.055)	−0.063 (0.054)	−0.044 (0.051)	−0.009 (0.053)	−0.060 (0.052)	−0.035 (0.044)
Positive parenting index	−0.080*** (0.020)	−0.042* (0.020)	−0.210*** (0.020)	−0.241*** (0.019)	0.353*** (0.019)	−0.233*** (0.019)	– –

Notes: In the interest of space, the coefficients for all control variables are omitted from this table. See Table 4A in the appendix for full results.

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[a] Missing values were coded as a category for this variable but the coefficient is omitted from the table in the interest of space.

Table 7. *Indirect effects of maternal illness/disability and child SDQ scores for age 2, 5, and 8.*

Indirect effect	Conduct Problems	Hyperactivity-Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)
Maternal illness/disability (age 2)	0.027** (0.008)	0.027** (0.008)	0.008** (0.003)	0.016** (0.005)	−0.032** (0.009)	0.029** (0.009)
Maternal illness/disability (age 5)	0.026*** (0.007)	0.018*** (0.005)	0.006* (0.003)	−0.012** (0.004)	−0.043*** (0.011)	0.016*** (0.004)
Maternal illness/disability (age 8)	0.004 (0.003)	0.002 (0.002)	0.012 (0.008)	0.013 (0.009)	−0.020 (0.013)	0.013 (0.009)

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4. Discussion

We examined the relationship between maternal chronic illness or disability and the development of children's socio-emotional skills, using the Growing Up in New Zealand longitudinal study. Our study contributes to an international body of evidence that examines the association between parental long-term illness and children's socio-emotional outcomes (e.g., Grant et al., 2006; Rainville et al., 2012; Sieh et al., 2010). We add to the literature by studying whether and at what age parental illness affects children's socio-emotional outcomes. Our findings revealed that differences in socio-emotional outcomes between children whose mother has a long-term condition and other children are likely to emerge in early childhood. These differences remain small in the first few years of life but widen after the child starts school. This is a novel finding that highlights the need for a life course approach to understand the association between parental illness and child development. Future research should investigate the reasons for the stronger relationship in mid-childhood than in early childhood. For instance, as children become older, they may begin to understand what it means for a parent to be ill and acquire caring responsibilities. They may also be stigmatised by peers. Although our analysis does not account for caring responsibilities at eight years of age, our results nonetheless highlight the importance of understanding the experiences of children who may become young carers at mid-childhood.

Aligned with past research, our mediation analysis revealed that parenting style might act as an important transmission channel of the influence of maternal chronic illness or disability on children's socio-emotional outcomes (e.g., Armistead et al., 1995; Masarik & Conger, 2017). Interestingly, we found that positive parenting mediates the relationship between maternal health and child socio-emotional outcomes in early childhood, but less so in mid-childhood after commencement of formal education. Future research should explore the reasons for this finding.

Our study provides useful guidance for research and policy on the consequences of maternal long-term health conditions and child socio-emotional development. At the same time, we acknowledge that our analysis is primarily a descriptive exercise and has limitations. First, we are not accounting for all factors that could affect both maternal health and child socio-emotional outcomes. We controlled for observable, relevant factors, such as maternal depression, socioeconomic status and parenting style. By doing so, maternal chronic illness or disability and child socio-emotional development at age 8 remain associated, which suggest that factors beyond those listed underlie the relationship between maternal health and child outcomes. A second limitation is that we use a binary measure of maternal chronic illness and disability assessed at one point in time and we cannot establish whether the relationship with child socio-emotional outcomes varies given the severity of the health condition. Future research should account for persistence and severity of long-term maternal health conditions when examining their relationships with child development. A third limitation is that child socio-emotional outcomes were reported by mothers only. It is

possible that mothers with poorer health may judge their children more harshly. Future research that draws on reports of child development from multiple actors may be valuable.

Finally, we can only report on child developmental outcomes until eight years of age. The emerging picture is that the gap in socio-emotional development between children whose mother has a chronic illness or disability and other children becomes large and consistent across measures at eight years of age. It is important to know how the gap evolves over time, such as when they age into adolescence. Future research drawing on additional waves of the GUiNZ study could address this question.

References

Armistead, L., Klein, K., & Forehand, R. (1995). Parental physical illness and child functioning. *Clinical Psychology Review, 15*(5), 409-422. doi: https://doi.org/10.1016/0272-7358(95)00023-I

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182.

Borghans, L., Duckworth, A. L., Heckman, J. J., & Ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of human Resources, 43*(4), 972-1059.

Chen, C. Y.-C. (2017). Effects of Parental Chronic Illness on Children's Psychosocial and Educational Functioning: a Literature Review. *Contemporary School Psychology, 21*(2), 166-176. doi: 10.1007/s40688-016-0109-7

Chen, Y.-C., & Fish, M. C. (2013). Demands of Maternal Chronic Illness and Children's Educational Functioning: An Exploratory Study. *Child and Adolescent Social Work Journal, 30*(3), 257-274. doi: 10.1007/s10560-012-0288-7

Chowdhury, S. R., Das, D. C., Sunna, T. C., Beyene, J., & Hossain, A. (2023). Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis. *EClinicalMedicine*, *57*.

Collings, S., & Llewellyn, G. (2012). Children of parents with intellectual disability: Facing poor outcomes or faring okay? *Journal of Intellectual & Developmental Disability, 37*(1), 65-82. doi: 10.3109/13668250.2011.648610

Conrad, M., & Hammen, C. (1993). Protective and resource factors in high and low-risk children: A comparison of children with unipolar, bipolar, medically ill, and normal mothers. *Development and Psychopathology, 5*(4), 593-607. doi: Doi: 10.1017/s0954579400006180

Cox, J. L., Holden, J. M., Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10- item Edinburgh postnatal depression scale. *The British Journal of Psychiatry, 150*, 782-786.

Croft, S., Stride, C., Maughan, B., & Rowe, R. (2015). Validity of the strengths and difficulties questionnaire in preschool-aged children. *Pediatrics*, *135*(5), e1210-e1219.

D'Souza, S., Waldie, K. E., Peterson, E. R., Underwood, L., & Morton, S. M. B. (2019). Antenatal and Postnatal Determinants of Behavioural Difficulties in Early Childhood: Evidence from Growing Up in New Zealand. *Child Psychiatry & Human Development, 50*(1), 45-60. doi: 10.1007/s10578-018-0816-6

Davies, P. T., Harold, G. T., Goeke-Morey, M. C., Cummings, E. M., Shelton, K., Rasi, J. A., & Jenkins, J. M. (2002). Child emotional security and interparental conflict. *Monographs of the society for Research in Child Development*, i-127.

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., ... & Guthrie, I. K. (2001). The relations of regulation and emotionality to children's

externalizing and internalizing problem behavior. *Child Development*, *72*(4), 1112-1134.

Gao, W., Paterson, J., Abbott, M., Carter, S., & Iusitini, L. (2007). Maternal Mental Health and Child Behaviour Problems at 2 Years: Findings from the Pacific Islands Families Study. *Australian & New Zealand Journal of Psychiatry, 41*(11), 885-895. doi: 10.1080/00048670701634929

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review, 14*(1), 1–27.

Grant, K. E., Compas, B. E., Thurm, A. E., McMahon, S. D., Gipson, P. Y., Campbell, A. J., Krochock, K., & Westerholm, R. I. (2006, 2006/05/01/). Stressors and child and adolescent psychopathology: Evidence of moderating and mediating effects. *Clinical Psychology Review, 26*(3), 257-283. https://doi.org/10.1016/j.cpr.2005.06.011

Growing Up in New Zealand. (2020). *External Data Release 2020 Data User Guide*. https://www.growingup.co.nz/sites/growingup.co.nz/files/documents/DCW8%20Data%20User%20Guide%20Final%20September%202020.pdf

Haker, M., Peper, J., Haagen, M., Heesen, C., & Rahn, A. C. (2022). The Psychosocial Impact of Parental Multiple Sclerosis on Children and Adolescents: A Systematic Review. *International Journal of MS Care*. https://doi.org/10.7224/1537-2073.2021-075

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Publications.

Kroenke, K., & Spitzer, R. L. (2002). The PHQ–9: A new depression diagnostic and severity measure. *Psychiatric Annals, 32*, 509–515. doi:10.3928/00485713-20020901-06

Martin, A. J. (2003). The relationship between parents' enjoyment of parenting and children's school motivation. *Journal of Psychologists and Counsellors in Schools, 13*(2), 115-132.

Masarik, A. S., & Conger, R. D. (2017, 2017/02/01/). Stress and child development: a review of the Family Stress Model. *Current Opinion in Psychology, 13*, 85-90. https://doi.org/10.1016/j.copsyc.2016.05.008

MacKinnon, N., Kingsbury, M., Mahedy, L., Evans, J., & Colman, I. (2018). The association between prenatal stress and externalizing symptoms in childhood: Evidence from the avon longitudinal study of parents and children. *Biological Psychiatry*, *83*(2), 100-108.

Ministry of Health. (2021). *New Zealand Health Survey: Annual Data Explorer 2020/2021*. https://minhealthnz.shinyapps.io/nz-health-survey-2020-21-annual-data-explorer/

Möller, B., Barkmann, C., Krattenmacher, T., Kühne, F., Bergelt, C., Beierlein, V., ... & Romer, G. (2014). Children of cancer patients: prevalence and predictors of emotional and behavioral problems. *Cancer, 120*(15), 2361-2370.

Morris, J. N., Martini, A., & Preen, D. (2016). The well-being of children impacted by a parent with cancer: an integrative review. *Supportive Care in Cancer, 24*(7), 3235-3251. doi: 10.1007/s00520-016-3214-2

Mühlenweg, A. M., Westermaier, F. G., & Morefield, B. (2016). Parental health and child behavior: Evidence from parental health shocks. *Review of Economics of the Household, 14*(3), 577-598. doi: 10.1007/s11150-015-9284-y

OECD (2021), *Health at a Glance 2021: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en.

Pakenham, K. I., & Cox, S. (2014). The Effects of Parental Illness and Other Ill Family Members on the Adjustment of Children. *Annals of Behavioral Medicine, 48*(3), 424-437. https://doi.org/10.1007/s12160-014-9622-y

Paterson, G., & Sanson, A. (1999). The association of behavioural adjustment to temperament, parenting and family characteristics among 5-year-old children. *Social Development, 8*(3), 293-309.

Purc-Stephenson, R., & Lyseng, A. (2016). How are the kids holding up? A systematic review and meta-analysis on the psychosocial impact of maternal breast cancer on children. *Cancer Treatment Reviews, 49*, 45-56. https://doi.org/10.1016/j.ctrv.2016.07.005

Rainville, F., Dumont, S., Simard, S., & Savard, M.-H. (2012). Psychological distress among adolescents living with a parent with advanced cancer. *Journal of Psychosocial Oncology, 30*(5), 519–534. https://doi.org/10.1080/07347332.2012.703765

Sieh, D. S., Meijer, A. M., Oort, F. J., Visser-Meily, J. M. A., & Van der Leij, D. A. V. (2010). Problem Behavior in Children of Chronically Ill Parents: A Meta-Analysis. *Clinical Child and Family Psychology Review, 13*(4), 384-397. doi: 10.1007/s10567-010-0074-z

Smithers, L. G., Sawyer, A. C., Chittleborough, C. R., Davies, N. M., Davey Smith, G., & Lynch, J. W. (2018). A systematic review and meta-analysis of effects of early life non-cognitive skills on academic, psychosocial, cognitive and health outcomes. *Nature Human Behaviour*, *2*(11), 867-880.

Stanley, J., Semper, K., Millar, E., & Sarfati, D. (2018). Epidemiology of multimorbidity in New Zealand: a cross-sectional study using national-level hospital and pharmaceutical data. *BMJ Open*, *8*(5), e021689.

Statistics New Zealand. (2014). *Disability survey: 2013*. Statistics New Zealand. https://www.stats.govt.nz/information-releases/disability-survey-2013

Umberger, W. (2014). Children of Parents With Chronic Noncancer Pain: A Comprehensive Review of the Literature. *Journal of Child and Adolescent Psychiatric Nursing, 27*(1), 26-34. doi: https://doi.org/10.1111/jcap.12055

Visser, A., Huizinga, G. A., van der Graaf, W. T. A., Hoekstra, H. J., & Hoekstra-Weebers, J. E. H. M. (2004). The impact of parental cancer on children and the family: a review of the literature. *Cancer Treatment Reviews, 30*(8), 683-694. doi: https://doi.org/10.1016/j.ctrv.2004.06.001

Visser, A., Huizinga, G. A., Hoekstra, H. J., Ta Van Der Graaf, W., Gazendam-Donofrio, S. M., & Ehm Hoekstra-Weebers, J. (2007). Emotional and behavioral problems in children of parents recently diagnosed with cancer: A longitudinal study. *Acta Oncologica, 46*(1), 67-76. https://doi.org/10.1080/02841860600949560

Vostanis, P. (2006). Strengths and Difficulties Questionnaire: research and clinical applications. *Current Opinion in Psychiatry*, *19*(4), 367-372.

Watson, M., St. James-Roberts, I., Ashley, S., Tilney, C., Brougham, B., Edwards, L., Baldus, C., & Romer, G. (2006). Factors associated with emotional and behavioural problems among school age children of breast cancer patients. *British Journal of Cancer, 94*(1), 43-50. https://doi.org/10.1038/sj.bjc.6602887

Woerner, W., Fleitlich-Bilyk, B., Martinussen, R., Fletcher, J., Cucchiaro, G., Dalgalarrondo, P., ... & Tannock, R. (2004). The Strengths and Difficulties Questionnaire overseas: evaluations and applications of the SDQ beyond Europe. *European Child & Adolescent Psychiatry*, *13*, ii47-ii54.

Zhao, X., Lynch Jr, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37*(2), 197-206.

Appendix

Table 1A. Parenting variables and items included in the positive parenting index.

Variable (wave)	Item
Interest with the baby (9 months)	I say nice things about my baby [babies]
	I take an active interest in my baby [babies
	I am interested in the things my baby does [babies do]
	I praise my baby when he/she deserves it [babies when they deserve it]
	I enjoy having my baby [babies] around me
	I tell my baby how proud I am of him/her when he/she is good [babies how proud I am of them when they are good]
	I make my baby [babies] feel proud when he/she does [they do] well
	I talk to my baby [babies] in a warm and affectionate way
	I make my baby [babies] feel what he/she does [they do] is important
	I pay a lot of attention to my baby [babies]
	I try to make my baby [babies] happy
	I like to spend time with my baby [babies]
Parenting confidence (age 2)	We would like to know how you feel about being a parent. Overall, do you feel that as a parent you are: (Not very good at being a parent; A person who has some trouble being a parent; An average parent; A better than average parent; A very good parent)
Parenting enjoyment (age 2)	On the whole, I enjoy being a parent
	Being a parent is very satisfying
	On the whole, my child is/children are easy to parent
	On the whole, it's good to be a parent
Authoritarian parenting (age 5)	Children should obey their parents?
	Parents should teach their children to behave properly?
	Children should not talk back to their parents?
	It is a child's responsibility to look after the parents when they need help?
	Parents always know what is best?
Hostile parenting (age 5)	I guide {him/her} by punishment more than by reason
	I smack {him/her} when {he/she} is disobedient
	I grab {him/her} when {he/she} is being disobedient
	I use physical punishment as a way of disciplining {him/her}
	I argue with {him/her}
	I yell or shout when {he/she} misbehaves
	I explode with anger at {him/her}
	I disagree with {him/her}
Warm parenting (age 5)	I encourage {him/her} to talk about {his/her} troubles
	I give praise when {he/she} is good
	I show sympathy if {he/she} is hurt or frustrated
	I give comfort and understanding when {he/she} is upset
	I am responsive to {his/her} feelings and needs
	I tell {him/her} that I appreciate what they try to accomplish express affection by hugging, kissing, and holding {him/her}
	I apologise to {him/her} when I make a mistake in parenting
Parenting efficacy (age 5)	I find it difficult to discipline {him/her}

	I am afraid that disciplining my child for misbehaviour will cause {him/her} to not like me
	I threaten {him/her} with punishment more often than actually giving it
	I set strict, well-established rules for {him/her}
	I am unsure of how to solve {his/her} misbehaviour
Hostile parenting (age 8)	I have lost my temper with {NAME}
	I have raised my voice and have shouted at {NAME}
	I have been angry with {NAME}
	When {NAME} cries, {HE/SHE} gets on my nerves
Parenting efficacy (age 8)	Does {NAME} behave in a manner different from the way you want {HIM/HER} to?
	Do you think that {NAME}'s behaviour is more than you can handle?
	Do you feel that you are in control and on top of things when you are caring for {NAME}?
	Do you feel you are good at getting {NAME} to do what you want {HIM/HER} to do?
Parenting consistency (age 8)	When you give {NAME} an instruction or make a request to do something, how often do you make sure that {HE/SHE} does it?
	How often does {NAME} get away with things that you feel should have been disciplined?
	If you tell {NAME} that {HE/SHE} will be disciplined if {HE/SHE} doesn't stop doing something, but {HE/SHE} keeps doing it, how often will you discipline {HIM/HER}?
	When you discipline {NAME}, how often does {HE/SHE} ignore it?
	How often is {NAME} able to get out of discipline when {HE/SHE} really sets {HIS/HER} mind to it?
	How often do you think the level of discipline you give {NAME} depends on your mood?
Warm parenting (age 8)	How often do you express affection by hugging, kissing, holding {NAME}?
	How often do you hug or hold {NAME} for no particular reason?
	How often do you have warm, close times together with {NAME}?
	How often do you feel close to {NAME} both when {HE/SHE} is happy and upset?
	How often do you enjoy listening to {NAME} and doing things with {HIM/HER}?
	How often do you tell {NAME} how happy {HE/SHE} makes you?

Table 2A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates, and child SDQ scores and positive parenting at age 2 years, including missing codes.*

Age 2 years	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	−0.025	0.046	0.036	−0.013	−0.028	0.017	−0.060**
	(0.039)	(0.040)	(0.039)	(0.039)	(0.041)	(0.037)	(0.017)
Age	−0.058*	−0.057*	−0.014	−0.064**	−0.001	−0.071**	0.011)
	(0.023)	(0.024)	(0.023)	(0.024)	(0.024)	(0.022)	(0.010)
Age²	0.000	0.001	0.000	0.001*	0.000	0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BMI (Ref: Normal)							
(Missing)	0.204***	0.172***	0.262***	0.104*	0.018	0.266***	0.040+
	(0.046)	(0.048)	(0.046)	(0.047)	(0.048)	(0.044)	(0.021)
Underweight	−0.018	0.020	0.240**	0.018	0.102	0.083	0.006
	(0.074)	(0.078)	(0.075)	(0.076)	(0.078)	(0.071)	(0.034)
Overweight	0.075*	0.053	0.001	−0.015	−0.013	0.046	−0.006
	(0.034)	(0.036)	(0.034)	(0.035)	(0.036)	(0.033)	(0.016)
Obese	0.164***	0.073+	0.096*	−0.052	0.037	0.107**	−0.024
	(0.039)	(0.041)	(0.039)	(0.040)	(0.041)	(0.037)	(0.018)
Rurality (Ref: Urban)	−0.103*	−0.101*	−0.236***	−0.105*	−0.022	−0.189***	−0.046*
	(0.046)	(0.049)	(0.047)	(0.048)	(0.049)	(0.044)	(0.021)
Maternal relationship status (Ref: Partnered)	0.152**	0.017	0.046	−0.010	0.058	0.076	−0.034
	(0.050)	(0.052)	(0.050)	(0.051)	(0.052)	(0.048)	(0.023)
Child gender (Ref: Girl)	−0.015	0.182***	−0.046+	0.103***	−0.219***	0.089***	−0.002
	(0.026)	(0.027)	(0.026)	(0.026)	(0.027)	(0.025)	(0.012)
Maternal depression	0.129**	0.101*	0.247	0.102*	−0.023	0.202***	−0.139***
	(0.041)	(0.043)	(0.041)	(0.042)	(0.043)	(0.039)	(0.019)
(Missing)	0.092*	−0.001	0.044	0.010	−0.045	0.052	0.014
	(0.039)	(0.041)	(0.039)	(0.040)	(0.041)	(0.037)	(0.018)
Household income (Ref: $50–70,000)							
(Missing)	0.051	0.092	0.051	0.109+	−0.072	0.109*	0.011
	(0.057)	(0.060)	(0.057)	(0.058)	(0.060)	(0.054)	(0.026)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
< $20,000	0.064	0.087	0.291**	0.281**	−0.133	0.243**	−0.100*
	(0.085)	(0.089)	(0.086)	(0.087)	(0.090)	(0.082)	(0.039)
$20–30,000	0.028	0.014	0.134*	0.211**	−0.001	0.127*	−0.080**
	(0.066)	(0.069)	(0.066)	(0.067)	(0.069)	(0.063)	(0.030)
$30–50,000	0.093*	0.066	0.083+	0.125**	−0.070	0.129**	−0.017
	(0.045)	(0.048)	(0.046)	(0.047)	(0.048)	(0.043)	(0.021)
$70–100,000	−0.029	−0.025	−0.066	−0.030	−0.009	−0.052	−0.017
	(0.044)	(0.046)	(0.044)	(0.045)	(0.046)	(0.042)	(0.020)
$100–150,000	0.015	−0.045	−0.096*	−0.082+	−0.018	−0.070	0.014
	(0.046)	(0.048)	(0.046)	(0.047)	(0.048)	(0.044)	(0.021)
>$150,000	0.036	−0.038	−0.115*	−0.103*	−0.036	−0.072	0.053*
	(0.050)	(0.053)	(0.051)	(0.052)	(0.053)	(0.048)	(0.023)
Education (Ref: Secondary school)							
No secondary school	0.312***	0.038	0.112+	0.216***	−0.049	0.240***	−0.037
	(0.059)	(0.062)	(0.060)	(0.061)	(0.062)	(0.057)	(0.027)
Diploma/Trade	0.027	0.018	−0.065+	0.049	0.024	0.013	0.026
	(0.036)	(0.038)	(0.036)	(0.037)	(0.038)	(0.034)	(0.016)
Bachelor	−0.134**	−0.076+	−0.158***	−0.086*	−0.027	−0.160***	−0.006
	(0.040)	(0.042)	(0.041)	(0.041)	(0.042)	(0.039)	(0.018)
Higher degree	−0.231***	−0.132**	−0.136**	−0.088+	0.018	−0.214***	−0.017
	(0.046)	(0.048)	(0.046)	(0.047)	(0.048)	(0.044)	(0.021)
NZ Deprivation Index 2013	0.026***	0.013*	0.026***	0.033***	−0.011+	0.034***	0.005*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.002)
Co-residential siblings	0.071***	−0.008	0.056**	0.024	−0.035*	0.049**	0.016*
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)	(0.008)
Birth order	0.000	−0.006	−0.017	0.017	0.016	−0.003	−0.004
	(0.012)	(0.013)	(0.012)	(0.012)	(0.013)	(0.012)	(0.006)
Positive parenting index	−0.439***	−0.441***	−0.138***	−0.265***	0.526***	−0.480***	–
	(0.031)	(0.033)	(0.031)	(0.032)	(0.033)	(0.030)	–

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates, and child SDQ scores and positive parenting at age 5 years, including missing codes.*

Age 5 years	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	0.023	–0.032	0.025	–0.010	0.033	–0.002	–0.096***
Maternal illness/disability	(0.040)	(0.039)	(0.039)	(0.038)	(0.040)	(0.037)	(0.024)
	0.004	–0.051*	–0.047+	–0.094***	–0.031	–0.070**	0.027+
Age	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)	(0.024)	(0.015)
	0.000	0.001	0.000	0.001**	0.000	0.001*	0.000+
Age²	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BMI (Ref: Normal)							
	0.165**	0.164**	0.262***	0.142**	0.005	0.277***	0.105***
(Missing)	(0.049)	(0.048)	(0.048)	(0.047)	(0.049)	(0.046)	(0.029)
	–0.067	–0.114	–0.039	0.103)	0.027	–0.064	–0.034
Underweight	(0.079)	(0.077)	(0.077)	(0.076)	(0.078)	(0.073)	(0.047)
	0.002	0.070*	0.000)	–0.025	0.092**	0.030	–0.024
Overweight	(0.035)	(0.035)	(0.035)	(0.034)	(0.035)	(0.033)	(0.021)
	0.093*	0.173***	0.073+	0.058	0.073+	0.162***	–0.012
Obese	(0.041)	(0.040)	(0.040)	(0.039)	(0.041)	(0.038)	(0.024)
	–0.044	–0.002	–0.155**	–0.081+	0.054	–0.099*	–0.068*
Rurality (Ref: Urban)	(0.048)	(0.047)	(0.047)	(0.046)	(0.048)	(0.045)	(0.029)
Maternal relationship status (Ref: Partnered)	0.125*	0.073)	0.104*	0.095+	0.033	0.143**	–0.039
	(0.052)	(0.051)	(0.051)	(0.050)	(0.052)	(0.048)	(0.031)
	–0.432	–0.302	–0.514	–0.267	–0.486	–0.625+	–1.631***
(Missing)	(0.392)	(0.387)	(0.420)	(0.378)	(0.427)	(0.365)	(0.234)
	0.128***	0.246***	–0.069**	–0.013	–0.349***	0.132***	0.000
Child gender (Ref: Girl)	(0.027)	(0.026)	(0.026)	(0.026)	(0.027)	(0.025)	(0.016)
	0.457***	0.341***	0.543***	0.316***	–0.011	0.617***	–0.199
Maternal depression	(0.051)	(0.050)	(0.050)	(0.049)	(0.050)	(0.047)	(0.030)
Household income (Ref: $50–70,000)							
	–0.039	0.047	0.123*	0.154**	–0.013	0.104*	0.051
(Missing)	(0.053)	(0.053)	(0.052)	(0.051)	(0.053)	(0.049)	(0.032)

< $20,000	−0.024	0.063	0.068	−0.074	−0.190	0.031	−0.124
	(0.136)	(0.134)	(0.133)	(0.131)	(0.135)	(0.126)	(0.081)
$20–30,000	0.066	0.012	0.123	0.110	0.045	0.106	0.000
	(0.091)	(0.089)	(0.089)	(0.087)	(0.090)	(0.084)	(0.054)
$30–50,000	0.080	0.135*	0.066	0.089+	−0.071	0.145**	0.001
	(0.056)	(0.055)	(0.055)	(0.054)	(0.056)	(0.052)	(0.033)
$70–100,000	−0.028	(0.025	−0.087+	−0.005	0.000	−0.032	0.014
	(0.048)	(0.048)	(0.047)	(0.046)	(0.048)	(0.045)	(0.029)
$100–150,000	−0.070	−0.009	−0.070	−0.034	0.057	−0.063	0.073*
	(0.049)	(0.048)	(0.048)	(0.047)	(0.049)	(0.045)	(0.029)
>$150,000	−0.031	−0.008	−0.125*	−0.056	0.059	−0.078	0.057+
	(0.052)	(0.051)	(0.051)	(0.050)	(0.052)	(0.048)	(0.031)
Education (Ref: Secondary school)							
No secondary school	0.088	0.119+	0.061)	−0.009	0.048	0.108+	−0.036
	(0.064)	(0.063)	(0.063)	(0.062)	(0.064)	(0.059)	(0.038)
Diploma/Trade	0.003	−0.019	0.018	0.001	0.007	−0.002	0.037
	(0.038)	(0.037)	(0.037)	(0.036)	(0.038)	(0.035)	(0.023)
Bachelor	−0.167***	−0.231***	−0.070+	−0.173***	−0.078+	−0.244***	−0.052*
	(0.042)	(0.041)	(0.041)	(0.040)	(0.042)	(0.039)	(0.025)
Higher degree	−0.172***	−0.293***	0.021	−0.151**	−0.011	−0.234***	−0.077+
	(0.047)	(0.046)	(0.046)	(0.045)	(0.047)	(0.044)	(0.028)
NZ Deprivation Index 2013	0.012*	0.020***	0.024***	0.031***	−0.016**	0.032***	0.010**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
Co-residential siblings	0.020	−0.032*	0.048**	−0.003	−0.034*	0.008	0.012
	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)	(0.009)
Birth order	−0.001	−0.002	−0.001	0.006	−0.007	0.000	0.005
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.007)
Positive parenting index	−0.272***	−0.190***	−0.058*	0.128***	0.448***	−0.166***	
	(0.024)	(0.023)	(0.023)	(0.023)	(0.024)	(0.022)	

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates, and child SDQ scores and positive parenting at age 8 years, including missing codes.*

Age 8 years	Conduct Problems	Hyperactivity-Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	0.180***	0.053	0.109*	0.091*	0.029	0.153**	−0.055
	(0.047)	(0.047)	(0.046)	(0.044)	(0.045)	(0.044)	(0.038)
Age	−0.030	0.001	0.025	−0.065+	−0.055	−0.023	0.060+
	(0.040)	(0.040)	(0.039)	(0.037)	(0.038)	(0.037)	(0.032)
Age²	0.000	0.000	0.000	0.001	0.001	0.000	−0.001+
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BMI (Ref: Normal)							
(Missing)	0.166*	0.128*	0.163*	0.269***	−0.022	0.275***	−0.017
	(0.065)	(0.065)	(0.063)	(0.061)	(0.062)	(0.061)	(0.052)
Underweight	−0.094	−0.044	−0.138	−0.150+	0.137	−0.166+	−0.063
	(0.095)	(0.095)	(0.092)	(0.088)	(0.091)	(0.089)	(0.076)
Overweight	0.052	0.049	−0.015	−0.006	0.051	0.021	−0.026
	(0.041)	(0.041)	(0.040)	(0.038)	(0.039)	(0.039)	(0.033)
Obese	0.116*	0.060	0.095*	0.302***	−0.027	0.221***	−0.035
	(0.049)	(0.049)	(0.047)	(0.045)	(0.047)	(0.046)	(0.039)
Rurality (Ref: Urban)	0.038	−0.115*	−0.051	−0.023	0.065	−0.064	0.020
	(0.053)	(0.053)	(0.052)	(0.050)	(0.051)	(0.050)	(0.043)
Maternal relationship status (Ref: Partnered)	0.039	−0.105+	0.063	0.089	−0.040	0.040	0.008
	(0.058)	(0.058)	(0.057)	(0.054)	(0.056)	(0.055)	(0.047)
(Missing)	0.199	0.097	−0.025	0.063	−0.128	0.100	−0.291*
	(0.142)	(0.142)	(0.139)	(0.133)	(0.136)	(0.134)	(0.114)
Child gender (Ref: Girl)	0.135***	0.155***	−0.085**	0.084**	−0.348***	0.085**	−0.044+
	(0.032)	(0.032)	(0.031)	(0.030)	(0.030)	(0.030)	(0.025)
Maternal depression	0.439***	0.214**	0.590***	0.316***	0.000	0.593***	−0.236***
	(0.068)	(0.068)	(0.067)	(0.064)	(0.065)	(0.064)	(0.055)
Household income (Ref: $50–70,000)							
(Missing)	0.057	0.137*	0.073	0.121+	−0.201**	0.147*	−0.075
	(0.069)	(0.069)	(0.067)	(0.064)	(0.066)	(0.065)	(0.055)

	0.336**	0.343**	0.088	0.334**	−0.362***	0.386***	−0.119
< $20,000	(0.106)	(0.106)	(0.103)	(0.099)	(0.102)	(0.100)	(0.085)
	0.143)	0.016	−0.111	0.182+	−0.108	0.067	−0.018
$20–30,000	(0.115)	(0.116)	(0.113)	(0.108)	(0.111)	(0.109)	(0.093)
	0.007	−0.021	−0.059	0.058	−0.127+	−0.008	−0.062
$30–50,000	(0.077)	(0.078)	(0.075)	(0.072)	(0.074)	(0.073)	(0.062)
	0.006	−0.001	−0.080	−0.066	−0.151*	−0.064	0.051
$70–100,000	(0.064)	(0.064)	(0.063)	(0.060)	(0.062)	(0.061)	(0.052)
	0.018	−0.062	−0.084	−0.089	−0.076	−0.093	0.208***
$100–150,000	(0.063)	(0.063)	(0.061)	(0.059)	(0.060)	(0.059)	(0.050)
	−0.026	−0.042)	−0.117+	−0.136*	−0.127*	−0.132*	0.188***
>$150,000	(0.063)	(0.063)	(0.062)	(0.059)	(0.061)	(0.060)	(0.051)
Education (Ref: Secondary school)							
	−0.030	−0.125	−0.084	0.109	−0.077	−0.045	0.028
No secondary school	(0.087)	(0.087)	(0.084)	(0.081)	(0.083)	(0.082)	(0.069)
	−0.062	−0.001	−0.062	0.023)	0.026	−0.036	0.104**
Diploma/Trade	(0.046)	(0.047)	(0.045)	(0.043)	(0.045)	(0.044)	(0.037)
	−0.047	−0.080	−0.084+	−0.071	−0.032	−0.109*	0.019
Bachelor	(0.049)	(0.049)	(0.048)	(0.046)	(0.047)	(0.046)	(0.039)
	−0.047	−0.002	−0.063	−0.044	−0.009	−0.060	−0.035
Higher degree	(0.055)	(0.055)	(0.054)	(0.051)	(0.053)	(0.052)	(0.044)
	−0.011+	0.008	−0.003	0.020**	−0.012*	0.007	−0.006
NZ Deprivation Index 2013	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
	0.013	−0.005	−0.081***	−0.031+	0.016	−0.049**	−0.028+
Co-residential siblings	(0.019)	(0.019)	(0.018)	(0.017)	(0.018)	(0.018)	(0.015)
	−0.004	−0.004	0.015	0.021	−0.045**	0.013	0.010
Birth order	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.012)
	−0.080***	−0.042*	−0.210***	−0.241***	0.353***	−0.233***	
Positive parenting index	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	

$+ p < 0.1$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

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Table 5A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates and child SDQ scores and positive parenting at age 2 years, without missing codes.*

Age 2 years	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	−0.052	0.022	0.010	−0.066	−0.042	−0.029	−0.058**
	(0.044)	(0.048)	(0.043)	(0.045)	(0.047)	(0.042)	(0.020)
Age	−0.055+	−0.061+	−0.013	−0.076*	0.001	−0.075**	0.029*
	(0.029)	(0.032)	(0.029)	(0.030)	(0.032)	(0.028)	(0.013)
Age²	0.000	0.001	0.000	0.001*	0.000	0.001+	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BMI (Ref: Normal)							
Underweight	0.004	0.063	0.247**	0.030	0.137	0.115	−0.017
	(0.080)	(0.086)	(0.077)	(0.081)	(0.085)	(0.075)	(0.036)
Overweight	0.084*	0.052	−0.006	−0.030	−0.016	0.042	−0.016
	(0.037)	(0.039)	(0.036)	(0.037)	(0.039)	(0.035)	(0.017)
Obese	0.167***	0.099*	0.048	−0.045	0.041	0.106**	−0.040*
	(0.043)	(0.046)	(0.041)	(0.043)	(0.046)	(0.040)	(0.020)
Rurality (Ref: Urban)	−0.088+	−0.101+	−0.269***	−0.074	−0.008	−0.184***	−0.017
	(0.052)	(0.056)	(0.050)	(0.053)	(0.056)	(0.049)	(0.024)
Maternal relationship status (Ref: Partnered)	0.073	−0.059	0.032	−0.040	0.067	0.001	0.008
	(0.064)	(0.068)	(0.062)	(0.065)	(0.068)	(0.060)	(0.029)
Child gender (Ref: Girl)	−0.017	0.180***	−0.026	0.128***	−0.220***	0.101***	−0.018
	(0.030)	(0.032)	(0.029)	(0.030)	(0.032)	(0.028)	(0.014)
Maternal depression	0.143***	0.112*	0.263***	0.065	−0.028	0.205***	−0.152***
	(0.046)	(0.049)	(0.044)	(0.046)	(0.049)	(0.043)	(0.021)
Household income (Ref: $50–70,000)							
< $20,000	0.066	0.023	0.245*	0.222*	−0.168	0.184+	−0.115*
	(0.103)	(0.111)	(0.100)	(0.105)	(0.110)	(0.097)	(0.047)
$20–30,000	−0.002	−0.031	0.046	0.176*	0.061	0.057	−0.106**
	(0.080)	(0.086)	(0.078)	(0.082)	(0.086)	(0.076)	(0.037)
$30–50,000	0.118*	0.100+	0.111*	0.104*	−0.061	0.155**	−0.019
	(0.052)	(0.056)	(0.050)	(0.053)	(0.056)	(0.049)	(0.024)

	−0.041	−0.002	−0.062	−0.075	0.002	−0.060	−0.015
$70–100,000	(0.048)	(0.052)	(0.047)	(0.049)	(0.052)	(0.045)	(0.022)
	0.025	−0.020	−0.094+	−0.101*	−0.013	−0.061	0.005
$100–150,000	(0.050)	(0.054)	(0.048)	(0.051)	(0.053)	(0.047)	(0.023)
	0.048	−0.022	−0.127*	−0.160**	−0.028	−0.082	0.054*
>$150,000	(0.055)	(0.059)	(0.053)	(0.056)	(0.059)	(0.052)	(0.025)
Education (Ref: Secondary school)							
	0.299***	0.105	0.127	0.257**	−0.017	0.281***	0.033
No secondary school	(0.082)	(0.088)	(0.079)	(0.083)	(0.087)	(0.077)	(0.037)
	0.003	0.023	−0.029	0.056	0.056	0.019	0.040*
Diploma/Trade	(0.043)	(0.046)	(0.042)	(0.044)	(0.046)	(0.041)	(0.020)
	−0.171***	−0.060	−0.121**	−0.081+	−0.013	−0.155***	−0.009
Bachelor	(0.046)	(0.050)	(0.045)	(0.047)	(0.050)	(0.044)	(0.021)
	−0.271***	−0.132*	−0.099*	−0.076	0.031	−0.214***	−0.012
Higher degree	(0.051)	(0.055)	(0.050)	(0.052)	(0.055)	(0.048)	(0.023)
	0.026***	0.014*	0.022***	0.028***	−0.010	0.032***	0.004
NZ Deprivation Index 2013	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.003)
	0.065**	−0.024	0.040*	−0.005	−0.027	0.026	0.015
Co-residential siblings	(0.020)	(0.021)	(0.019)	(0.020)	(0.021)	(0.019)	(0.009)
	−0.007	−0.007	0.006	0.023	0.001	0.004	−0.007
Birth order	(0.014)	(0.015)	(0.014)	(0.014)	(0.015)	(0.013)	(0.006)
	−0.474***	−0.454***	−0.180***	−0.309***	0.541***	−0.526***	
Positive parenting index	(0.036)	(0.039)	(0.035)	(0.037)	(0.039)	(0.034)	

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates, and child SDQ scores and positive parenting at age 5 years, without missing codes.*

Age 5 years	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	0.045	–0.016	0.043	–0.046	0.022	0.010	–0.093
	(0.043)	(0.044)	(0.042)	(0.040)	(0.044)	(0.040)	(0.026)
Age	0.016	–0.071*	–0.017	–0.080**	–0.051	–0.060*	0.032
	(0.031)	(0.031)	(0.030)	(0.029)	(0.031)	(0.028)	(0.018)
Age²	0.000	0.001+	0.000	0.001*	0.001	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BMI (Ref: Normal)							
Underweight	–0.095	–0.155+	–0.035	0.073	0.041	–0.101	–0.012
	(0.084)	(0.085)	(0.081)	(0.078)	(0.084)	(0.077)	(0.050)
Overweight	–0.006	0.077+	–0.017	–0.037	0.073+	0.020	–0.036
	(0.037)	(0.038)	(0.036)	(0.034)	(0.037)	(0.034)	(0.022)
Obese	0.074+	0.156***	0.027	0.060	0.076+	0.129**	–0.020
	(0.043)	(0.044)	(0.042)	(0.040)	(0.043)	(0.040)	(0.026)
Rurality (Ref: Urban)	–0.042	0.006	–0.178***	–0.081+	0.046	–0.103*	–0.036
	(0.051)	(0.052)	(0.049)	(0.047)	(0.051)	(0.047)	(0.030)
Maternal relationship status (Ref: Partnered)	0.141*	0.109+	0.026	0.077	–0.025	0.130	–0.016
	(0.062)	(0.063)	(0.060)	(0.057)	(0.063)	(0.057)	(0.037)
Child gender (Ref: Girl)	0.107***	0.238***	–0.070*	0.004	–0.356***	0.126***	–0.001
	(0.030)	(0.030)	(0.029)	(0.027)	(0.030)	(0.027)	(0.018)
Maternal depression	0.425***	0.348***	0.566***	0.337***	0.071	0.625***	–0.201
	(0.060)	(0.061)	(0.057)	(0.055)	(0.060)	(0.055)	(0.035)
Household income (Ref: $50–70,000)							
< $20,000	0.059	–0.004	0.133	0.030	–0.158	0.078	–0.083
	(0.152)	(0.154)	(0.146)	(0.140)	(0.152)	(0.139)	(0.090)
$20–30,000	0.131	0.043	0.104	0.196*	0.073	0.159+	–0.036
	(0.101)	(0.102)	(0.097)	(0.093)	(0.101)	(0.093)	(0.060)
$30–50,000	0.051	0.116	0.085	0.098+	–0.049	0.136*	–0.021
	(0.061)	(0.061)	(0.058)	(0.056)	(0.061)	(0.056)	(0.036)

	−0.027	0.022	−0.076	−0.006	−0.001	−0.028	0.014
$70–100,000	(0.051)	(0.051)	(0.049)	(0.047)	(0.051)	(0.047)	(0.030)
	−0.091+	−0.017	−0.085+	−0.053	0.069	−0.084+	0.082
$100–150,000	(0.051)	(0.052)	(0.049)	(0.047)	(0.051)	(0.047)	(0.030)
	−0.041	−0.014	−0.154**	−0.076	0.059	−0.101*	0.060
>$150,000	(0.054)	(0.055)	(0.052)	(0.050)	(0.055)	(0.050)	(0.032)
Education (Ref: Secondary school)							
	−0.014	0.078	0.096	−0.039	0.001	0.063	−0.039
No secondary school	(0.085)	(0.086)	(0.081)	(0.078)	(0.085)	(0.078)	(0.050)
	−0.049	−0.034	0.039	0.008	0.016	−0.014	0.051
Diploma/Trade	(0.044)	(0.044)	(0.042)	(0.040)	(0.044)	(0.040)	(0.026)
	−0.212***	−0.217***	−0.045	−0.165***	−0.090+	−0.239***	−0.062
Bachelor	(0.046)	(0.047)	(0.044)	(0.043)	(0.046)	(0.042)	(0.027)
	−0.231***	−0.295***	0.051	−0.156**	−0.024	−0.243***	−0.075
Higher degree	(0.051)	(0.052)	(0.049)	(0.047)	(0.051)	(0.047)	(0.030)
	0.008	0.019**	0.016**	0.026***	−0.013*	0.026***	0.009
NZ Deprivation Index 2013	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.003)
	0.019	−0.052**	0.021	−0.018	−0.039*	−0.017	0.016
Co-residential siblings	(0.017)	(0.017)	(0.016)	(0.016)	(0.017)	(0.016)	(0.010)
	−0.011	0.002	−0.006	0.007	−0.013	−0.003	−0.002
Birth order	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.013)	(0.008)
	−0.290***	−0.228***	−0.110***	0.120***	0.453***	−0.214***	
Positive parenting index	(0.027)	(0.027)	(0.026)	(0.025)	(0.027)	(0.025)	

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7A. *Full regression coefficients for models estimating the relationship between maternal illness/disability, all covariates, and child SDQ scores and positive parenting at age 8 years, without missing codes.*

Age 8 years	Conduct Problems	Hyperactivity -Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ	Positive parenting
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Maternal illness/disability	0.195***	0.043	0.090+	0.056	0.062	0.130**	−0.066+
	(0.050)	(0.050)	(0.049)	(0.047)	(0.049)	(0.047)	(0.039)
Age	−0.036	0.019	0.010	−0.107*	−0.071	−0.043	0.079*
	(0.046)	(0.046)	(0.046)	(0.043)	(0.045)	(0.043)	(0.036)
Age²	0.000	0.000	0.000	0.001*	0.001+	0.000	−0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
BMI (Ref: Normal)							
Underweight	−0.076	0.026	−0.141	−0.189*	0.181+	−0.155	−0.063
	(0.100)	(0.102)	(0.100)	(0.094)	(0.098)	(0.095)	(0.080)
Overweight	0.063	0.063	−0.011	−0.020	0.061	0.025	−0.021
	(0.042)	(0.042)	(0.042)	(0.039)	(0.041)	(0.040)	(0.033)
Obese	0.125*	0.074	0.108*	0.289***	−0.008	0.228***	−0.032
	(0.050)	(0.051)	(0.050)	(0.047)	(0.049)	(0.047)	(0.040)
Rurality (Ref: Urban)	0.023	−0.079	−0.029	0.019	0.074	−0.027	0.016
	(0.056)	(0.057)	(0.056)	(0.053)	(0.055)	(0.053)	(0.045)
Maternal relationship status (Ref: Partnered)	−0.034	−0.126+	0.007	0.035	0.042	−0.035	0.001
	(0.068)	(0.068)	(0.067)	(0.064)	(0.066)	(0.064)	(0.054)
Child gender (Ref: Girl)	0.104**	0.103**	−0.087*	0.065	−0.352***	0.049	−0.048+
	(0.034)	(0.034)	(0.034)	(0.032)	(0.033)	(0.032)	(0.027)
Maternal depression	0.425***	0.216**	0.644***	0.348***	−0.009	0.628***	−0.251***
	(0.073)	(0.074)	(0.073)	(0.069)	(0.072)	(0.069)	(0.058)
Household income (Ref: $50–70,000)							
< $20,000	0.362**	0.321**	0.105	0.397***	−0.315**	0.419***	−0.179+
	(0.118)	(0.120)	(0.118)	(0.111)	(0.116)	(0.112)	(0.094)
$20–30,000	0.146	−0.077	−0.072	0.143	−0.152	0.037	−0.011
	(0.120)	(0.121)	(0.119)	(0.113)	(0.117)	(0.113)	(0.095)
$30–50,000	−0.041	0.018	−0.104	0.057	−0.162*	−0.029	−0.045
	(0.080)	(0.081)	(0.080)	(0.075)	(0.079)	(0.076)	(0.064)

	−0.023	−0.008	−0.089	−0.081	−0.150*	−0.084	0.095+
$70–100,000	(0.066)	(0.067)	(0.066)	(0.062)	(0.064)	(0.062)	(0.052)
	−0.032	−0.057	−0.098	−0.111+	−0.049	−0.120*	0.218***
$100–150,000	(0.064)	(0.065)	(0.064)	(0.061)	(0.063)	(0.061)	(0.051)
	−0.085	−0.056	−0.121+	−0.152*	−0.108+	−0.161**	0.206***
>$150,000	(0.065)	(0.066)	(0.065)	(0.061)	(0.064)	(0.061)	(0.052)
Education (Ref: Secondary school)							
	−0.163	−0.142	−0.109	0.110	−0.044	−0.096	−0.029
No secondary school	(0.110)	(0.111)	(0.110)	(0.104)	(0.108)	(0.104)	(0.088)
	−0.048	−0.008	−0.046	0.054	−0.012	−0.014	0.134**
Diploma/Trade	(0.051)	(0.052)	(0.051)	(0.048)	(0.050)	(0.048)	(0.041)
	−0.019	−0.088+	−0.082	−0.083+	−0.053	−0.108*	0.015
Bachelor	(0.052)	(0.053)	(0.052	(0.049	(0.051)	(0.049)	(0.042)
	−0.027	−0.007	−0.081	−0.081	−0.024	−0.080	−0.028
Higher degree	(0.058)	(0.059)	(0.058	(0.055	(0.057)	(0.055)	(0.046)
	−0.018**	0.002	−0.002	0.013*	−0.010	0.000	−0.003
NZ Deprivation Index 2013	(0.007)	(0.007)	(0.007	(0.006	(0.006)	(0.006)	(0.005)
	0.022	−0.017	−0.083***	−0.052**	0.028	−0.060**	−0.022
Co-residential siblings	(0.021)	(0.021)	(0.020	(0.019	(0.020)	(0.019)	(0.016)
	−0.001	0.004	0.011	0.017	−0.046**	0.013	0.003
Birth order	(0.016)	(0.016)	(0.016	(0.015	(0.016)	(0.015)	(0.013)
	−0.064**	−0.040+	−0.212***	−0.226***	0.353***	−0.223***	
Positive parenting index	(0.023)	(0.023)	(0.023	(0.021	(0.022)	(0.021)	

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8A. *Indirect effects of maternal illness/disability and child SDQ scores for age 2, 5, and 8, estimated without missing codes.*

Indirect effect	Conduct Problems	Hyperactivity-Inattention	Emotional Symptoms	Peer Problems	Prosociality	Total SDQ
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
	(1)	(2)	(3)	(4)	(5)	(6)
	0.027**	0.026**	0.010*	0.018**	–0.031**	0.030**
Maternal illness/disability (age 2)	(0.010)	(0.010)	(0.004)	(0.007)	(0.011)	(0.011)
	0.027**	0.021**	0.010**	–0.011**	–0.042***	0.020**
Maternal illness/disability (age 5)	(0.008)	(0.006)	(0.004)	(0.004)	(0.012)	(0.006)
	0.004	0.003	0.014+	0.015+	–0.023+	0.015+
Maternal illness/disability (age 8)	(0.003)	(0.002)	(0.008)	(0.009)	(0.014)	(0.009)

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$