

**The influences of social
connectedness on behaviour in
young children:
A longitudinal investigation
using GUiNZ data**

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**MINISTRY OF SOCIAL
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TE MANATŪ WHAKAHIATO ORA



TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI

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Disclaimer

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Executive Summary

The Growing up in New Zealand (GUiNZ) longitudinal study of more than 6800 children and families/whanau started in 2009. The study began collecting data from families in the antenatal period and was followed by several more substantive data collection waves, of which the most recent (at December 2018) was when the children were 4.5 years old.

Our research investigated how diverse New Zealand families, particularly those who experience risk factors, nurture the next generation of children. In this vein, we analysed data concerning the impact of early family vulnerability and family transitions on the developmental outcomes of the children in the GUiNZ sample. We expected to find that children who have higher levels of risk factors early in life (greater antenatal vulnerability and those who experience instability in the main caregiver relationship) would report higher levels of difficulties in childhood including increased problem behaviours (externalising, such as getting into fights, and internalising, such as anxiety and depression) and lower levels of positive or prosocial behaviours (such as being kind and considerate towards others).

Further, we sought to identify potential protective factors that might mitigate against these potential negative impacts, namely the degree to which the family is internally supportive and caring (*family connectedness*) and embedded in functional community organisations (*community connectedness*). It was expected that greater family connectedness and community caring resources would buffer/lessen the expected ill effects of vulnerability and family instability.

Key findings

Main effect findings

- Higher levels of vulnerability in the antenatal period (defined by a composite indicator comprised of maternal education, maternal depression, household overcrowding, household income, household deprivation, and financial stress) were found to predict higher levels of externalising and internalising behaviour, higher levels of illness and developmental problems, and lower levels of prosocial behaviour. In usual psychological usage, 'externalising' behaviours refer to expressions of anger such as fighting, yelling at others, and destruction of property, whereas internalising behaviour refers to inward expressions of dysfunction such as anxious and depressive symptoms.

- Children raised in families that had experienced relationship transition(s) (defined by a derived set of indicators representing change in relationship status of main caregiver as captured at each of the data collection waves) also reported higher externalising and internalising behaviour, and lower prosocial behaviour.

And, as expected, children raised in families marked by higher levels of family connectedness generally showed lower problem behaviours (both externalising and internalising). Effects were similar for community connectedness and problem behaviour, but weaker.

Buffering effect findings

- The key hypothesis that social connectedness would buffer/lessen the strength of the relationships between vulnerability and relationship instability on the one hand and resultant child outcomes on the other hand was tested, and weak support was obtained for this prediction. In particular, neither family connectedness nor community connectedness functioned to reduce the impact of risk factors on externalising or internalising behaviour, however family connectedness did enhance prosocial behaviour under conditions of low vulnerability.
- Although the buffering hypothesis was not strongly supported, we did find clear evidence that family connectedness functions as a protective factor for children.

Temporal sequential findings

Since we have data from four time points (antenatal, 9 months, 2 years, and 4.5 years) we sought to examine predictive relationships among the key constructs over time to assess whether temporal pathways could be found among the constructs. We found that:

- Vulnerability in the antenatal period evidenced an indirect predictive effect on externalising and internalising child behaviour at 4.5 years of age through the intervening variable of family stress: vulnerability predicted family stress, which, in turn, predicted higher levels of problem behaviour for children.
 - Interestingly, relationship instability evidenced the same patterns but with additional indirect effects through both family stress and perceived social support: vulnerability predicted reduced levels of perceived support, which, in turn, predicted worse behavioural outcomes for children.
- Lastly, family connectedness was shown to predict reduced family stress and increased perceived support, both of which, in turn, predicted better behavioural outcomes.

Implications of key findings

- As amply documented in previous studies, vulnerable families and families marked by parent/caretaker relationship transitions tend to raise children who exhibit higher levels of problem behaviours and lower levels of prosocial behaviour. Much governmental policy is devoted to reducing the number of families “living on the margin”, ie, struggle with financial, occupational and housing deprivation. Our results support efforts to improve the conditions for families, particularly those who are currently expecting children, or who have very young children within the family. By intervening early in the life course, arguably more benefits can be ensured for the children in New Zealand.
- Social connectedness, particularly *family connectedness*, was shown to predict better outcomes for families (eg, reduced stress) and for children (eg, fewer problem behaviours). The results clearly show that ‘social connectedness’, an infrequently studied construct within governmental policy, is a useful protective factor, and the NZ government should continue its efforts in supporting healthy, functioning family/whanau units, and encourage engagement of these families/whanau with prosocial community organisations to build social support networks and reduce family stress. Positive social bonds with others benefits parents, and infants and young children indirectly, and sets families on a trajectory likely to be beneficial for the whole family, as well as New Zealand society in general.

Introduction

The Growing Up in New Zealand (GUINZ) study offers a unique opportunity to examine the trajectories of growth of children from a representative cohort, and from multiple perspectives over the course of development.

In particular it allows us to look at the trajectories of children who are vulnerable not only from birth, but from *before* birth. The GUINZ project has tracked the growth and development of more than 6800 children starting before they were born, and at the time of this study had released data from the first four time points; from the antenatal period up to when the children were 4.5 years old. The longitudinal design of GUINZ ensures that change over time can be examined, allowing us to investigate trajectories of growth and development over time for this cohort.

The aim of this study is to inform public policy concerning the wellbeing of children and their families in New Zealand, and this report conveys some recent findings relevant to this aim. In this report we consider the findings of analyses that include measures of family vulnerability before birth, of family instability, and of social connectedness, on outcomes for children when they are 4.5 years old. We first discuss these three constructs, and then propose several hypotheses about how the GUINZ data is likely to illuminate the relationships between these constructs. We conclude the report by using these findings to underscore several important practical actions that are likely to improve the lives of children and families in New Zealand. In particular, we will use the findings to make observations about how governmental policy could support families that experience transition and/or social and financial vulnerability.

Three key questions that we intended to illuminate were:

1. Are health indicators early in a child's life, even as early as pregnancy, able to predict outcomes later in toddlerhood and early childhood?
2. Do vulnerabilities concerning relationship and financial stability of a family unit early in a child's life predict important outcomes 4.5 years later? and;
3. Do psychological states such as social support and family stress influence the trajectories of child outcomes through toddlerhood to early childhood?

We asked these questions because the New Zealand government seeks to implement assessment of early indicators and to support families both financially and socially. Research on the usefulness of social supports for families is often performed in New Zealand, but topics such family connectedness and family stress have been less studied. Our intention is to provide evidence (or not) for the helpfulness of these approaches to fulfil our goal of improving children's lives.

Family transitions

Throughout the Western world the stability of the family unit has decreased. The prevalence of divorce, separation, re-partnering, and single parenthood has increased, resulting in changes to household composition for children from a very early age. In the United States, for example, one third of children born to unmarried mothers experience two or more family changes by the age of three. Although comparative data from New Zealand is not available, given that nearly half of New Zealand children are born outside marriage, it is likely that rates of family change will be similar to the international rates. Family changes bring with them significant stresses, as some adults leave the household and others enter. As such, children's relationships with caregivers undergo shifts that may cause distress to the children. Alongside changes in the relationships of main caregivers, there is likely to be changes in the houses children live in, and changes in schools, neighbourhoods, and peers, all of which confer stress on children and their parents and caregivers.

Family instability has been operationalised as 'the count of the entrances and exits by biological parents, romantic partners, or spouses' (Fomby & Osborne 2017). There is a considerable body of research that documents the impact of family instability on outcomes for children and adolescents. Family transitions predict childhood conduct problems (Bachman et al. 2011, Cooper & Osborne 2011, Fomby & Osborne 2017), such as anxiety, externalising behaviours, and self-reported delinquency (Fomby & Osborne 2017, Fomby & Cherlin 2007), as well as child health (Bzosteck & Beck 2011). Similar findings are reported in adolescence, with higher levels of delinquency and drug use being linked with family instability, especially for boys (Goodnight et al. 2013; Krohn et al. 2009).

Further, some researchers suggest that transitions experienced early in life are more adverse than those experienced later (Cavanagh et al. 2008, Ryan & Claessens 2013). Ryan and Claessens found that changes in the first three years of a child's life were stronger predictors of behavioural development in contrast with later changes. This outcome is not surprising, as early instability is likely to lead to subsequent changes, with new families formed after the initial family more likely to dissolve, and there can be cumulative effects of family change on children. In particular, as the National Scientific Council on the Developing Child (2014) states, "excessive stress disrupts the architecture of the developing brain" (p. 1). Children in the first year of life typically develop strong emotional bonds to their parents and caretakers, and disturbances of these attachments may not only cause emotional difficulties, significant stress may also actually harm the all-important foundation of the infant's brain.

As Sutherland (2015), a family researcher, has suggested, "family instability is bad for kids". She reports, based on findings from the Fragile Families and Child Wellbeing Study in the United States, that longitudinal data gathered from birth

to age 9 years shows that three types of deleterious outcomes accrue from family instability: deficits in cognitive achievement; externalising behaviour (aggression and rule-breaking); and internalising behaviour (anxiety and depression). However, the study also importantly compared the effects of family instability with the effects of poverty and lack of mother's education. They found that poverty and lack of education accounted for more ill effects than relationship instability. In this vein, Schoon et al. (2012) found a similar result in that persistent economic hardship and early poverty played a stronger deleterious role than family instability for cognitive functioning at five years of age. The impact of poverty in these studies exerted a stronger impact than family change.

Social Connectedness: Families and Communities

An important distinction needs to be made, however, with regard to family *structure* as opposed to family *dynamics*. Not all single-parent families or blended families provide deleterious contexts for raising children and not all intact original families are excellent places to nurture and raise children; the nature of the closeness and nurturance within the family unit makes a difference above and beyond the structure of the family.

For the purposes of this report, we will refer to family dynamics as '*family connectedness*'. Manzi and Brambilla (2014) defined family connectedness as "a particular characteristic of the family bond, also referred as family or parental closeness, support, warmth, or responsiveness" (p. 1), and Jose, Ryan, and Pryor (2012) have defined it as "the nature and quality of specific elements (eg, communication, trust, expressions of affection) of relationship interactions and [they] view connectedness as a dyadic or family construct" (p. 237). Numerous studies have demonstrated that family connectedness exerts a positive influence on child development alongside the typical benefits of raising a child in an intact family (eg, Crespo et al. 2011, Ministry of Social Development, 2005). In a related study, Coe et al. (2018) noted the moderating effect of family cohesion on the impact of maternal relationship instability on externalising problems at five years. Therefore there is reason to believe that strong relationships and a sense of belonging in a family are able to ameliorate the ill effects of family change and family instability.

Family connectedness also predicts lower levels of substance abuse, violence and health-compromising behaviour (Yang et al. 2014), and it has been shown to be protective against suicidal ideation and behaviour (Kaminski et al. 2010, Stone et al. 2015), and depressed mood in adolescence (Houltberg et al. 2011). Family connectedness is associated with higher levels of body satisfaction in teenagers (Crespo et al. 2010), lower levels of identity confusion, termed 'lostness' (Ja & Jose 2017), and positive future orientation (Crespo et al. 2013).

In Hispanic youth, family connectedness was found to be a protective factor against alcohol use (Sale et al. 2005). Parent-child connectedness has also been found to be a mediator between economic stress and prosocial behaviour in 11 year-olds (Carlo et al. 2011). In sum, family connectedness tends to confer a protective influence on family members.

In addition to feeling connected to one's family, one can also feel connections to one's community. *Community connectedness* is conceptualised as the extent to which individuals feel part of their neighbourhood and feel a sense of belonging with and trust for their neighbours and community members (Social Capital Community Benchmark Survey, 2018).

Benefits of community connectedness include greater confidence, a sense of security, and a sense of being part of a larger whole (Plan H, 2018). These positive results are likely the result of emotional and instrumental social support and feeling more in control over one's living situation. Despite these benefits, some findings are mixed regarding the impact of feeling connected to communities. For example, Foster and Horowitz (2017) found that community connection reduced social anxiety but increased sexual activity in a group of 12 - 15 year-olds. In a meta-analysis of community factors associated with depression in 4 - 18 year-olds, Stirling, Toumbourou et al. (2015) reported no direct association between community connectedness and reduction of depressive symptoms. Caughy et al. (2008) examined the impact of neighbourhood social processes on child behaviour problems in first grade children and found that behaviour problems were linked with high community involvement for children, although this was so only in economically disadvantaged neighbourhoods.

In summary, numerous family transitions, especially early in life, put children at cognitive, emotional, and neurological risk for later adverse outcomes. We also know that family transitions are usually accompanied by financial hardship, a reduction in parenting ability by the adults in the family, changes of schools and consequent instability of peer relationships, and changes in neighbourhoods that can all adversely affect both child and adult relationships. However, strong emotional bonds within the family, termed *family connectedness*, and strong relationships with neighbours, termed *community connectedness*, may buffer these stressful events and states.

We will now explore the negative influences of maternal and economic vulnerability.

Vulnerability

Twelve risk factors have been identified to define 'vulnerability' in the GUiNZ cohort (Morton et al. 2014), which they cluster in three basic ways, during both the antenatal period and in infancy. The most common cluster captured young,

single mothers lacking formal educational qualifications, who were likely to continue smoking in pregnancy and be receiving an income-tested benefit. The second most common cluster defined mothers who were living in areas of high deprivation, eg, in over-crowded rental housing. The third common cluster described mothers experiencing high levels of physical, emotional and or financial stress during late pregnancy or during the postnatal period. These aspects of vulnerability include low income, low educational achievement, substance use, substandard housing, crowded living conditions, and high stress.

The GuiNZ study has reported links between antenatal vulnerability and subsequent behavioural scores at two years of age (Morton et al. 2015). In the group identified as having low vulnerability, 79.4% were considered at low risk of negative behavioural outcomes from their Strengths and Difficulties Questionnaire (SDQ) scores, and 8.3% were considered to have 'abnormally high' SDQ scores, i.e., at risk. In contrast, of those in the high vulnerability group, 43.9% continued to have 'abnormally high' SDQ scores at two years of age, whereas 36.9% were seen to be at low risk of negative behavioural outcomes. Thus, it can be seen that vulnerability significantly increases the risk of poor behavioural outcomes for toddlers.

Other studies around the world have reported that children are at risk for poor outcomes when their families experience poverty and the attendant stressors of maternal depression, household overcrowding, and low maternal education levels. For example, in the UK, diminished cognitive ability at five years of age was found to be linked strongly with early poverty and persistent economic hardship earlier in life (Jeon et al. 2014, Schoon, Jones et al. 2012). It has been shown that different types of risks may yield different types of dysfunction, however, as Roy and Raver (2014) have reported that although children who experienced high levels of risk in preschool years had poorer performance at school, those children in a group labelled 'single parent and stressed' exhibited more behavioural problems while those children in the group labelled 'deep poverty and crowded' yielded worse academic performance. This set of findings suggests that vulnerability is clearly multifaceted, but at the same time, risk indicators are likely to co-exist with others. Household deprivation and poverty, for example, are often linked with maternal depression and with household crowding. The stress associated with lack of financial resources contributes to both maternal and paternal distress which, in turn, is likely to have an impact on parenting. Jeon et al. (2014) examined links between vulnerability and cognitive and social-emotional development in a group of 420 children aged fifty-five months.

Socioeconomic risk and neighbourhood disadvantage were indirectly linked with social-emotional problems through their impact on parental depressive symptoms. Parents' cognitive stimulation in the home mediated the relationship between socio-economic risk and cognitive ability at fifty-five months. The

relationships among vulnerability factors are complicated and suggest that a focus on any one aspect will not be useful in addressing the impact of the constellation of factors that confer vulnerability on children. We sought to define vulnerability as multifaceted in nature, as GUiNZ has previously done.

We now propose four predictions concerning child development outcomes shaped by the impacts of vulnerability, relationship instability of mothers, and social connectedness as assessed within the GUiNZ longitudinal study.

Predictions

In this study, we examined the associations among antenatal vulnerability, early childhood caregiver relationship instability, social connectedness, and infant and child outcomes between and across four times of measurement: 1) antenatal period; 2) 9-months; 3) 2-years; and 4) 4.5 years. We expected to see that the three main constructs (vulnerability, relationship instability, and social connectedness) would influence the child outcomes in expected ways. We made four basic predictions:

- 1) The risk factors of vulnerability and relationship instability would positively predict worse child outcomes (eg, illness, developmental problems, and externalising behaviour) and negatively predict adaptive behavioural child outcomes (eg, prosocial behaviour).
- 2) In contrast, the protective factors of family connectedness and community connectedness would negatively predict poor child outcomes and positively predict good child outcomes.
- 3) Further, we expected that the protective and risk factors might yield interaction effects among themselves such that these factors might jointly predict the child outcomes. In particular, a primary goal of this study was to determine whether social connectedness might be seen to buffer the ill effects of vulnerability and/or relationship instability on children.
- 4) And last, we expected to find evidence of temporal relationships among the constructs over time, such that the effects of vulnerability and parental relationship instability on child outcomes would be mediated by family stress and support. In particular, we expected to see that the risk factor of vulnerability would negatively predict family support at a later point in

time, which, in turn, would be likely to predict higher levels of internalising and externalising behaviour in the child at 4.5 years.

Method

Participants

Data from mothers at the antenatal interviews, the 9-month interviews, the 2-year interviews and the 4.5-year interviews are included in the study¹. At each wave, the total number of available children was assessed; ranging from 6853 at the antenatal interview to 6156 at the 4.5-year interview. Full information on the demographic information of participants at each wave is available elsewhere (Morton et al., 2010; 2012; 2014a; 2017).

Measures

Antenatal Vulnerability

To assess vulnerability, key indicators were selected from the antenatal interview broadly following the measures used in previously published GUINZ reports² (see Morton et al., 2014b; Morton et al. 2015). In the current study, in order to develop a more sensitive measure that captured the distribution of vulnerability of children within the sample, a continuous measure of vulnerability was calculated. The six indicators used to calculate vulnerability were: (1) mother's level of depression as measured by her score on the Edinburgh Postnatal Depression Scale, a 10-item self-report measure (Cox, Holden, Sagovsky, 1987); (2) mother's level of education coded as an ordinal measure from 1 = higher degree qualified to 5 = no secondary school qualification; (3) household overcrowding measured by the number of people living in the household at the time of the interview; (4) household income coded as an ordinal measure from 7 = less than \$20,000 annually to 1 = over \$150,000 annually; (5) household deprivation measured by the score on the New Zealand Deprivation Index 2016; and (6) financial stress measured by the single question "To what extent are money problems a source of worry?" rated on a scale from 1 = not at all stressful to 5 = highly stressful. Each indicator was converted into a z-score and these were then averaged to create an index representing relative deprivation of individuals within the sample at the antenatal interview. See Table 1 for descriptive statistics of the indicators.

¹ The relevant datasets were merged on the basis of the study child in order to undertake these analyses.

² Note that in the reports cited, vulnerability was derived from a series of dichotomised items representing proximal family factors, distal family factors, and home environment.

Table 1: Antenatal Vulnerability Indicators

Construct	Mean	Standard Deviation	Number of items	Range
Maternal Depression	6.24	5.04	10	0 – 40, higher scores represent higher depression
Maternal level of education	2.84	1.16	1	1-5, higher scores represent lower education
Household overcrowding	2.80	1.84	1	1-11, higher scores represent more overcrowding
Household income	3.27	1.62	1	1-7, higher scores represent lower household income
Household deprivation	6.04	2.92	1	1-10, higher score represent greater deprivation
Financial Stress	2.46	1.04	1	1-5, higher scores represent greater financial stress

It is acknowledged that the first two items, being focused on the mother’s characteristics, in the absence of information from the father, may tend to bias the measure of vulnerability toward the mother’s status. Traditionally, research on families has tended to prioritise information about the mother over the father because information about the father is difficult or impossible to obtain and often results in much missing data. Adjusting for missing data is problematic and can result in other types of bias. In the present case, although some data was available from fathers, we have opted for the traditional approach for this reason.

Relationship Stability

Partnership status of the mother was measured antenatally, at the 9-month interview, at the 2-year interview, and at the 4.5-year interview with a single question, “Do you have a current partner?”³. The identity of the partner was not assessed, however, for the latter two assessments.

³ Due to missing data in this item at each data collection wave and the focus on change over time, after the antenatal interview, where information was missing at the subsequent wave, data were imputed from the previous relationship status. This approach enabled a more comprehensive utilization of the data.

For our current purposes, relationship stability was assessed by examining the partnership status of the mother at the wave in question alongside partnership status at the previous wave. The only wave where this variable was assessed differently was at the antenatal interview (9 months), due to the measurement of retrospective change in relationship status. Specifically, at the antenatal interview, relationship stability was assessed through three items that asked: what the relationship was with the biological father at the time of conception, whether the status of the mother's relationship with the biological father of the child had changed since becoming pregnant, and if so, what change had occurred.

The relationships items at the antenatal interview were used in this study to categorise the mother's relationship status into one of four categories: (1) those who were in a relationship with the biological father at the time of pregnancy and were still in that relationship at the antenatal interview; (2) those who were single at pregnancy and still were single at the antenatal interview; (3) those who were in a relationship at pregnancy and had ended their relationship by the time of the antenatal interview; and (4) those who were in a relationship with the biological father at pregnancy, but had re-partnered by the antenatal interview. These groups were further defined into two categories representing a *stable partnered relationship* from pregnancy to the antenatal interview (#1) and an unpartnered or *unstable relationship* from pregnancy to the antenatal interview (#s 2, 3, and 4). Relationship status was assessed so that stability, instability, or lack of relationships could be demonstrated over periods of time, eg, #1.

At each subsequent data wave, relationship changes were calculated similarly, by assessing whether the mother was in a current relationship within the context of the previous relationship status. Additionally, an overall index of relationship change was calculated by computing the number of times the mother had changed relationships from pregnancy to the time the child was 4.5 years old. Within this coding structure, an assumption was made that when the mother self-reported as being in a relationship at every data collection wave, that this pattern of answers constituted relationship stability. However, the identity of the specific partner was not identified at time points 3 and 4, so it is possible that the mother might have re-partnered over this time frame. Due to the constraints of the questions used in the survey, this information is not a perfectly accurate measure that captures all relationship change, but rather is the best indicator of relationship stability that can be derived from the present data.

It must be noted that the assumption of contiguous stable relationships between waves of data is generally supported by results of analyses of the antenatal data (which are more comprehensive in their measurement of relationship status than other waves), which show that the participants who re-partnered during the time prior to pregnancy until the antenatal interview comprised only 0.6% of the

sample. It is acknowledged that more opportunities for re-partnering would have occurred between later waves, but we would argue that the present coding method would likely misclassify only a very small percentage of people.

Family Connectedness

Family connectedness at the antenatal interview was measured by an average of 9 items from the third version of the Family Adaptation and Cohesion Scales (FACES III; Olson, 1985). This self-report assessment captures overall family climate and measures the degree to which the family as a unit is perceived to be interconnected and mutually supportive. For example, "People in our family/whanau provide for each other, even when there is little to go around," and "We feel very close to each other in our family/whanau". Responses were rated on a scale from 1 = never to 4 = always, such that greater endorsement indicates higher levels of family connectedness.

Community Connectedness

Community connectedness at the antenatal interview was measured by an average of 10 items developed by GUiNZ that assessed the degree to which the participant feels a sense of belonging, enjoyment, identification with, and safety within their neighbourhood. For example, "I have a lot in common with the people in my neighbourhood", and "I like living where I live". All items were coded such that greater endorsement represents higher levels of community connectedness. Responses were rated on a scale from 1 = strongly disagree to 5 = strongly agree.

Family Social Support

Social support at 9-months was measured by 6 items derived from the Family Support Scale (Dunst, Jenkins, & Trivette, 1984). The scale measures the degree to which close others' support is perceived to be generally helpful. The six items represent support from the following sources: partner, parents, partner's parents, extended family, partner's extended family, and friends. The scale captures full information on support such that where the source of support is unavailable it is coded as 1, with available support coded from 2 = not at all helpful to 6 = extremely helpful.

Family Stress

At the 9-month interview, 9 items were developed by GUiNZ to represent areas of stress that may be relevant to families. These items included anxieties about family relationships, childhood behaviour, material resources, and parenting. For example; "In the time since your baby was born, to what extent has worry about balancing work and family life been a source of stress?" Responses were rated

from 1 = not at all stressful to 4 = highly stressful, such that higher scores indicate greater family stress.

Childhood Behavioural Problems

At the 4.5-year interview, the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) was used to measure behavioural problems in children. The SDQ is a widely validated measure that has a series of five subscales which each contain 5 items (emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour). The scale is reliability-factored into an overall indicator of child internalizing (emotional problems and peer relationship problems), externalizing (conduct problems and hyperactivity) and prosocial behaviours (Goodman, Lamping, & Ploubidis, 2010). Responses are rated on a three-point scale: 1 = not true, 2 = somewhat true and 3 = certainly true.

Developmental Problems of the Child

At the 4.5-year interview, a count of developmental problems of the child was assessed by an index of the number of problems from a possible nine listed issues (see Table 2). Scores ranged from 0 to 8.

Table 2: Developmental Concerns at 4.5 year Interview

Concern	N	Percentage
Hearing	828	13.5%
Vision	524	8.5%
Speech	774	12.6%
Behaviour	406	6.6%
Autistic Spectrum Disorders	112	1.8%
Learning Difficulties	204	3.3%
Movement or mobility	118	1.9%
Growth	180	2.9%
Other	115	1.9%

Common Illnesses of the Child

At the 4.5 year interview, a count of experiences of common illnesses was assessed by an index of the number of illnesses from a possible 12 listed (see Table 3). Scores ranged from 0 to 11.

Table 3: Common Illness of the Child at 4.5 year Interview

Concern	N	Percentage
Non-food allergies	177	2.9%
Hayfever	543	8.8%
Ear infections	1532	24.9%
Asthma	803	13.1%
Whooping cough	110	1.8%
Chest infection	834	13.6%
Wheezing	822	13.4%
Gastroenteritis	952	15.5%
Eczema	1390	22.6%
Throat infection	1316	21.4%
Skin infection	730	11.8%

Overall Parental Concerns about the Child

A single item was used to assess overall concerns with childhood development: "In general, how happy are you with how your child is doing overall?" Responses were rated from 1 = very happy to 4 = very concerned.

Results

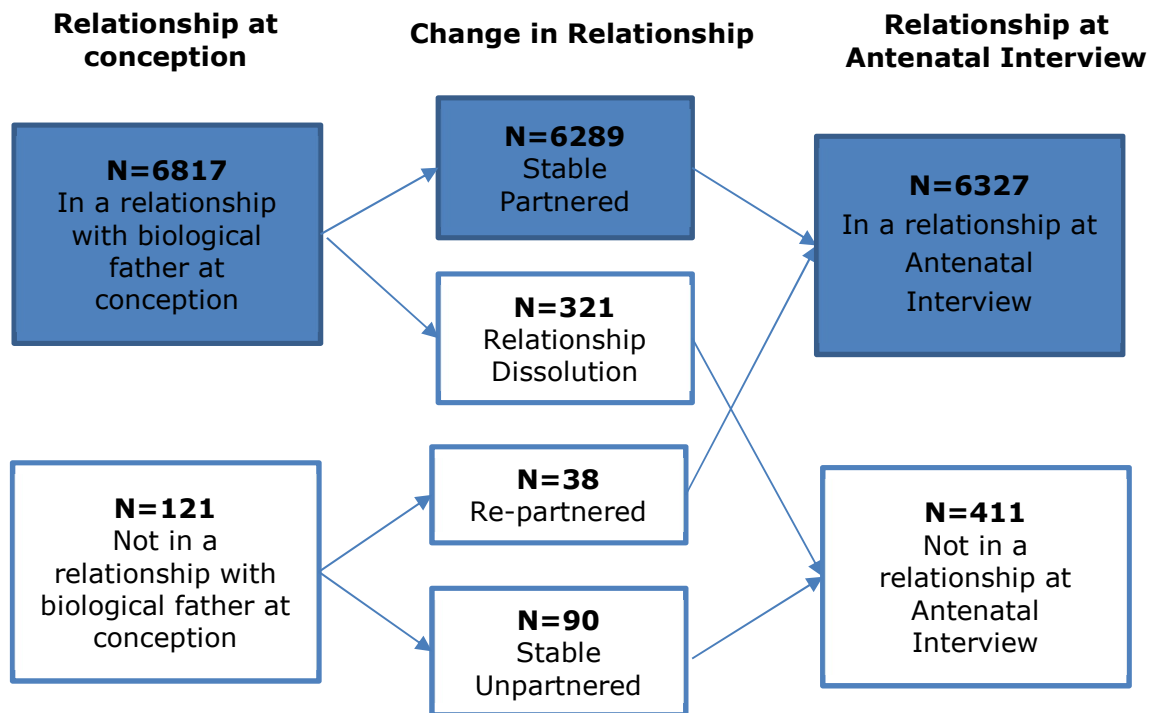
Computation and Assessment of Relationship Stability

The following section examines changes in the relationship status of the mother from the antenatal interview until the 4.5-year interview. The analyses are broken down into an assessment of relationship transitions at each of the data collection waves and an investigation of relationship stability across the whole span of data collection.

Conception to Antenatal Interview

At the antenatal interview (see Figure 1), most mothers (N = 6817, 98.2%) indicated that they were in a relationship with the biological father at the time of conception, 121 (1.9%) indicated they were not in a relationship and 115 were missing this information. Following on from this question, the mothers indicated whether changes had occurred in the relationship which included both dissolving the relationship or becoming more committed to the relationship. As such, relationship changes from conception to the antenatal interview were categorised as: 6289 individuals who had stayed in a relationship (or become more committed) with the father since becoming pregnant (93.3%), 90 individuals who had remained single (1.3%), 321 individuals who had ended their relationship (4.8%), and finally 38 individuals who had re-partnered (0.6%). See Figure 1 for more details (note that because of some missing data, relationship status was derivable for 6738 individuals). Not depicted in the figure, but derived from the frequencies, was two categories representing those individuals in a stable partnered relationship during pregnancy (N = 6289; 93.3%) and those individuals unpartnered or in an unstable relationship (those who experienced relationship dissolution (321) combined with those who re-partnered (38) and those remained unpartnered (90), for a total of N = 449 (6.7%).

Figure 1: Derived Change in Relationship for Mother from Conception to Antenatal Interview

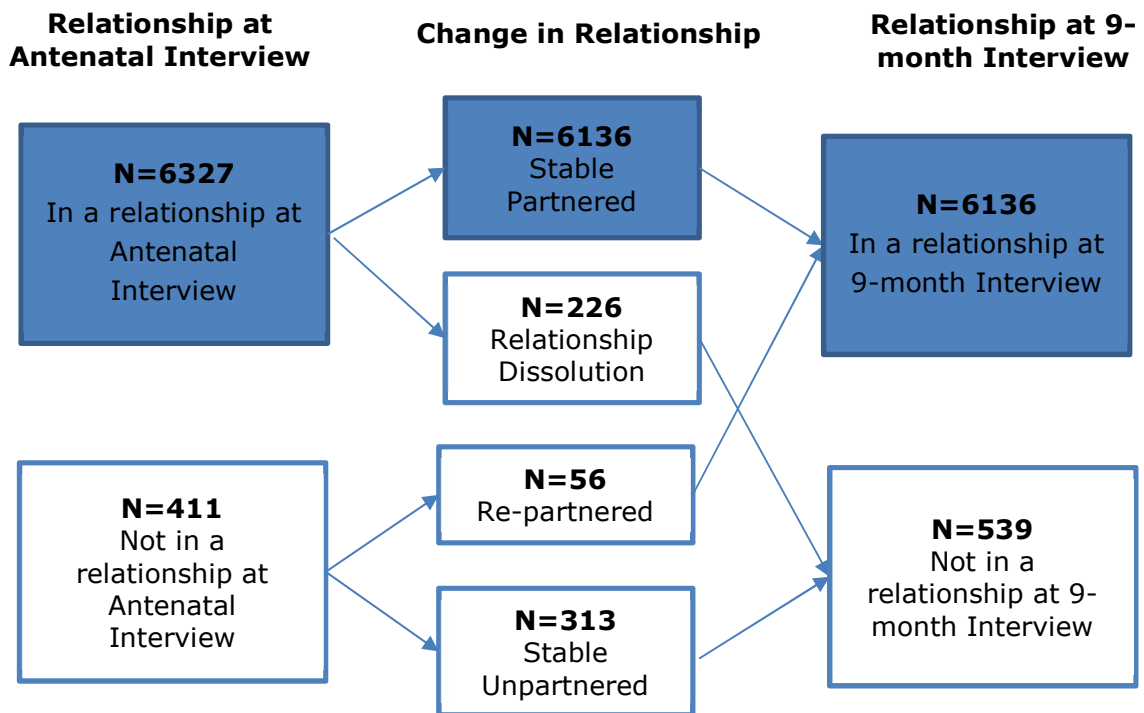


Change in Relationship Status from Antenatal to 9-month Interview

The derived data (described above) at the antenatal interview (see Figure 2), found that 6327 of mothers were in a relationship at the antenatal interview and 411 were not⁴. Combining this information with the self-reported relationship status of mothers at the 9-month data collection wave, changes in relationship status were derived. Similar to the previous data wave, the majority of mothers who were in a stable partnership had stayed in a relationship, N = 6136 (91.2%), smaller numbers had remained single, N = 313 (4.7%), ended their relationship, N = 226 (3.4%), or had re-partnered, N = 56 (.8%). As such, the majority of the sample was categorised as being in a stable relationship from the antenatal to the 9-month interview (N = 6136; 89.5%) and a minority were unpartnered or in an unstable relationship (those who experienced relationship dissolution (226) combined with those who re-partnered (56) and those remained unpartnered (313), for a total of N = 595; 9.2%).

⁴ As previously noted, in order to develop the most complete picture of relationship transitions, where information on partnership was missing at the wave in question, the previous relationship status was considered to have remained the same.

Figure 2: Derived Change in Relationship from Antenatal to 9-month Interview



Following the investigation of change in relationship status across the first two data collection waves, the proportion of those mothers who had a relationship transition before the study child was born (conception to the antenatal interview) alongside a change in relationship from the antenatal to the 9-month interviews were examined (see Table 4). It was found that nearly all (95.5%) of mothers who were categorised as in a stable relationship from conception to the antenatal interview were also categorised as in a stable relationship from the antenatal to 9-month interview. Only a small proportion (4.5%) of those who were in a stable relationship from conception to the antenatal interview were categorised as becoming single or having re-partnered at the subsequent data collection wave. In contrast, for those mothers who were categorised as in unstable relationships or unpartnered from conception to the antenatal interview, the majority (73.5%) were categorised in the same way from the antenatal to 9-month interview. Around a quarter (26.5%) of those identified as previously unpartnered or in an unstable relationship was considered to have transitioned to a stable relationship.

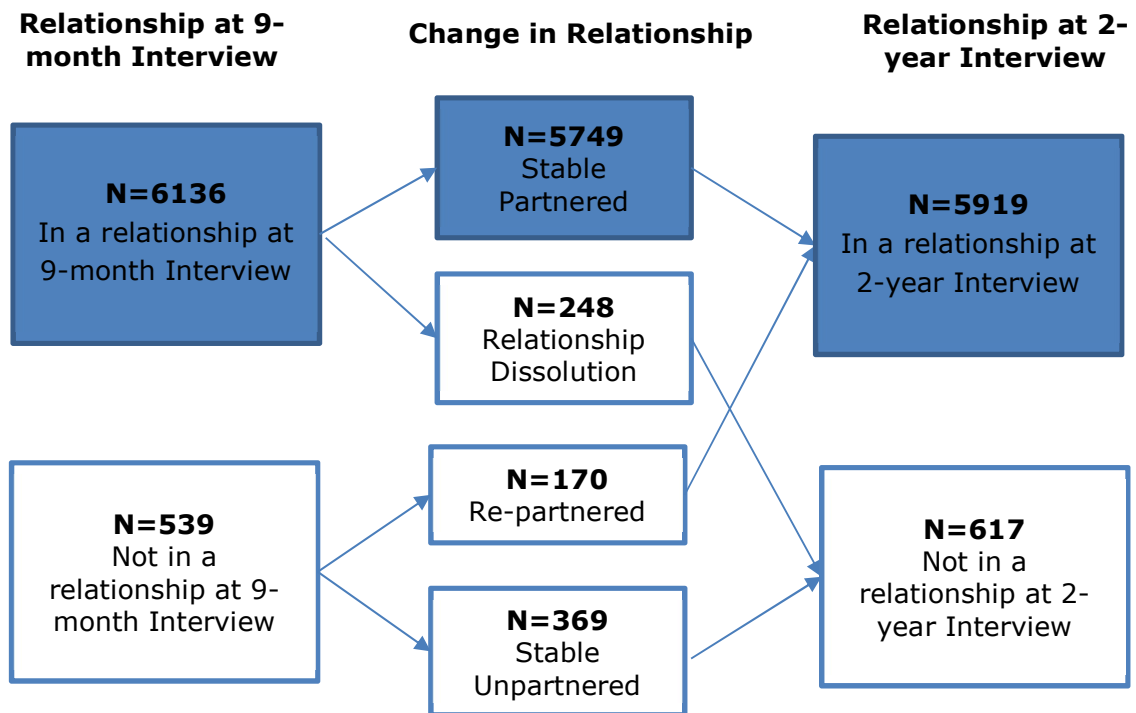
Table 4: Relationship Transitions Conception to 9-month Interview

	Antenatal to 9-month Interview		
Conception to Antenatal Interview	Stable Partnered	Unstable or Unpartnered	Total
Stable partnered	6006 (95.5%)	283 (4.5%)	6289
Unstable or unpartnered	119 (26.5%)	330 (73.5%)	449

Change in Relationship Status from 9-month to 2-year Interview

The derived data (described above) at the 9-month interview (see Figure 3), found that 6136 of mothers were in a partnered relationship at the 9-month interview and 536 were not. Combining this information with the self-reported relationship status of mothers at the 2-year data collection wave, changes in relationship status were derived. This analysis indicated that the majority of caregivers had stayed in their relationship, N = 5749 (87.9%), smaller numbers had remained single, N = 369 (5.6%), ended their relationship, N = 248 (3.8%), and the smallest group had re-partnered, N = 170 (2.6%). This group was further defined into two categories representing a stable partnered relationship (N = 5749; 87.9%) and unstable or unpartnered (those who experienced relationship dissolution (248) combined with those who re-partnered (170) and those remained unpartnered (369), for a total of N = 787 (12.1%)).

Figure 3: Derived Change in Relationship from 9-month to 2-year Interview



When investigating the proportion of those mothers who were identified as having a relationship transition between the antenatal interview and the 9-month interview alongside those who had a relationship transition from the 9-month to 2-year interview, it was found that nearly all mothers repeated previous patterns of derived change (see Table 5). Specifically, 96.2% of those who were categorised as having stayed in their relationship from the antenatal to the 9-month interview were also categorised as having stayed in their relationship from the 9-month interview to the 2-year interview. Only a small proportion (3.8%) who were initially defined as stable in their relationship (antenatal to 9-months) were identified as having become single or re-partnered during the period from the 9-month interview to the 2-year interview. Similarly, 93.2% of those who were identified as unstable or unpartnered from the antenatal to 9-month interview were also identified as unstable or unpartnered from the 9-month to the 2-year interview.

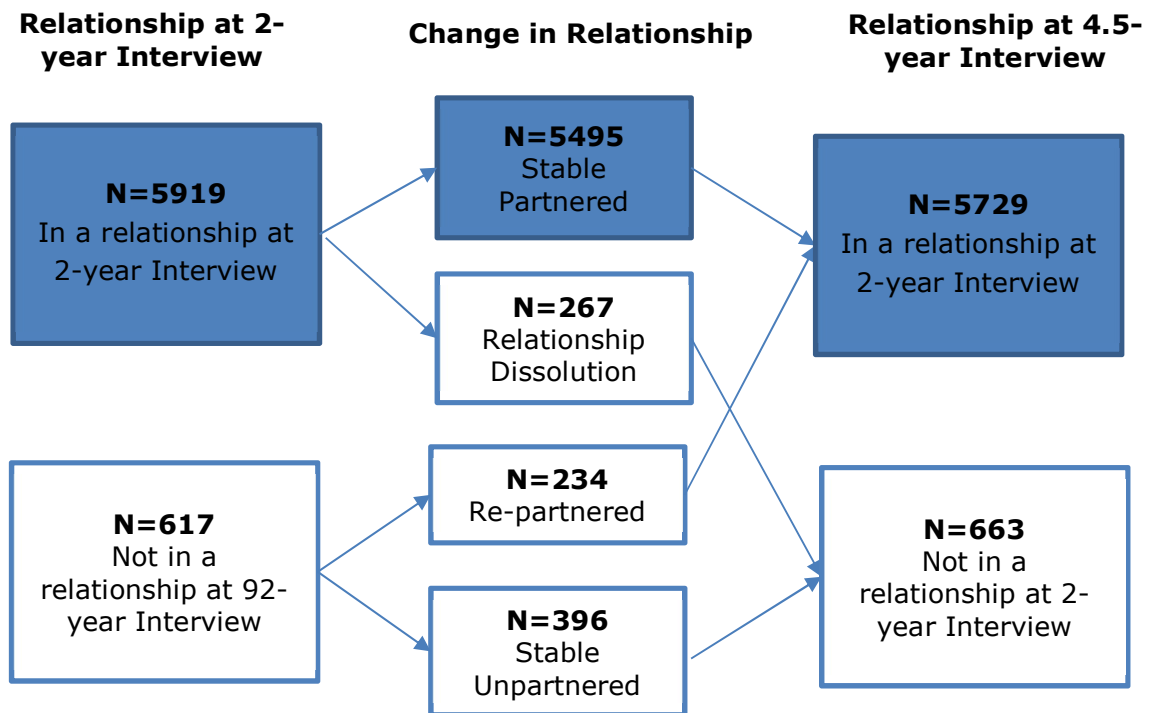
Table 5: Relationship Transitions for Mothers Antenatal to 2-year Interview

	9-month to 2-year Interview		
Antenatal Interview to 9-month Interview	Stable Partnered	Unstable or Unpartnered	Total
Stable partnered	5708 (96.2%)	226 (3.8%)	5934
Unstable or unpartnered	41 (6.8%)	560 (93.2%)	601

2-year to 4.5-year Interview

The derived frequencies (described above) at the 2-year interview (see Figure 4) found that 5919 of mothers were in a partnered relationship at the 2-year interview and 617 were not. Combining this information with the self-reported relationship status of mothers at the 4.5-year data collection wave, changes in relationship status were derived. This analysis indicated that since the 2-year interview, the majority of caregivers had stayed in their relationship, N = 5495 (86%), smaller numbers had remained single, N = 396 (6.2%), ended their relationship, N = 267 (4.2%), or had re-partnered, N = 234 (3.7%). Data were missing for 461 participants. These groups were reclassified into two categories representing a stable partnered relationship (5495; 86%) and unstable or unpartnered (those who experienced relationship dissolution (267) combined with those who re-partnered (234) and those remained unpartnered (396), for a total of 897 (14%).

Figure 4: Derived Change in Mother’s Relationship from 2-year to 4.5-year Interview



When investigating the proportion of those mothers who were defined as having had a relationship transition between the 9-month interview and the 2-year interview alongside those mothers who were identified as having had a relationship transition from the 2-year interview to the 4.5-year interview, it was found that nearly all (97.6%) of those mothers who were categorised as having stayed in their relationship from the 9-month interview to the 2-year interview were also categorised as having had also stayed in their relationship from the 2-year interview to the 4.5 year interview (see Table 6). Only a small proportion (4.7%) of those who were identified as being in a stable relationship previously were identified as having become single or re-partnered during the period from the 2-year to the 4.5-year interview. In contrast, for those mothers who were previously categorised as unpartnered from the 2-year to 4.5-year interview, the majority (82.7%) were categorised as remaining unpartnered or in an unstable relationship from the 9-month to the 2-year interview.

Table 6: Relationship Transitions 9-month to 4.5 year interview

2-year to 4.5-year Interview	9-month to 2-year Interview		
	Stable Partnered	Unstable or Unpartnered	Total
Stable partnered	5328 (95.3%)	260 (4.7%)	5588
Unstable or unpartnered	131 (17.3%)	628 (82.7%)	759

Relationship Stability of Mothers from Pregnancy to 4.5-year Interview

Overall (see Table 7), 5234 (82%) mothers were categorised as having stayed in a relationship consistently from the time they became pregnant until the 4.5 year interview. A small number (N = 240; 3.8%) of the mothers were identified as having had consistently been in unstable partnerships or unpartnered since before their child was born, with similar numbers categorised as having transitioned from stable relationships to unpartnered or unstable relationships one (N = 296; 4.7%), two (N = 334; 5.3%), or three times (N = 225; 3.6%). By collapsing across all time points, it was found that 1095 (17.3%) of mothers were categorised as having experienced 1-4 relationship transitions from pregnancy to the 4.5-year interview.

Table 7: Relationship Instability from Conception to 4.5-year Interview

Number of periods of Relationship Instability out of 4 Time points	N	Percentage
Stable partnership across all time points	5234	82.7%
1 period of instability	296	4.7%
2 periods of instability	334	5.3%
3 periods of instability	225	3.6%
Unstable or unpartnered across all time points	240	3.8%

The Interrelationship between Vulnerability and Relationship Instability

In order to examine whether families differed in levels of vulnerability by partnership status and derived relationship stability categories, a series of statistical tests (t-tests and analyses of variance) were conducted. Results showed (see first two lines in Table 8), largely as expected, that at each wave, those mothers who were identified as not being in a partnership had significantly higher levels of vulnerability than those mothers with a partner at each wave. Similarly, when those categorised as in a stable partnership were compared with variations on unstable partnership, the former group had significantly lower vulnerability ratings than those categorised as unpartnered or in unstable relationships across the data collection waves. All groups maintained similar levels of vulnerability over time, with the only exception being relationship dissolution at the 4.5-year interview where vulnerability was significantly greater than all other groups. This result suggests that the relationship between vulnerability and relationship status is fairly stable across infancy and young childhood.

Table 8: Average Antenatal Vulnerability by Relationship at each of the Four Time Points

	Antenatal	9-Month	2-year	4.5-year
In a partnership	-.04 _a	-.06 _a	-.07 _a	-.08 _a
Not in a partnership	.43 _b	.39 _b	.36 _b	.27 _b
Stable partnership	-.03 _a	-.04 _a	-.07 _a	-.07 _a
Unpartnered	.30 _b	.37 _b	.39 _b	.39 _b
Relationship Dissolution	.41 _b	.43 _b	.34 _b	.18 _c
Re-partnered	.42 _b	.49 _b	.40 _b	.35 _b
Stable partnership	-.02 _a	-.04 _a	-.06 _a	-.07 _a
Unstable or unpartnered	.39 _b	.40 _b	.37 _b	.31 _b

Note: Different subscripts, reading horizontally, indicate a significant difference at $p < .001$.

Vulnerability and Relationship Instability as Predictors of Child Health and Behaviour at 4.5 years old

Descriptive analyses were computed, and then a correlation matrix between the risk factors (vulnerability and relationship instability) and each of the childhood outcomes at 4.5 years (partialing out the effects of gestational age, mother's age and child gender) was computed to examine the associations among the constructs (see Table 9).

Overall, average levels of childhood behavioural problems were low and prosocial behaviours were high. The average number of developmental problems was minimal, and overall levels of concern for the child were low. At 4.5 years old, on average, children had experienced 2 common illnesses in the prior 12 months. Thus, the sample, taken as a whole, evidenced typical and normal levels of development.

In terms of whether vulnerability and relationship instability were significantly associated with subsequent childhood behaviour problems, the correlation matrix shows that greater vulnerability and experiences of relationship instability at each time point evidenced statistically significant positive relationships with both internalising and externalising symptoms at 4.5 years. However, the relationships between vulnerability and health outcomes were not significant, and the association between relationship instability and health was also weak.

Following on from these descriptive analyses, six linear regressions were conducted to answer specific questions about temporal prediction. In all cases, we adjusted the analyses for typical covariates (mother's age, gestational age, and child gender). In each model, risk factors (vulnerability and relationship instability) as well as the interaction terms between these variables were entered as predictors in order to assess both the main effects and interactive effects of risk factors on child outcomes.

Table 9: Correlations and Descriptive Statistics for Vulnerability, Relationship Instability, and Childhood Outcomes at 4.5-year interview

	1	2	3	4	5	6	7	8	9	10	Mean	SD
1.Antenatal Vulnerability	-											
2.Relationship Instability 1	.13**	-									-	-
3.Relationship Instability 2	.17**	.62**	-								-	-
4.Relationship Instability 3	.20**	.51**	.79**	-							-	-
5.Relationship Instability 4	.19**	.41**	.50**	.72**	-						-	-
6.Child Internalising at 4.5 years	.27**	.09**	.12**	.12**	.12**	-					3.58	2.82
7.Externalising at 4.5 years	.22**	.10**	.10**	.13**	.12**	.32**	-				5.70	3.10
8.Prosocial Behaviour at 4.5 years	-.04	-.01	-.00	.01	.01	-.16**	-.32**	-			7.76	1.80
9.Developmental Problems at 4.5 years	.01	.07**	.05**	.06**	.05**	.16**	.19**	-.13**	-		.53	.89
10.Illness at 4.5 years	.03	.05**	.05**	.07**	.07**	.07**	.09**	-.00	.14**	-	1.90	1.32
11.Overall Concerns at 4.5 years	.02	.03	.03	.03	.03	.14**	.16**	-.15**	.23**	.06**	1.20	.50

Note: ** $p < .001$

Relationship Instability 1 = being non-partnered or in an unstable relationship from conception to the antenatal interview; Relationship Instability 2 = from antenatal to 9-month interview; Relationship Instability 3 = from 9-month to 2-year interview; Relationship Instability 4 = from 2-year to 4.5-year interview

Controlling for covariates (see Table 10), vulnerability was found to moderately and positively predict childhood behaviour problems 4.5 years later ($\beta_{\text{Externalising}} = .29$, $\beta_{\text{Internalising}} = .27$, $ps < .001$), but it had no effect on prosocial behaviours. Additionally, vulnerability had a weak, but significant predictive effect on overall concerns for child's development.

Regarding relationship instability, small positive effects were found between being unpartnered or in an unstable relationship from pregnancy to the antenatal interview on subsequent behavioural problems ($\beta_{\text{Externalising}} = .10$, $\beta_{\text{Internalising}} = .04$, $ps < .05$) and developmental problems ($\beta = .09$, $p < .05$). The only other time frame where relationship instability was found to have predictive effects on childhood outcomes was the time between the 9-month and 2-year interview, with significant, small positive predictive effects found for externalising ($\beta = .10$, $p < .001$), developmental concerns ($\beta = .07$, $p < .05$), and number of childhood illnesses ($\beta = .06$, $p < .05$).

Additionally, vulnerability evidenced an interactive effect with presence of a stable relationship during pregnancy across all three of the childhood behaviour indicators. Specifically, relationship instability from conception to the antenatal interview significantly exacerbated the negative effects of antenatal vulnerability on childhood externalising and internalizing (Figures 5 and 6). In contrast, vulnerability did not have a significant direct effect on prosocial childhood behaviours, but did interact with relationship instability during pregnancy, such that for those children whose mothers were in a stable relationship, vulnerability increased prosocial behaviour at 4.5 years old, but for children whose mother was not in a stable relationship during pregnancy, vulnerability reduced prosocial behaviours (Figure 7). These interaction effects suggest that both vulnerability and relationship instability in some cases jointly determine child outcomes.

Table 10: Multivariate Regression Models predicting Childhood Behaviour and Health at 4.5-year interview

	Externalising Behaviours	Internalising Behaviours	Prosocial Behaviours	Developmental Problems	Illness	Overall Concerns
Vulnerability	.29**	.27**	-.05	.07	.06	.09*
Relationship Instability 1	.10**	.04*	-.02	.07**	.02	.02
Relationship Instability 2	-.07*	.04	.04	-.02	-.02	.04
Relationship Instability 3	.10**	-.04	.01	.07*	.06*	-.01
Relationship Instability 4	.01	.05*	.03	.01	.02	.02
Vulnerability X Relationship Instability 1	-.12*	-.08*	.09*	-.06	.01	-.02
Vulnerability X Relationship Instability 2	.05	-.01	-.05	.02	-.04	-.01
Vulnerability X Relationship Instability 3	-.03	.08	-.03	-.03	-.01	-.01
Vulnerability X Relationship Instability 4	.01	.03	-.01	-.02	-.01	-.04
R ²	.11**	.15**	.03**	.02**	.01	.02**

Note: Adjusted for mother's age, gestational age of child and child gender. Relationship instability 1= unpartnered or unstable relationship from conception to antenatal; Relationship instability 2 = unpartnered or unstable relationship from antenatal to 9-months; Relationship instability 3 = unpartnered or unstable relationship from 9-months to 2-years; Relationship instability 4 = unpartnered or unstable relationship from 2-years – 4.5-years.

** $p < .001$; * $p < .05$

Figure 5: Antenatal vulnerability on externalising at 4.5 years moderated by presence of stable relationship during pregnancy

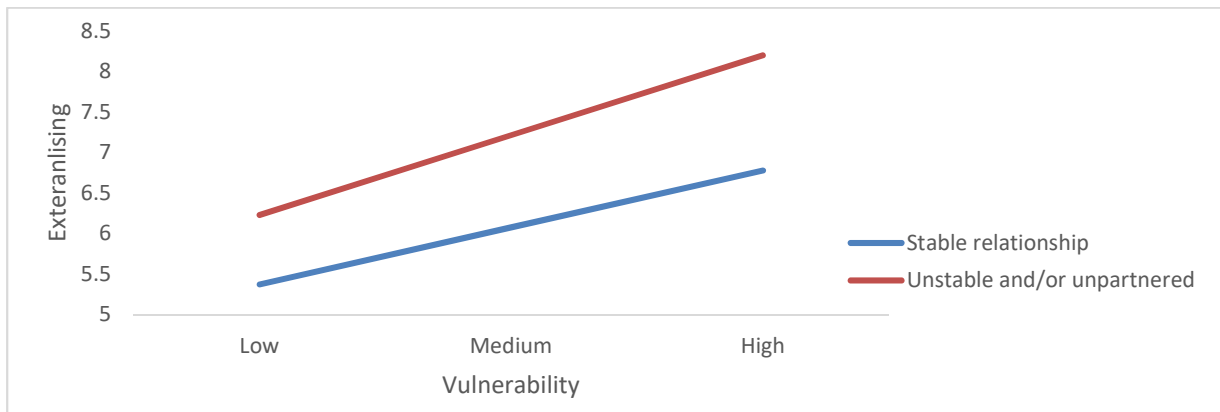


Figure 6: Antenatal vulnerability on internalising at 4.5 years moderated by presence of stable relationship during pregnancy

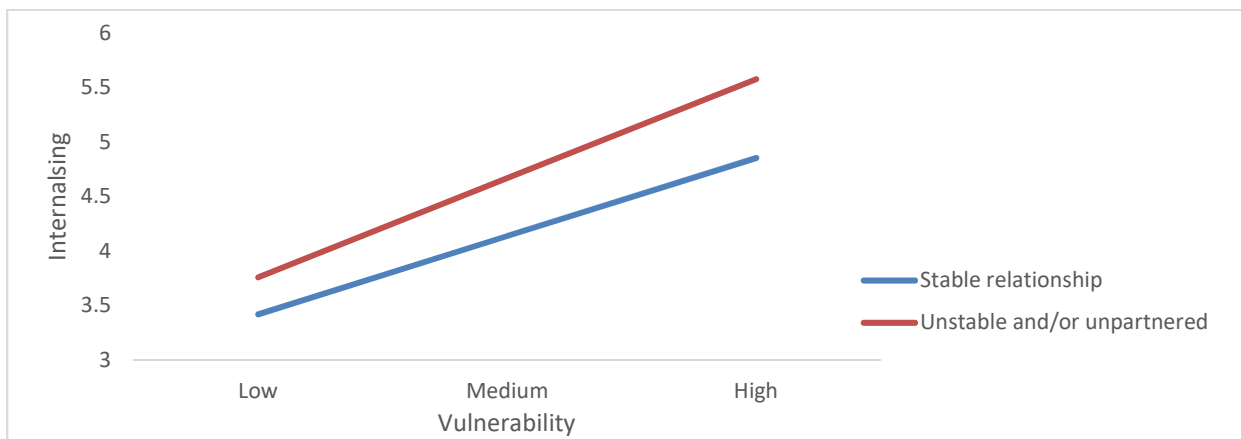
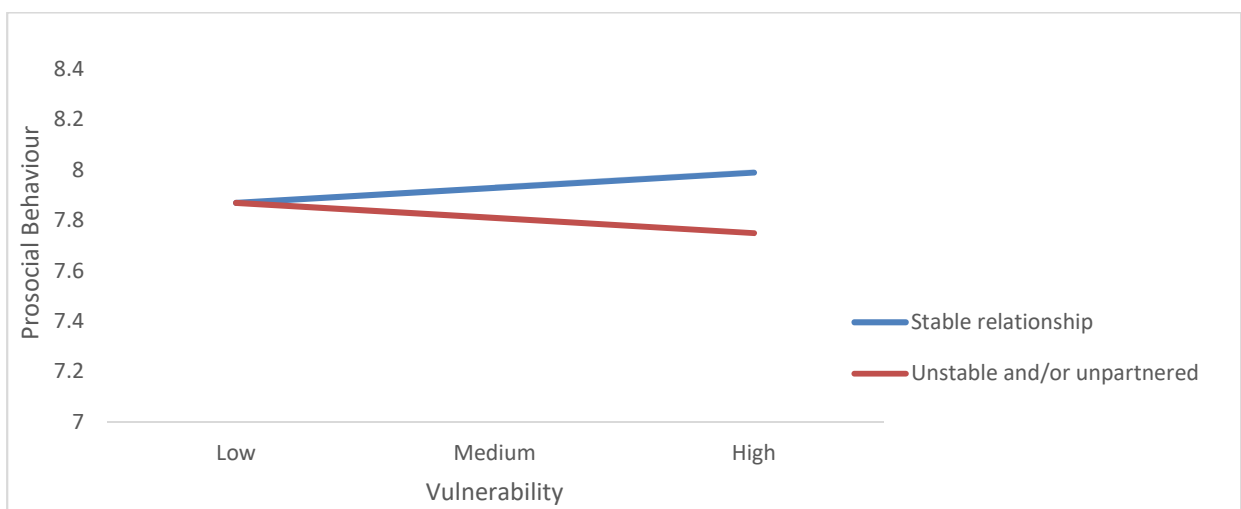


Figure 7: Antenatal vulnerability on prosocial behaviours at 4.5 years moderated by presence of stable relationship during pregnancy



Social Connectedness as a Buffer for Vulnerability and Relationship Instability

The following series of analyses sought to assess whether social connectedness disrupts or buffers the negative associations between risk factors and childhood outcomes. Two broad domains of social connectedness were examined—family connectedness and community connectedness—followed by an investigation of intimate partner connectedness (for those mothers in a partnership).

Antenatal Family and Community Connectedness

Correlations were computed between vulnerability, overall relationship instability (coded as 0 = stable across all time points and 1 = unstable or unpartnered at any point), indicators of connectedness, and childhood outcomes at 4.5 years (see Table 11).

As indicated by previous analyses, vulnerability showed a positive association with overall relationship instability. Further, there was evidence for negative associations between risk factors and social connectedness, with weak negative relationships between risks and family connectedness ($r_s = -.04$ to $-.06$, $p < .01$) and a stronger negative association between community connectedness and risk factors ($r_s = -.11$ to $-.05$, $p < .01$). These relationships indicate that greater overall social connection was associated with fewer risk factors.

Further, many of the childhood indicators were found to have negative associations with one or both types of social connectedness, with the exception being number of common childhood illnesses.

Similar to the previous analyses, a series of linear regressions were conducted (see Table 12) on each of the child behaviour and health outcomes. The main aim of these analyses was to investigate the potential protective effects of early social connectedness, and the potential for these factors to mitigate the negative effects of vulnerability and relationship stability on childhood outcomes.

Adjusting for covariates (mother's age, gestational age, and child's gender) in each model, risk factors (vulnerability and overall relationship instability) and protective factors (family and community connectedness), as well as the interaction terms between these, were entered as predictors in order to assess both the main effects and interactive effects on child outcomes.

Table 11: Correlations and Descriptive Statistics for Vulnerability, Relationship Instability, Social Connectedness and Childhood Outcomes at 4.5-year interview

	1	2	3	4	5	6	7	8	9	10	Mean	SD	A
1.Vulnerability	-										0		-
2.Overall Relationship Instability	.22**	-									-	-	-
3.Family Connectedness	-.04*	-.06**	-								3.42	.47	.84
4.Community Connectedness	-.11**	-.05**	.15**	-							3.50	.62	.84
5.Internalising	.29**	.12**	-.01	-.05**		-					3.58	2.82	.70
6.Externalising	.22**	.11**	-.06**	-.05**	.31**	.31**	-				5.70	3.10	.73
7.Prosocial Behaviour	-.04	-.01	.11**	.06**	-.16**	-.16**	-.32**	-			7.76	1.80	.69
8.Developmental Problems	.01	.05**	-.07**	-.02	.16**	.16**	.19**	-.13**	-		.53	.89	-
9.Illness	.03	.06**	-.03	-.01	.07**	.07**	.09**	-.00	.14**	-	1.90	1.32	-
10.Overall Concerns	.02	.04	-.10**	-.07**	.14**	.14**	.16**	-.15**	.23**	.06**	1.20	.50	-

Note: ** $p < .001$

Table 12: Multivariate Regression Models predicting Childhood Behaviour and Health at 4.5-year interview

	Externalising Behaviours	Internalising Behaviours	Prosocial Behaviours	Developmental Problems	Illness	Overall Concerns
Vulnerability	.09	.05	.22	.17	.12	-.03
Relationship Instability	.24*	.16	-.04	.06	-.04	.08
Family Connectedness	-.03	.02	.09**	-.07**	-.02	-.08**
Community Connectedness	-.03*	-.02	.05**	-.01	-.02	-.06**
Vulnerability X Family Connectedness	.19	.24**	-.37**	.01	-.07	.15
Vulnerability X Community Connectedness	-.06	-.01	.11	-.04	-.04	-.11
Relationship Instability X Family Connectedness	-.27**	-.07	.10	-.03	.00	-.07
Relationship Instability X Community Connectedness	.10	-.03	-.04	-.03	.10	.02
R ²	.11	.15	.05	.03	.01	.01

Note: Adjusted for mother's age, gestational age of child and child gender.

** $p < .001$, * $p < .05$

Results indicate that, after controlling for protective factors, there was only one significant main effect of risk factors still evident: relationship instability was a significant positive predictor of greater externalising behaviour, although this effect was moderated by family connectedness (as outlined below).

Family connectedness had a significant negative effect on both developmental problems ($\beta = -.07, p < .01$) and overall concerns ($\beta = -.08, p < .01$) and a positive effect on prosocial behaviours ($\beta = .09, p < .01$). Community connectedness also had positive effects, although these were weaker, predicting less externalising behaviour, more prosocial behaviours, and fewer overall concerns for the child.

Interactive effects were evident between risk and protective factors for each of the behavioural outcomes (similar to the previous analysis), but not for the health outcomes. Specifically, higher family connectedness predicted significantly reduced externalising behaviour for those children whose mothers were consistently in a stable relationship but did not have an effect for those children whose mothers experienced relationship transitions or were consistently unpartnered (Figure 8).

Significant interactive effects were also found between family connectedness and vulnerability on internalising and prosocial behaviours. Specifically, family connectedness exacerbated the negative effects of vulnerability on internalising symptoms such that children in highly connected families were more affected by increased vulnerability than those children in families with lower levels of connectedness. In fact, children in highly connected families had higher levels of internalising symptoms than those in weakly connected families at the highest levels of vulnerability (Figure 9).

Regarding prosocial behaviours, similar but opposite effects were found. Specifically, those children with high levels of family connectedness exhibited greater decreases in prosocial behaviour with increased vulnerability (Figure 10). Unlike internalising symptoms, however, at the highest levels of vulnerability, children in highly connected families still had greater levels of prosocial behaviours than children in weakly connected families.

Figure 8: Antenatal Family Connectedness on Externalising at 4.5 years moderated by Relationship Stability

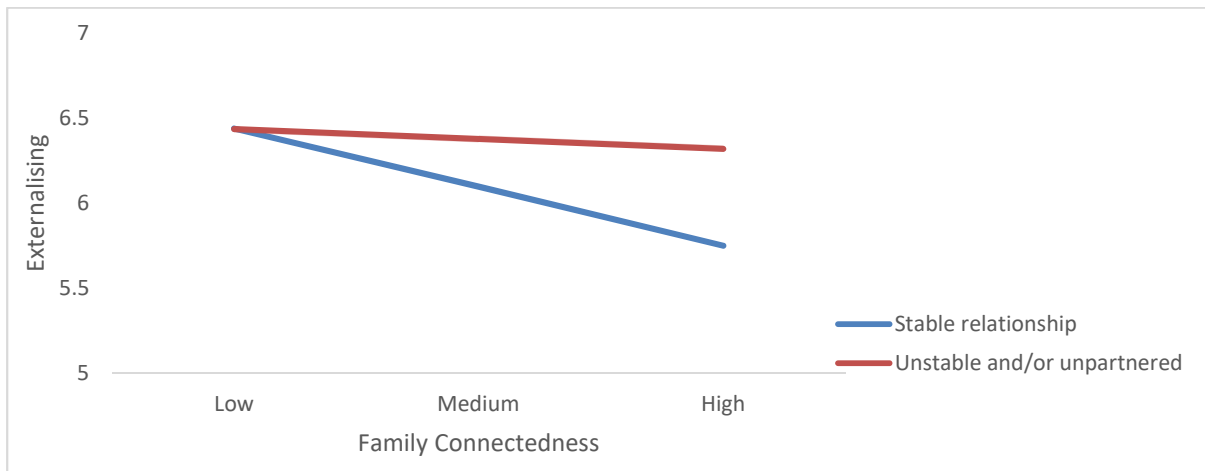


Figure 9: Antenatal vulnerability on internalising at 4.5 years moderated by antenatal family connectedness

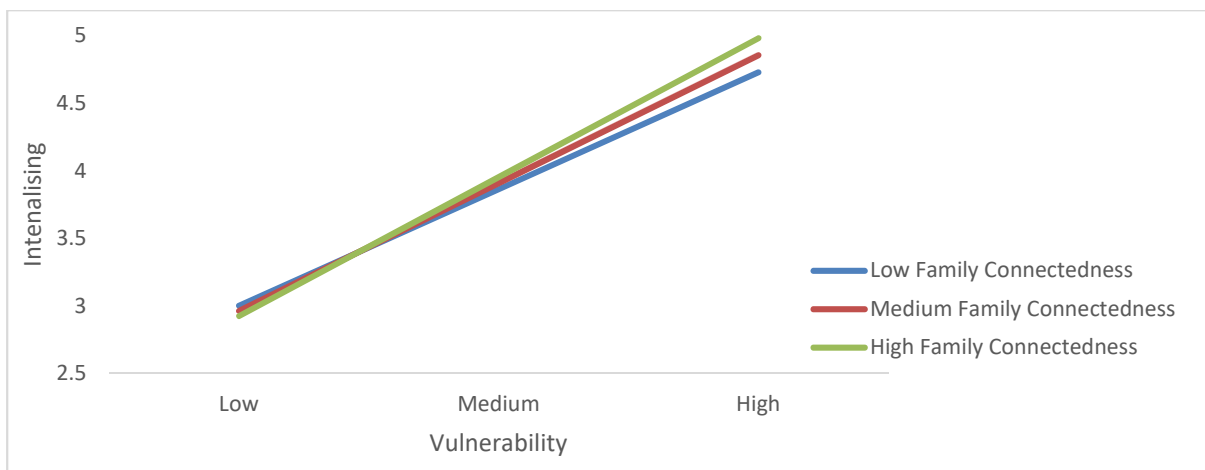
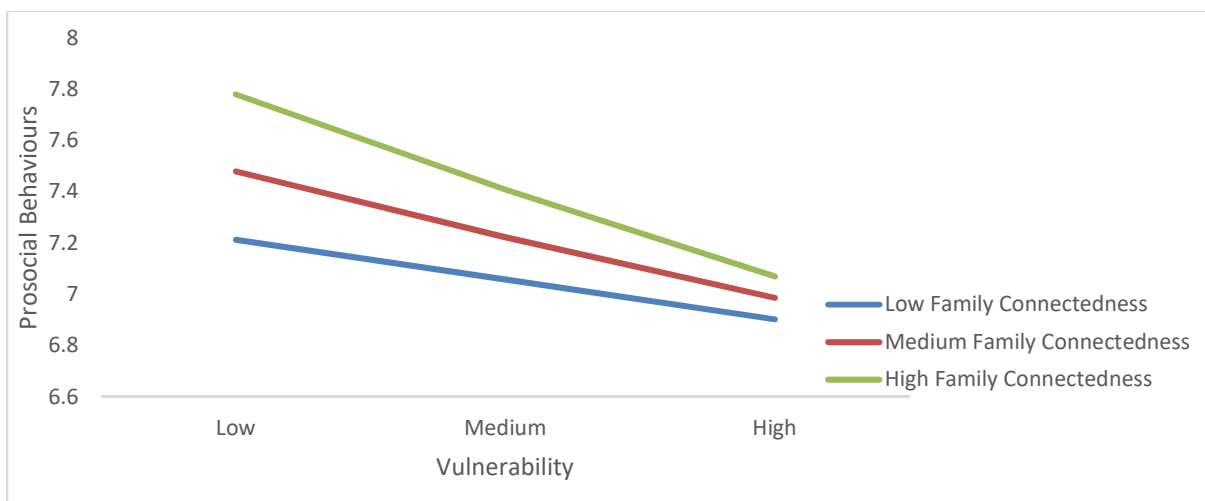


Figure 10: Antenatal vulnerability on prosocial behaviour at 4.5 years moderated by family connectedness



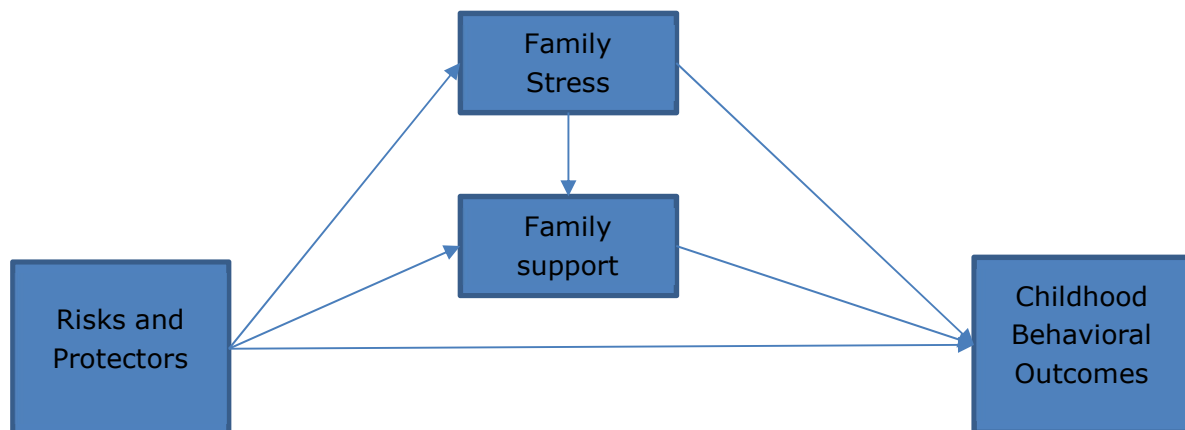
Family Factors at 9-months as Mediators of Risks and Protectors on Childhood Behaviour

To more deeply investigate the mechanisms by which risk and protective factors influence childhood behaviour at 4.5-years old, a series of models were tested examining the potential mediating effects of family stress and support at 9-months on childhood behaviour. The overall diagrammatic representation of the model is depicted at Figure 11⁵. This model proposed tested the direct and indirect relationships of antenatal risk (vulnerability and relationship instability during pregnancy) and protective factors (family and community connectedness) on childhood behaviour (externalising, internalising, and prosocial behaviours). The effects of antenatal risk and protectors on childhood behaviours were suggested to be mediated by family stress and/or perceived levels of family support at 9-months. Specifically, it was suggested that risks predict increased family stress over time, which, in turn, predicts increases in the likelihood of behavioural problems later. The opposite effect was suggested for the relationships between protectors and childhood behaviour as mediated by stress.

In parallel, greater antenatal risks were suggested to predict reduced perceived support at 9-months, and, in turn, perceived support was expected to predict decreases in behavioural problems over time, with the opposite effects suggested for the relationships between protective factors and child behaviour as mediated by support. Further, it was suggested that there might be an indirect pathway from antenatal factors to family stress and support, and then, in turn, to childhood behaviour. Specifically, it was suggested that risk factors might likely predict increases in family stress at 9-months (and decreases in protective factors), and, in turn, family stress was likely to negatively predict perceptions of support over time. Thus, through reductions in support, childhood behavioural problems were expected to increase and prosocial behaviours to decrease.

⁵ A multiple mediation model was conducted for all combinations of independent and dependent variable utilising the PROCESS macro in SPSS. This approach resulted in 12 separate models being tested.

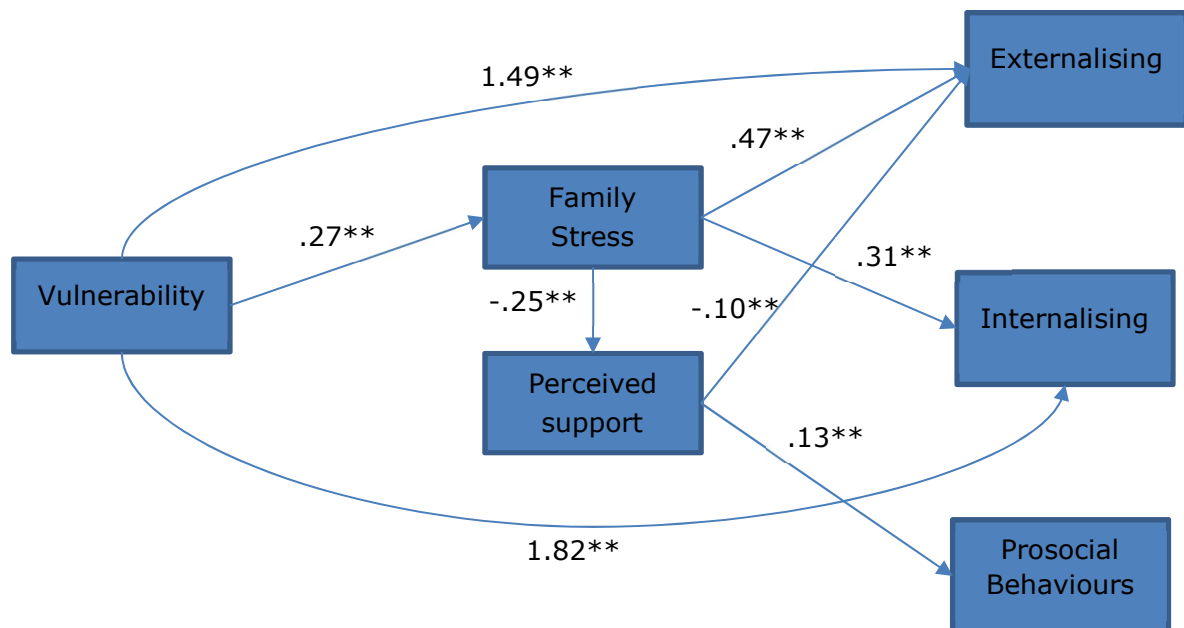
Figure 11: Proposed Mediation Model



Risk Factors: Vulnerability

The resulting model in PROCESS showed that antenatal vulnerability was found to significantly predict increased family stress at 9-months, and directly predict both increased externalising and internalising behaviours at 4.5 years (see Figure 12). Family stress was also found to significantly predict less perceived support at 9-months, and greater internalising and externalising at 4.5 years. In contrast, perceived support was found to predict decreased externalising and increased prosocial behaviours. In addition, statistical evidence was found for indirect effects on all childhood behaviours as mediated by family stress. Specifically, vulnerability was found to predict significant increases in internalising ($B = .12, p < .01$) via increased family stress and a similar indirect effect was found for externalising via family stress ($B = .13, p < .01$). In addition, vulnerability predicted an increase in externalising via the multiple mediation path through family stress to reductions in perceived support to externalising ($B = .01, p < .05$). And last, vulnerability was found to predict decreased prosocial behaviours through the multiple mediation of family stress to reductions in perceived support ($B = -.01, p < .05$).

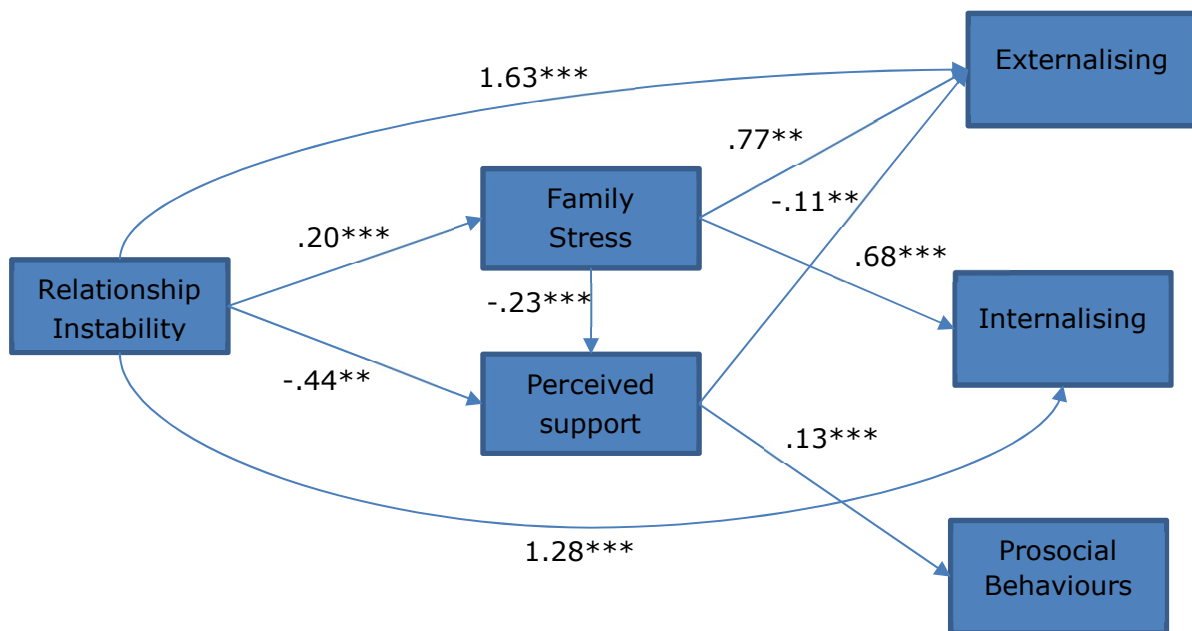
Figure 12: Unstandardised Coefficients for Stress and Support as Mediators of Vulnerability



Risk Factors: Relationship Instability

Very similar results to vulnerability were found for the risk factor of relationship instability (see Figure 13). Relationship instability was found to significantly predict increased family stress and decreased family support at 9-months as well as directly predict both increased externalising and internalising behaviours at 4.5 years. Family stress was also found to significantly predict less perceived support at 9-months and greater internalising and externalising at 4.5 years. Perceived support, however, was found to predict reduced externalising and increased prosocial behaviours. There was also evidence for indirect effects on problem behaviours as mediated by family stress, and on prosocial behaviours as mediated by support. Specifically, antenatal relationship instability was found to predict significant increases in internalising ($B = .11, p < .01$) and externalising ($B = .13, p < .01$) via increased family stress. Additionally, relationship instability was found to decrease prosocial behaviours via reductions in perceived support ($B = -.03, p < .01$).

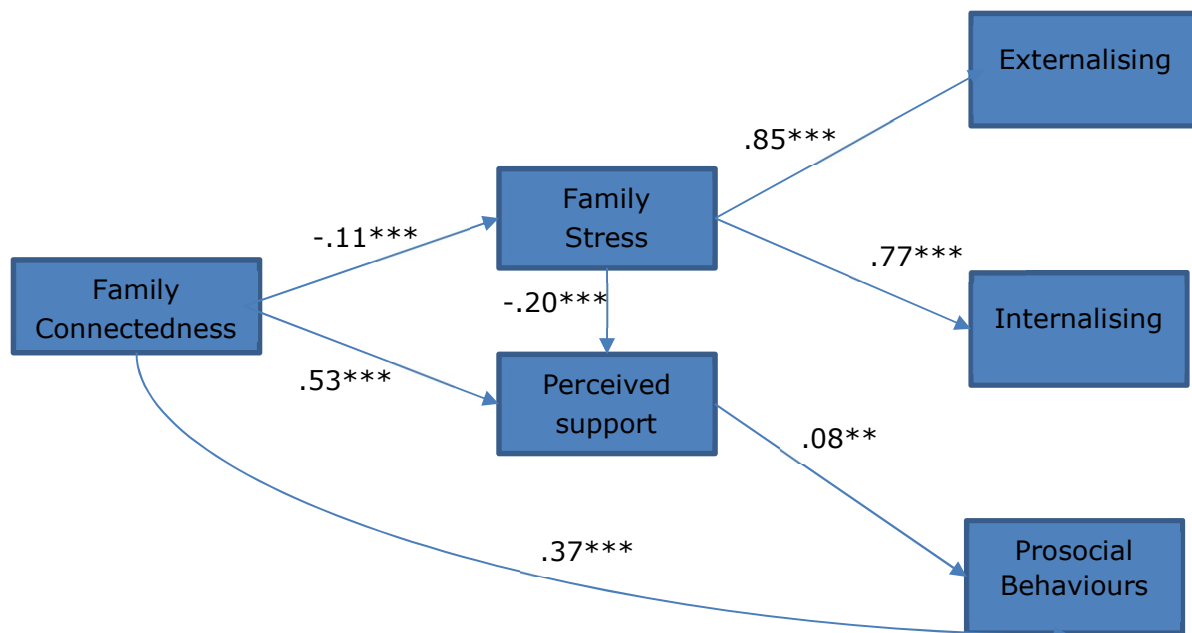
Figure 13: Unstandardised Coefficients for Stress and Support as Mediators of Antenatal Relationship Instability



Protective Factors: Family Connectedness

The obtained model (see Figure 14) showed that family connectedness was found to significantly predict decreased family stress and increased perceptions of support at 9-months as well as directly predict increased prosocial behaviours at 4.5 years. Similar to previous analyses, family stress was also found to significantly predict less perceived support at 9-months, and greater internalising and externalising behaviour at 4.5 years, while perceived support only predicted increased prosocial behaviours. Evidence was found for indirect effects on all childhood behaviours as mediated by family stress and support. Specifically, family connectedness was found to predict significant decreases in internalising ($B = -.09, p < .01$) and externalising ($B = -.13, p < .01$) via reduced family stress. Additionally, family connectedness was found to predict increases in prosocial behaviours via perceived support ($B = .05, p < .01$), as well as through the multiple mediation where family connectedness predicted reduced family stress, reductions in stress predicted increased perceived support, and then family support predicted increased prosocial behaviours ($B = .01, p < .01$).

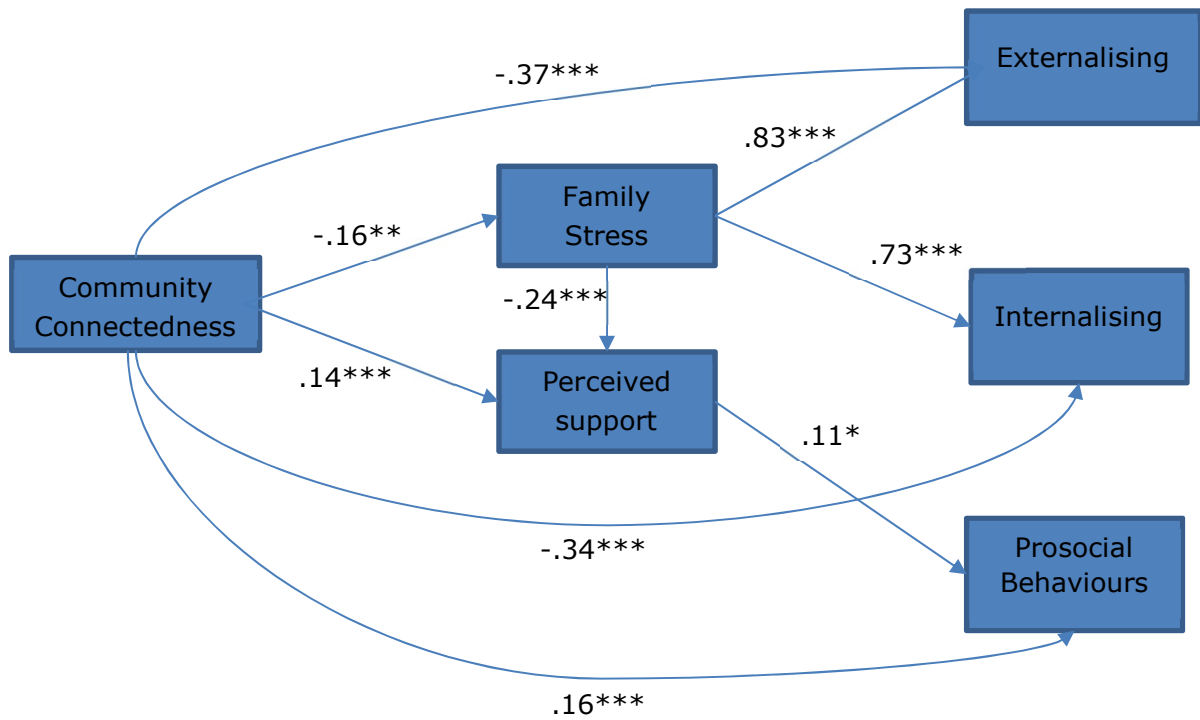
Figure 14: Unstandardised Coefficients for Stress and Support as Mediators of Family Connectedness



Protective Factors: Community Connectedness

Similar to family connectedness, community connectedness was found to significantly predict decreased family stress and increased perceptions of support at 9-months as well as directly predict decreased internalising and increased prosocial behaviours at 4.5 years (see Figure 15). Similar to previous analyses, family stress was also found to significantly predict less perceived support at 9-months, and greater internalising and externalising at 4.5 years, while perceived support only predicted increased prosocial behaviours. Several indirect effects were found, specifically community connectedness was found to predict significant decreases in internalising ($B = -.02, p < .05$) and externalising ($B = -.04, p < .05$) via reduced family stress. Additionally, family connectedness was found to increase prosocial behaviours via increases in perceived support ($B = .02, p < .05$).

Figure 15: Unstandardised Coefficients for Stress and Support as Mediators of Community Connectedness



Discussion

Given the wide range of variables, numerous times of measurement, and variety of analytic analyses, we have presented a long list of findings in the Results section above. To help with reader comprehension, we summarise key findings below, and following this summary, we unpack the findings by noting key interrelationships among the variables, and end with policy recommendations.

Summary of key findings:

- It is not the norm for New Zealand mothers to be without partners. However, the chance that a child will experience a period in which their mother is unpartnered increases as they get older. Negative behavioural outcomes remain a risk factor for children whose mothers experience unstable relationships.
- The majority of mothers remained in a stable relationship from the time they became pregnant until the time their child was 4.5 years old.
- Those who were unpartnered or in unstable relationships were very likely to remain this way over time rather than transition into a stable relationship.
- The most common pattern aside from a stable partnership was being consistently unpartnered, followed by ending a relationship and lastly becoming re-partnered.
- Being in an unstable relationship or being unpartnered was more likely to occur as the child grew older, (7% pregnancy to antenatal, 9% antenatal to 9-months, 12% 9-months to 2-years, and 14% 2-years to 4.5 years).
- A relatively substantial portion of mothers (17.3%) went through some period of being unpartnered or experiencing relationship instability from the time they conceived until the time their child was 4.5 years old. The majority of these mothers (73%) experienced more than one period of being unpartnered or experiencing instability, and nearly a quarter (22%) was in an unstable relationship or unpartnered across all time periods studied.
- Those mothers who were unpartnered or in unstable relationships experienced higher relative levels of vulnerability than those mothers in stable partnerships at each time point.

Relationship instability and vulnerability co-occurred and interacted in the prediction of childhood behavioural problems.

- Although vulnerability increased the likelihood of both internalising and externalising behaviour, it was relationship instability from the period when the child was conceived until the antenatal interview that tended to have the greatest effects on childhood behaviour.
- At the same time, the effects of vulnerability on all behaviour (externalising, internalising and prosocial) were moderated by antenatal relationship instability. For both behaviour problems, early relationship

instability exacerbated the negative effects of vulnerability. However, for stable families, vulnerability was a positive predictor of prosocial behaviour, although the opposite was true for unstable or unpartnered families. This result indicates that vulnerability put additional strains on families already experiencing risk, which had deleterious flow-on effects to child behaviour.

- The effects described above seem to primarily hold true for childhood behaviour, and less so for the other health-related indicators (and where they did, the effects were very small). This pattern is understandable given that health during childhood may have multifactorial influences, whereas behaviour is proximally influenced by parenting and the family environment.

Antenatal social connectedness reduced some, but not all, of the negative effects of vulnerability and early relationship instability – and the story is more complicated than it initially seems.

- Family connectedness interacted with risk factors in the prediction of childhood behaviours, but not health outcomes. In parallel to the previous findings, connectedness seemed to be a cumulative protective factor within the family that worked additively with relationship stability (rather than interacting with it) in reducing the levels of externalising and prosocial behaviour (but not for internalising symptoms).
- Children in stable households with high levels of family connectedness evidenced greater reductions in externalising and greater increases in prosocial behaviour than those children living in highly connected families in unstable households.
- However, for internalising behaviour, family connectedness had the opposite effect. For children in highly connected families, greater vulnerability increased internalising behaviour. This somewhat surprising result may occur because children are more deeply embedded into the family system, and therefore seem to experience the negative outcomes of vulnerability more directly and intensely.

Transitions and problems within the contextual family environment after the birth of the child can increase the negative effects of early risk factors and reduce the positive effects of protective factors on child behaviour.

- Early vulnerability predicted increased family stress after the child was born. This increased stress directly predicted increased childhood problem behaviours and increased the negative effects of vulnerability. Vulnerability did not directly predict reduced perceived support received after the child was born, but family stress did. This result suggests that there were cascading effects from vulnerability to increased family stress and reduced family support, which then led to increased childhood behaviour problems.

- Very similar to vulnerability, antenatal relationship instability directly predicted increased externalising and internalising behaviour, as well as indirectly predicted increased behaviour problems via increases in family stress, but also via decreased support. The cascading effect of early relationship instability on all child behaviours was evident in the models we tested.
- Family connectedness was found to predict decreases in family stress and increases in perceived support, but was only found to have a direct effect on increased prosocial behaviours. Effectively, family connectedness predicted decreased behaviour problems via reduced stress and predicted increased prosocial behaviours via increased support.
- Community connectedness had direct protective effects on childhood behaviour as well as indirect effects in reduction in problem behaviour via reductions in stress and increases in prosocial behaviour via increases in perceived support.

Broad Conclusions

- Early vulnerability and early parental relationship disruption unfortunately exert long-term negative effects on children’s development, but protective factors, such as social connectedness, can protect against these pernicious influences.
- Three avenues for bolstering optimal child development would seem to be:
 - Supporting long term involvement of both parents in a child’s life;
 - Reducing vulnerability; and
 - Encouraging healthy family connectedness and the involvement of families within their communities.

All three above-named avenues could be strengthened and promoted through government interventions and programmes.

Interpretation of key findings:

The longitudinal data from the Growing Up in New Zealand Study (GuiNZ) has provided a valuable opportunity to examine the trajectories of infants and their families over time, to better understand the impact of prenatal and early childhood factors on outcomes around five years later. In this project we have elucidated the influences and interactions of prenatal and postnatal aspects of families on children’s wellbeing. In particular we have studied the importance of relationship instability, economic and housing vulnerability, and connectedness to family and community. Although relationship instability and vulnerability have both broadly exerted deleterious influences, and social connectedness has broadly exerted beneficial influences on child outcomes, our research findings

illuminate how these influences work conjointly and/or sequentially over time to impact upon families and children.

Relationship Instability

Although it is not the norm in New Zealand, being unpartnered or in an unstable relationship is a relatively common experience that is increasing in our society, and increases in frequency as children grow older. We found that the large majority of mothers in the GUiNZ study remained in a stable relationship from the time they became pregnant until the time their child was 4.5 years old. However, those mothers who were un-partnered or in unstable relationships were very likely to remain in that status over time, rather than transition into a stable relationship.

The most common pattern aside from staying in a stable partnership was being consistently un-partnered. The next most common change was ending a relationship. The least common change during their child's early years was a mother re-partnering. Being in an unstable relationship or being un-partnered was more likely to occur as the child grew older, (7% pregnancy to antenatal, 9% antenatal to 9-months, 12% 9-month to 2-years, and 14% 2-years to 4.5 years).

It is notable that a relatively substantial portion of mothers (17.3%) went through some period of being un-partnered or experiencing relationship instability from the time they conceived until the time the child was 4.5 years old. Further, the majority of these mothers (73%) experienced more than one time period of being un-partnered or experiencing instability, and nearly a quarter (22%) were in an unstable relationship or un-partnered across all time periods studied. In sum, almost one in five mothers had periods of time when they were raising their child alone.

Economic and Household Vulnerability in Conjunction with Relationship Instability

We found that those mothers who were un-partnered or in unstable relationships also had higher relative levels of vulnerability than those in stable partnerships at each of the time points. They were more likely to experience household deprivation and overcrowding, and to suffer from depression, financial stress, low household income and comparatively low levels of education. As expected, both these two background factors additively predicted worse child outcomes, for example, externalising behaviour. Unsurprisingly, these two factors, relationship instability and vulnerability, were related. New information was obtained in our study showing that they also interacted with each other in the prediction of childhood behavioural problems. In particular, vulnerability in the

antenatal period increased the likelihood of both internalising and externalising behaviour, but importantly, relationship instability from the period when the child was conceived until the antenatal interview tended to have a greater effect on childhood behaviour compared with later instability.

Importantly, the effects of vulnerability on all behaviour (externalising, internalising and prosocial) were moderated by antenatal relationship instability. For both kinds of behavioural problems, early relationship instability exacerbated the negative effects of vulnerability. However, for stable families, vulnerability had a positive effect on prosocial behaviour, although the opposite was true for unstable or unpartnered families. This finding suggests that vulnerability puts additional strains on families already experiencing risk, which had flow-on effects to child behaviour. Conversely, as expected, stable relationships during pregnancy appeared to be protective against the impact of vulnerability.

The effects of vulnerability and relationship instability seemed to manifest consistent influences primarily on childhood behaviour, and they had less impact on health-related indicators. This pattern makes sense given that health during early childhood may have multifactorial influences, whereas behaviour is influenced in the main by parenting and the family environment.

Family and community connectedness

The third major influence we studied was social connectedness (operationalised as family connectedness and community connectedness). As predicted, we found direct beneficial relationships between family connectedness and community connectedness measured in the antenatal period, and subsequent children's outcomes. And, predictably, social connectedness was related to both vulnerability factors as expected; more vulnerable families and mothers experiencing relationship instability evinced lower levels of both kinds of connectedness.

Family and community connectedness functioned as protective factors for some, but not all, of the negative effects of vulnerability and early relationship instability. Family connectedness, particularly, evidenced the strongest bufferings of the effects of vulnerability on child outcomes. Specifically, family connectedness interacted with risk factors in the prediction of childhood behaviours, although not for health outcomes. Family connectedness appeared to be a cumulative protective factor within the family that worked in concert with relationship stability to buffer the negative effects of instability on externalising and prosocial behaviour.

We also found that stable households with high levels of family connectedness evidenced greater reductions in externalising and greater increases in prosocial

behaviour than did unstable households with high levels of family connectedness. In other words, the high degree of social connectedness within stable households generally exerted a strong protective influence on children's development. However, for the outcome of internalising child behaviour, family connectedness had the opposite effect. Specifically, for children in highly connected families, greater vulnerability increased levels of internalising behaviour. In other words, in highly connected families, vulnerability appeared to have a stronger impact on behaviours. This outcome may have occurred because children who are more deeply embedded into the family system are more likely to experience the negative outcomes of vulnerability more directly. It is possible that the impact of poverty and depression on parents is more directly transmitted to children who are raised in closer families. Thus, although we tend to consider family connectedness to be beneficial, this finding suggests that in some high deprivation households, close family connections might serve to worsen child outcomes.

Other Family Factors of Stress and Support

When we examined the possible effects of two other important family factors, namely stress and support, when the children were nine months old, we found that they mediated the ability of both vulnerability and relationship instability to predict behavioural outcomes for children. Predictably both relationship instability and vulnerability positively predicted stress and negatively predicted support, which, in turn, predicted child problems in expected ways. Specifically, early vulnerability predicted increased family stress after the child was born. In turn, stress at nine months directly predicted increases in subsequent childhood problem behaviours later. Vulnerability did not directly predict reduced perceived support after the child was born, but family stress did. This predictive relationship indicates the presence of cascading effects from vulnerability to increased family stress and reduced family support over time, which then led to increased childhood behaviour problems at 4.5 years.

As well as directly predicting externalising and internalising behaviour, antenatal relationship instability also indirectly predicted behaviour problems through the prediction of increases in family stress. It also manifested an indirect predictive effect on problem behaviours via decreased support. In contrast, family connectedness in the antenatal period was also found to predict decreased family stress and increased perceived support, and it had a direct predictive effect on increased prosocial behaviours. Family connectedness also predicted decreased behaviour problems indirectly through reduced stress and predicted increased prosocial behaviours through increased support. Community connectedness negatively predicted maladaptive childhood behaviour (internalising and externalising) as well as having an indirect predictive impact on problem behaviour through reduced family stress. Community connectedness

also had an indirect predictive effect on prosocial behaviour through increased family support. Taken together these direct and indirect relationships convincingly portray the web of interconnections among key constructs that predict the unfolding developmental trajectories of infants, toddlers, and children. In largely expected ways, positive influences (e.g. connectedness and support) negatively predicted behavioural problems and positively predicted good behavioural outcomes. In contrast, negative influences (e.g. vulnerability, relationship instability, and stress) showed the opposite associations. Importantly, these key constructs, all of which are modifiable to some extent, could possibly be ameliorated in an effort to improve developmental outcomes for New Zealand children.

Conclusions and Policy Implications

The ability of factors existing before children are born and in their early months as infants to predict later outcomes is striking in these findings.

Financial, household and personal vulnerability, and instability in relationships seem to be able to predict immediate and medium-term negative effects on children's development. Before children are born, their mothers' unstable relationships, vulnerability to poverty and mental illness, and feelings of connection to their families and whanau and their communities, are able to significantly predict outcomes. All three factors manifested independent (additive) effects on the outcomes, but they also statistically interacted with each other, suggesting that these factors combine in a complex web of interconnections to influence child outcomes.

The implications of these findings are:

- First, attention to the period between conception and birth is clearly needed. As well as support for lone parents in terms of housing and financial wellbeing, support for existing relationships is also warranted. This assistance might include screening for relationship difficulties for those pregnant women with partners, and provision of support outside the household for those women who are alone. An intervention at the six week check-up for infants in which a simple relationship screening tool is given to mothers is a possibility, with those women that indicate problems being offered support. Government funding for counselling services for parents who are expecting, or who have young children, could be preventative of future negative consequences for the family, the parents, and the children. Our findings suggest that this type of intervention, or something similar, would be a cost-effective way of ameliorating problems for children later.

These suggestions are consistent with goals and strategies enunciated in the September 2018 Cabinet paper entitled **Child Wellbeing Strategy Work Programme and Budget Implications**. Two relevant goals noted in this policy statement are “Children experience optimal development in their first 1000 days: safe and positive pregnancy, birth and parenting (conception to around two years)”, and “Children are thriving socially, emotionally and developmentally in the early years (two to six years).” The findings of the present research underscore the importance of these aspirations for our country’s youngest members. Further, this policy statement argues that more attention needs to be paid to the developmental period between conception and birth, a critical time period that serves as the foundation for later life. The present research findings also provide support and backing for the upcoming update of the **Child and Youth Wellbeing Strategy**, which is being developed by the Child Wellbeing Unit in the Department of Prime Minister and Cabinet, and will be published in 2019.

And last, our findings highlight how proper development during the antenatal period can have long-lasting implications for later mental health outcomes. The **Government Inquiry into Mental Health and Addiction** released a recent report on 4 December, 2018, and its goal was to identify service gaps and develop recommendations for a better lifespan mental health system. It is relevant here because the report notes the foundational role that prenatal and early brain development plays for adaptive mental health over the lifetime of a person. Harm to a developing fetus’s or baby’s brain can have long-lasting deleterious effects in a host of different domains. Healthy and attentive engagement in a baby’s life by empathic parents is protective against adverse developmental outcomes, and enrolment of toddlers and young children in support and play groups is also considered to be facilitative of optimal cognitive and social development.

- Second, financial, housing, and mental health vulnerability are clear issues that need addressing and particularly in the antenatal period. The data show links between these aspects of vulnerability and poor outcomes for families and children, consistent with decades of other research. Consequently, a case can be made for providing a living wage for households trying to subsist on poverty-level income (see for example Waldegrave, King, & Urbanova 2018). Lone parents are in particularly difficult circumstances with regard to finances since, unless they can obtain child care from family members, they are required to pay for care for their child if they enter the work force. In terms of housing, New Zealand has relatively low supplies of affordable housing for families on

low wages. This situation causes overcrowding, which triggers other vulnerability factors. For example, substandard housing is also linked with poorer mental health, cognitive development, and emotional wellbeing of children (Child Poverty Action Group, 2015).

Economic hardship is an area of concern in recent years in New Zealand. **The Child Poverty Reduction Act 2018**, which was enacted in December, 2018, commented on a need for a general reduction in child poverty, encouraging accountability for efforts to achieve published targets, requiring periodic non-political reports of child poverty levels, and requiring a pledge by government to foster child wellbeing. The Act stipulates the creation of a policy approach designed to improve the wellbeing of New Zealand children. It was stated in the September, 2018 **Child and Youth Wellbeing Strategy Cabinet paper** that one of the initial goals is "Child poverty is reduced, in line with the Government's intermediate and ten-year targets".

And last, the **Welfare Expert Advisory Group** (WEAG) has undertaken a general review of the New Zealand welfare system. Their work will clearly lead to further policy work relevant to the wellbeing of children and families.

- Third, we found that family stress and lack of support for families are significant mediators of early adversity on later child development. These results argue for continued and increased focus on investing in families, especially when children are young. Reductions in poverty, personal vulnerability factors (such as low education), and poor housing are likely to also reduce family stress and simultaneously boost perceptions of support over time, which, as demonstrated in our research findings, are likely to predict improved outcomes for children's development.

Our research as well as many other studies show that single parents can experience numerous difficulties in many areas of their lives. **The Families and Whānau Status Report 2018** reported that single parents yield poorer outcomes compared to other New Zealand family types. Although many sole parent families function well and achieve good outcomes for the parent and children, as a group they experience particular difficulties concerning finances and adequacy of parental supervision of young children, among other particular stressors. Governmental policy, based on our findings, would do well to give additional consideration for this family type with regard to services developed broadly for families and whānau with children. 'One size for families' may not fit all in terms of sole families' needs.

The findings of the present research is consistent with the **Status Report** in that both note different types of age-specific family stressors occurring at different points in the lifespan, and constituting a multiply determined profile of risk and vulnerability. The idea of multiple disadvantage has been described in the **Families and Whānau Status Reports** (from 2017 onwards), and **Oranga Tamariki** has developed a model of wellbeing across a child's life, which identifies instances where children experience one or more types of need. Cases of multiple disadvantage is a reality which government is increasingly conscious of, and responsive to, in the social policy domain. When children and families evidence needs across multiple domains, government agencies must work together effectively in addressing these oftentimes related needs, because many of these multiple-need families will 'show up on the radar' simultaneously across various agencies. Multiple risk factors can exacerbate and worsen a child's set of outcomes, so these cases are often the most urgent to identify and treat.

In this vein, the **Southern Initiative in South Auckland** (a body sponsored by the Auckland Council), has highlighted the need to identify "toxic stress" (cumulative and prolonged levels of stress) in families with babies, toddlers, and young children. This pernicious level of stress on parents is deleterious to the parents and indirectly it may seriously influence outcomes in the lives of their children and can have long-lasting effects on the wellbeing trajectories of the children. The Southern Initiative engages in innovative tests and trials in how services and agencies can best engage with these families and blunt the effects of multiple stressful circumstances. They 'work with a range of government, council, iwi, community, and business groups' in order to foster employment and work skills, support whanau and families, and promote entrepreneurship.

- Fourth, one of our most important findings was that feelings of connectedness to family and community functioned as a protective factor. The increasing diversity of families in New Zealand means that innovative approaches to helping families feel connected to each other are needed. Our findings, as well as others' (e.g., Cribb, 2009), suggest that the nature of cultural diversity in New Zealand means that the simple application of one-size-fits-all interventions and supports is not likely to be effective for everyone. For example, in a study of resilience in sole parent families in New Zealand, Waldegrave et al. (2016) highlighted cultural differences in where lone parents derive support and resilience. Appropriate encouragement toward cohesive families, provision of community support and encouragement of community involvement will need to be enhanced in culturally appropriate ways as a part of the focus of family social policy in New Zealand. These efforts should particularly

target families that are not integrated within their neighbourhood or community well, eg, single-parent headed families that are new to a community.

The early document of the Child and Youth Wellbeing Strategy entitled **Process for Developing the First Child Wellbeing Strategy** (2018) by the Office of the Minister for Child Poverty Reduction emphasised the Oranga Tamariki Lifetime Wellbeing Model, which cites the five domains of safety, security, stability, wellness, and development, which our present findings support as desirable goals for children. Further, the document stressed the development of 'human and social capital', which would encompass the aspects of social connectedness identified in the present work as beneficial to growing children and healthy families. More policy work needs to specifically address attenuated social connectedness by communities, parents, and children in order to provide resources for this important buffer of life's problems and difficulties.

In summary, the findings of this report provide further strong evidence for the vital importance of children's early years and especially the significance of the antenatal period, a time that has received less attention than infancy and early childhood. It shows the complex interactions amongst factors that impinge on wellbeing and development, and it emphasises the roles that family factors play, and in turn the impact on families and children of external factors such as poverty and support.

Limitations and future directions

Several limitations should be noted in the context of our reporting of the present empirical findings.

- First, as with all longitudinal studies, our observations of the predictive relationships among variables over time cannot be authoritatively interpreted as causal. Antenatal vulnerability predicted higher levels of stress two years later. Although it is plausible, and even compelling, to argue that economic deprivation during pregnancy caused higher stress two years later, we have not conducted an intervention with these variables, so we are limited to speculating about covariance of variables over time. The inclusion of covariates and the construction of path models involving multiple variables lend credibility to arguments of 'influence' and 'effect'. In the end, we have chosen the phrase 'variable A predicted an increase in variable B over this period of time', although we ultimately hope that these naturally occurring temporal covariances can be altered through social policy to truly effect more salubrious outcomes.

- Second, not all variables have been taken at all time points in the GUiNZ longitudinal study. If we had consistent measurements of vulnerability across the time-span, we would be able to track more sensitively the impact of it on other variables, and vice versa. However, the nature of longitudinal studies is that situations change (eg, some mothers become unpartnered) and variables change according to age-specific concerns. It is acknowledged, due to the economic constraints on the grant, that it is not feasible to collect all data at all time points. On balance, the GUiNZ study has collected numerous relevant variables from a large sample at close time intervals, marking it as one of the most successful longitudinal studies in New Zealand.
- The present analyses focused on gleaning information from the partner data, and interesting and useful conclusions were obtained. However, the research team acknowledges that some limitations should be noted with regard to this aspect of the data. Five 'snapshots' of partner relationships for the mother were taken (ie, conception, antenatal, 9 months, 2 years and 4.5 years), and although the relationship variable at the first two time-points allowed for identification of change in the individuals in the relationship, the latter measures did not. The last three time points asked simply whether the mother was in a relationship, not whom the partner was, and this lack of information allows for imprecision in identifying stable vs. unstable relationships over time. We recognise this potential source of error and urge that future assessments of the mother's relationships be more precise.
- The measure of vulnerability created here included two items concerning the mother's background but no items assessing the father's background. Although we earlier commented that this approach is often employed because of the biasing effect of missing data from fathers, we also acknowledge that the GUiNZ dataset obtained considerable data from fathers. Future work could take advantage of this information to determine how much value it would add to vulnerability assessments such as the one used here.
- Not much work has been performed on family and community connectedness, and part of the reason is that development of these measurements is still in its infancy. Although we believe that we used reasonably reliable and valid assessments in this regard, future work is needed to improve these measurements.
- The statistical treatment of the data identified general patterns of association among the key constructs. By doing so, we have glossed over individual cases that are hugely impactful at the personal level. A seriously ill child, for example, can cause household stress in a variety of ways (on the parents' relationship, on financial wellbeing, household mobility, etc.). This particular examination was not examined here due to limitations of the data collected, and the statistical approaches utilised. The analyses that we performed on the data that we obtained at these particular time points can illuminate broad associations among variables, but fine-grained detail about individuals will necessarily be lost in examining a sample of this size. Case studies of specific (and perhaps less common) causal influences would broaden our understanding of how people's lives are affected by these forces.

In terms of future directions for GUiNZ, the future seems to be bright. The study has established a very strong foundation of data concerning early development,

and with sustained funding, it is likely that the study can obtain further high-quality data on age-appropriate constructs moving forward. We would argue that family structure and dynamic variables should be continued to be collected, as well as risk factors that constitute vulnerability dimensions for the parents and the child. Of course, continued assessment of age-appropriate child outcomes will be collected as well, and these will evolve and change as the child ages. And finally, it is important, as the GUiNZ team fully appreciates, that culturally sensitive measures of development, family dynamics, and community engagement should be taken as well, given the cultural groups represented in this sample.

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