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Life course predictors of child emotional distress during the COVID-19 pandemic: Findings from a prospective intergenerational cohort study

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Background: We examine precursors of child emotional distress during the COVID-19 pandemic in a prospective intergenerational Australian cohort study. **Methods:** Parents (N = 549, 60% mothers) of 934 1–9-year-old children completed a COVID-19 specific module in 2020 and/or 2021. Decades prior, a broad range of individual, relational and contextual factors were assessed during parents' own childhood, adolescence and young adulthood (7–8 to 27–28 years old; 1990–2010) and again when their children were 1 year old (2012–2019). **Results:** After controlling for pre-pandemic socio-emotional behaviour problems, COVID-19 child emotional distress was associated with a range of pre-pandemic parental life course factors including internalising difficulties, lower conscientiousness, social skills problems, poorer relational health and lower trust and tolerance. Additionally, in the postpartum period, pre-pandemic parental internalising difficulties, lower parental warmth, lower cooperation and fewer behavioural competencies predicted child COVID-19 emotional distress. **Conclusions:** Findings highlight the importance of taking a larger, intergenerational perspective to better equip young populations for future adversities. This involves not only investing in child, adolescent, and young adult emotional and relational health, but also in parents raising young families. **Keywords:** Cohort studies; longitudinal data analysis; COVID-19; child behaviour; mental health; intergenerational; life course.

Introduction

The COVID-19 pandemic and resulting public health measures can be regarded as complex, global multi-faceted stressors with unknown long-term implications for individuals, families and society. Despite infection rates remaining low in Australia until 2022, families living in the State of Victoria, in particular, endured some of the most extensive social restrictions in the world during 2020 and 2021, involving wide-ranging disruptions to caregiving, work and learning in the absence of usual support systems (Edwards et al., 2022). Although children are less affected by COVID-19 in terms of infectious morbidity and mortality, pandemic mitigation measures have challenged the emotional and relational health of families (Prime, Wade, & Browne, 2020; Westrupp et al., 2021) and long-term sequalae are unknown. Children were also arguably one of the most disadvantaged population groups during lockdowns as a result of physical distancing, closures of childcare centres and schools, restricted access to playgrounds, clubs and leisure centres and disruption to daily routines (Shergold, Broadbent, Marshall, & Varghese, 2022). Further concerns are now being raised about possible socioemotional and cognitive developmental delays (Goldfeld et al., 2022).

Children rely on their caregivers for socioemotional and self-regulative support particularly in times of stress (Bridgett, Burt, Edwards, & Deater-Deckard, 2015). However, at a time of unprecedented challenges during the pandemic, the capacity of caregivers to support and protect their children is likely to depend on their own life histories including coping abilities, mental health and wellbeing and social supports. Indeed, a growing body of intergenerational research indicates that risk for child

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mental health problems may have their origins in the parent's preconception period well prior to pregnancy during parents' own childhood, adolescence or early adulthood (Letcher et al., 2020; Spry et al., 2020). This is important because it points to an often-missed idea, that investments in emotional and relational health are required at each age and stage of development to ensure not only that children and young people develop well, but that in doing so secure foundations are set for the next generation.

However, the extent to which such early life course investment could be considered protective of next generation adjustment to crises such as COVID-19 is yet to be examined. Many studies with pre-COVID baseline data have documented an increase in child internalising problems during the pandemic (Kauhanen et al., 2022; Newlove-Delgado et al., 2023). Much less is known about earlier risk and protective factors, with the bulk of research being cross-sectional (e.g., 74% of studies in one review; Panchal et al., 2021) and even those with prospective data have tended to examine risk and protective factors during the pandemic (e.g., Magson et al., 2021) rather than well prior. Systematic reviews have shown that female sex, older age (adolescent vs. child), poorer pre-pandemic mental health, chronic physical conditions, rural location and low income were associated with higher levels of youth mental health problems during COVID-19 (Elharake, Akbar, Malik, Gilliam, & Omer, 2022; Samji et al., 2022). These reviews show that most studies to date have included a limited set of factors, typically within sociodemographic and mental health domains and in adolescence rather than childhood (Kauhanen et al., 2022; Panchal et al., 2021).

A more comprehensive analysis would include a much more extensive array of factors relevant to children and their parents, including those assessed within parents' preconception years starting in childhood. Intergenerational perspectives highlight a range of parent factors that may be implicated in the growth and development of the next generation, due to biological and/or environmental processes (Patton et al., 2018). Parents provide both genes and a rearing environment for their children, and traits and behaviours first emerging in childhood or adolescence have the potential to persist or cascade over time and contribute to how parents raise the next generation (Cheng, Johnson, & Goodman, 2016). Developmental psychopathology and attachment theory emphasise the importance of early experiences in building the foundations for psychosocial functioning and adaptive capacities, in adults and their offspring (Rutter, 2006). Systems theories such as the family stress model also note the importance of preexisting vulnerabilities in challenging the family system during times of stress such as COVID-19 (Prime et al., 2020). Guided by the ecological model of development (Bronfenbrenner & Morris, 2006), these vulnerabilities or strengths may be grouped into individual parent and child characteristics (e.g., temperament, physical health, social skills, prior mental health), relational factors (e.g., parent and peer relationships, school bonding) and contextual factors (e.g., socioeconomic status, community bonding). However, opportunities to explore a range of prospective factors, across ecological domains, and across the parent life course (from childhood to parenthood) are exceedingly rare.

Here, we take advantage of a longstanding intergenerational cohort study with data on child emotional distress during the COVID-19 pandemic together with rich, multi-wave pre-pandemic data on individual, relational and contextual factors in children (Generation 3; G3) and their parents (Generation 2; G2) over almost three decades. These factors were selected because they were comprehensively assessed over multiple waves in the present study and are consistent with developmental psychopathology, family systems and ecological models of development and/or have previously been identified as key factors in the prediction of child mental health problems (Bronfenbrenner & Morris, 2006; Masten, 2018; Prime et al., 2020; Rutter, 2006). Inclusion of the same factors across child, adolescent and adult waves, where possible, allowed us to examine their relative importance over multiple developmental epochs, thus acknowledging the role of the chronosystem in development (Bronfenbrenner & Morris, 2006).

Specifically, we examine the extent to which G3 child emotional distress during the COVID-19 pandemic is associated with (a) long-term pre-existing G2 parental risk and protective factors (assessed 1990 to 2010; parent age 7–8 years to 27–28 years) and (b) pre-pandemic factors in G3 children and G2 parents at 1-year postpartum (assessed between 2012 and 2019). Our longitudinal study design allows us to adjust for pre-pandemic child behaviour problems to examine the extent to which factors are associated with child emotional distress during the COVID-19 pandemic controlling for prior socio-emotional behaviour problems. Examination of child emotional distress during preschool and primary school is rare, with most pandemic studies assessing older children and adolescents. A better understanding of life course determinants of child mood states under stressful conditions has the potential to assist with better mobilising of resources to those most vulnerable and planning for future pandemics and other crises.

Method

Sample

Participants were drawn from the Australian Temperament Project Generation 3 Study (ATPG3), an ongoing prospective cohort study that has followed the social–emotional

development of participants from infancy to adulthood, as well as next generation offspring born to the cohort (Olsson et al., 2022). The initial sample was representative of the state of Victoria, comprising 2,443 Generation 2 (G2) infants aged 4–8 months and their Generation 1 (G1) parents attending maternal and child health centres in 1983. Since then, families have been invited to participate via mail surveys approximately every 2 years until 19–20 years and every 4 years thereafter, using age-appropriate scales. G2s were asked to complete questionnaires from age 11–12 years onwards. Further details regarding ATP sample characteristics and procedures are provided in Vassallo and Sanson (2013) and Olsson et al. (2022).

Identification of pregnancies and recruitment of offspring into the ATPG3 occurred every six months between 2012 and 2018 when cohort participants were aged 29–35 years, representing the peak period of first births in Australia. Telephone or web-based surveys were conducted with parents or their partners at the third trimester of pregnancy, and at 2-months and 1-year postpartum. A 4-year postpartum follow-up is almost complete. The present study uses survey data from 1-year postpartum provided by the primary and/or secondary caregiver of the G3 child.

G2 parents participating in the ATPG3 study with one or more children were invited to complete a brief online survey about the impacts of the COVID-19 pandemic between May and September 2020 and again between October and December 2021. These two survey waves overlapped with lockdowns in Victoria (Boaz, 2021; Edwards et al., 2022), where the majority of participants resided (see Figure 1 for details).

Surveys were completed for a total of 844 G3 children born to 508 G2 parents in 2020 and 793 G3 children born to 478 G2 parents in 2021. To be included in the current sample participants needed to have data from at least one of the COVID-19 surveys and from three or more pre-pandemic exposure periods (i.e., childhood, adolescence, young adulthood, 1-year postpartum). The resulting sample included 934 children (53% girls) of 549 parents (60% mothers), for which 69% of parents participated in both COVID-19 surveys, 18% participated in the 2020 COVID-19 survey only, and 13% participated in the 2021 COVID-19 survey only. Children were on average aged 5.61 (*SD* 2.47) and 7.12 (*SD* 2.46) years at the first and second COVID assessments respectively. Parents reported that the majority of their G3 children were enrolled in primary school (52% in 2020 and 67% in 2021) or kindergarten (21% at each time point). Most families had not had a diagnosis of COVID-19 at the time of either assessment (93% of parents and 83% of children in 2020; 97% of parents and 84% of children in 2021) and the vast majority had not required medical or emergency attention (97% of parents and 98% of children at each time point). An increasing number of parents reported being in quarantine due to symptoms or exposure (10% in 2020 vs. 33% in 2021).

ATPG3 Study protocols have been approved by the Royal Children's Hospital Human Research Ethics Committee. Prior ATP waves were approved by the relevant committee at the time. Informed consent was obtained from all participants.

To assess bias due to attrition, we compared ATP participants on characteristics collected at baseline (1983, at 4–8 months), including the ATP participant sex, difficult temperament, and behaviour problems, as well as their G1 parent's education and country of birth. ATP G2s who were screened for the ATPG3 study had marginally lower rates of G1 parents born overseas and G1 parents with less education. Those eligible for the ATPG3 study were similar to the recruited ATPG3 sample. Those who participated in the COVID-19 surveys were representative of the ATPG3 sample although the analytic sample included fewer G2 males compared to those excluded from the analysis.

Measures

COVID-19 child emotional distress. In 2020 and 2021, G2 parents completed an adaptation of the Coronavirus Health and Impact Survey (CRISIS), a widely adopted questionnaire to capture impacts of the pandemic, including questions on COVID-19 infection and exposure, life changes, daily behaviours, parent and child emotions and worries, child care, education and family relationships (Nikolaidis et al., 2021). For the present study, eight items from the CRISIS based on the circumplex model of affect (Posner, Russell, & Peterson, 2005) were included to measure child mood states during the past 2 weeks, predominantly internalising symptoms including worry, sadness, anhedonia and fatigue. The scale's reliability and construct validity has been demonstrated in samples including children aged 0–5 years (Nikolaidis et al., 2021, 2022; see Appendix S1 for more details). Parents rated items on a 5-point scale. A mean score was calculated at each wave, with Cronbach's alphas of .84 and .87 for waves 1 and 2, respectively. Higher scores denoted higher levels of emotional distress.

COVID-19 parent emotional distress. Eight items from CRISIS were also included to measure parent emotional distress during the past 2 weeks. Participants rated items on a 5-point scale (see S1 for further details). A mean score was calculated at each wave, with Cronbach's alphas of .84 and .85 for waves 1 and 2, respectively.

Pre-pandemic infant behaviour problems. Infant behaviour problems at 1-year postpartum were reported by the primary caregiver using the Brief Infant-Toddler Social and Emotional Assessment (BITSEA), a validated, developmentally appropriate parent-report measure of socioemotional and behavioural problems and competencies in 12- to 36-month-olds (Briggs-Gowan & Carter, 2006). The 31-item Problem Total score captures a range of problem areas including internalising, externalising, dysregulation, atypical and

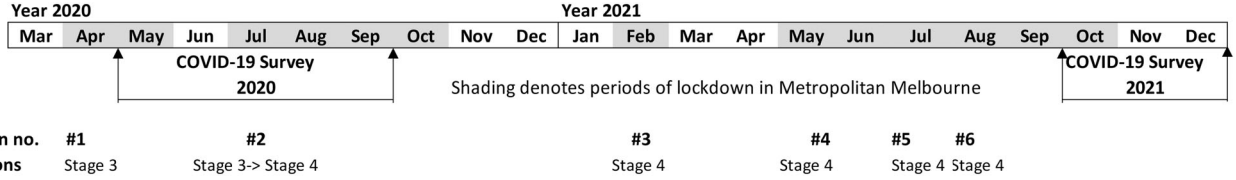

Figure 1 Timeline of Australian Temperament Project Generation 3 data collection in context of COVID-19 lockdowns in Melbourne, Australia during 2020 and 2021. Note: Stage 3 restrictions: included physical distancing, shutdown of non-essential services and four reasons to leave the home: food and supplies, medical care, exercise, and approved work or education; school completed remotely except for children of essential workers; Stage 4 restrictions: in addition to the Stage 3 restrictions, exercise was limited to one hour per day, travel was not allowed beyond 5km, and in 2020 there was a curfew from 8pm to 5am. On 4 October 2021 (during the study's second COVID-19 data collection wave), Melbourne became the city with the longest cumulative time in lockdown in the world (245 days; Boaz, 2021).

maladaptive behaviours, with higher scores denoting higher levels of problem behaviour. Parents rated items on a 3-point scale, from 0 (not true/rarely) to 2 (very true/often).

Pre-pandemic parental preconception child, adolescent and young adult precursors of child emotional distress. G2 parent preconception factors were obtained from G1 parent- and G2 self-report questionnaires administered prospectively during parents' childhood (ages 7–8 to 11–12 years; 1990–1994), adolescence (ages 13–14 to 17–18 years; 1996–2000) and young adulthood (ages 19–20 to 27–28 years; 2002–2010). For data reduction purposes, precursors that were repeatedly assessed at different ages within the same developmental epoch were combined to form a single construct. The measures are summarised in Table 1 and further details are provided in Tables S1–S3.

Pre-pandemic one-year postpartum precursors of child emotional distress. Pre-pandemic G2 and G3 precursors of child emotional distress during the pandemic were obtained from parent surveys when their children were 1 year old (2012–2019). Precursors were grouped as *individual factors* (child temperament, child competencies, child general physical health, parent internalising problems), *relational factors* (hostile, warm, and anxious parenting, parenting self-efficacy, parent–child bonding, social support) and *contextual factors* (family stressful life events, parent education, parent marital status, financial strain). Further details are provided in Table 1 and Table S4.

Statistical analysis

We estimated the associations between pre-pandemic factors and G3 child emotional distress during the pandemic entering each factor individually for each developmental period using linear regression estimated via generalised estimating equations (GEE) which accounted for within-parent clustering (i.e., parents with multiple offspring and repeated COVID-19 survey assessments). Although emotional distress outcomes are generally skewed, it should be noted that linear regression models are considered robust to violations of the normality (of the residuals) assumption (Schmidt & Finan, 2018). In the fully adjusted models, we adjusted for G2 sex, G3 sex, COVID-19 survey wave (2020/2021), and time between completion of

Table 1 Summary of Australian Temperament Project pre-pandemic factors across parents' childhood, adolescence and young adulthood and into the next generation

Construct	G2 childhood			G2 adolescence			G2 young adulthood			G3 infancy
Age (years)	7	9	11	13	15	17	19	23	27	1
Individual factors										
Temperament (McClowry, 1995; Windle & Lerner, 1986)			✓	✓	✓	✓	✓	✓		✓
Personality (Donnellan, Oswald, Baird, & Lucas, 2006; Lanthier & Bates, 1995)					✓				✓	
Internalising problems (Angold et al., 1995; Lovibond & Lovibond, 1995; Quay & Peterson, 1987; Reynolds & Richmond, 1978; Rutter, Tizard, & Whitmore, 1970)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Externalising problems (Elliott & Ageton, 1980; Moffitt & Silva, 1988; Rutter et al., 1970)	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Child competencies (Briggs-Gowan & Carter, 2006)										✓
General health problems (Eisen, Donald, Ware, & Brook, 1980)	✓						✓	✓	✓	✓
Social skills (Gresham & Elliot, 1990; Smart & Sanson, 2003)			✓	✓			✓	✓	✓	
Relational factors										
Parent–child relationship (ATP devised; Marsh, Barnes, Cairns, & Tidman, 1984)	✓	✓	✓	✓	✓	✓	✓	✓		
Parent-offspring bonding (Condon & Corkindale, 1998)										✓
Parenting (ATP devised; Zubrick, Lucas, Westrupp, & Nicholson, 2014)				✓	✓	✓				✓
Parental attachment (Armsden & Greenberg, 1987)						✓				
Parent-young adult relationship (Pierce, Sarason, & Sarason, 1991)								✓	✓	
Parent social support (Webster et al., 2000)										✓
Peer relationships (Marsh et al., 1984)			✓							
Peer attachment (Armsden & Greenberg, 1987)						✓				
Friendship quality (Pierce et al., 1991)								✓	✓	
Romantic attachment (Simpson, Rholes, & Phillips, 1996)									✓	
School bonding (Ainley, Reed, & Miller, 1984)					✓					
Community/contextual factors										
Parent education[a] (ATP Devised)	✓	✓	✓	✓	✓	✓		✓	✓	✓
Parent financial strain[a] (ATP Devised)						✓		✓	✓	✓
Parent separation (ATP Devised)	✓	✓	✓	✓	✓	✓				✓
Stressful life events[a] (ATP Devised)	✓	✓	✓	✓	✓	✓		✓	✓	✓
Community and political civic responsibility (Bowes, Chalmers, & Flanagan, 1996)					✓					
Community bonding (Catalano & Hawkins, 1996)						✓				
Civic action and engagement (Stone, 2001; Stone & Hughes, 2002)							✓	✓	✓	
Trust and tolerance (Flanagan & Longmire, 1995)							✓	✓	✓	
Trust in authorities and organisations (Stone & Hughes, 2002)							✓	✓	✓	

G1, Generation 1; G2, Generation 2; G3, Generation 3.
[a]Pertains to G1 during childhood and adolescence and pertains to G2 during young adulthood.

pre-pandemic socio-emotional behaviour problems measure and the pandemic child emotional distress scale. Further, models were adjusted for G3 pre-pandemic child socio-emotional behaviour problems (correlations between BITSEA & CRISIS child emotional distress: $r_{2020} = .17$, $p < .001$, $r_{2021} = .20$, $p < .001$) to account for child behaviour prior to the pandemic, and parent emotional distress during the pandemic (correlations between CRISIS parent and child emotional distress: $r_{2020} = .44$, $p < .001$, $r_{2021} = .45$, $p < .001$) to account for parent mental state at the time of the outcome assessments. The adjusted coefficients represent the extent to which the factors are associated with distress during the COVID-19 pandemic, controlling for prior child socio-emotional behaviour problems, parent emotional distress during COVID-19 and the other covariates.

A False Discovery Rate (FDR) correction was applied to control for multiple testing (Benjamini & Hochberg, 1995). Adjusted models were repeated to include an interaction between each factor and COVID-19 wave to examine whether associations varied across the pandemic. Scores were standardised (z-scored) to allow comparison of effect sizes across factors. Consequently, our reported regression effects are standardised betas (β) which are interpreted as the predicted β standard deviation change in offspring behaviour outcomes associated with a one standard deviation increase in continuous exposures and a unit change in binary exposures (Carlin & Moreno-Betancur, 2021; Hernán, Hsu, & Healy, 2019).

Multiple imputation was used to minimise the effects of sample attrition. On average, missing data on the 109 variables used in imputation was 11%. We imputed 20 complete datasets under a multivariate normal model. Binary variables were imputed as continuous variables and then back transformed with adaptive rounding following imputation. We obtained all estimates by averaging results across the 20 imputed datasets with inferences under multiple imputation obtained using Rubin's rules (Rubin, 2004). To investigate the effect of missing data, we repeated our analyses using available case data. We analysed data with Stata 17 (StataCorp., 2021).

Results

Sample characteristics

Mean scores on child emotional distress during the pandemic showed parents reported that their children experienced on average low levels of negative mood states during the earlier ($M = 0.89$, $SD = .64$, CI .85–.93; 13% missing) and later ($M = 1.00$, $SD = .71$, CI .95–1.05; 20% missing) stages of the pandemic.

On average, participants completed the first COVID-19 survey wave 4.29 years (SD 2.33; CI 4.06–4.52) after they completed the one-year postpartum assessment (second survey wave: 5.89 years, SD 2.34; CI 5.66–6.12).

Pre-pandemic individual, relational and contextual factors assessed during the parental preconception years of childhood, adolescence and young adulthood, and at 1-year postpartum, are summarised in Tables 2 and 3, respectively. For preconception predictors, correlations between predictors ranged between $r = -.73$ and $r = .80$, with an average correlation across all predictors of $r = .01$. For perinatal predictors, correlations between predictors ranged between $r = -.49$ and $r = .44$, with an average correlation across all predictors of $r = .01$. Correlations between pre-pandemic variables are available online (https://osf.io/gdfxm/?view_only=220ce28e585840969bdae6c8ca56483f).

Pre-pandemic characteristics and COVID-19 child emotional distress

Precursors during the parents' early life course. Table 4 and Figure 2 show the associations between pre-pandemic life course factors during parents' childhood, adolescence and young adulthood and child emotional distress during the pandemic, adjusted for G3 pre-pandemic child socio-emotional behaviour problems, COVID-19 wave, G2 sex, G3 sex, time between pre-pandemic and during pandemic assessments, and parent emotional distress during COVID-19. Interactions between COVID-19 outcome wave (2020 vs. 2021) were not significant unless noted otherwise below.

Parent precursors in childhood (1990–1994: 7–8 to 11–12 years): During parents' childhoods, evidence supported associations between child emotional distress during the pandemic and the individual factors of lower temperamental persistence (β = .06) and poorer child health (β = −.06). The childhood relational factors associated with child emotional distress during COVID-19 were G2-reported parent–child relationship difficulties (β = .06) and peer relationship difficulties (β = .09). There was negligible evidence that any assessed contextual factors during parents' childhoods were associated with child emotional distress during the pandemic. The only childhood factor that was retained after FDR correction for multiple tests was peer relationship difficulties.

Parent precursors in adolescence (1996–2000: 13–14 to 17–18 years): During parents' adolescence, evidence supported associations between child emotional distress during the pandemic and the individual factors of lower temperamental persistence (β = .07), the personality factors of lower conscientiousness (β = −.11) and neuroticism (β = .06), internalising difficulties (depression β = .11; anxiety β = .07), and the social skill of lower cooperation (β = −.08). Evidence for relational factors predicting child emotional distress during COVID-19 was limited to lower parental warmth (β = −.07) and evidence for contextual factors was weak. Factors that survived FDR correction were lower conscientiousness, depression and lower cooperation. Additionally, interactions between outcome wave and parental trust ($p = .019$), political civic responsibility ($p = .033$) and community civic engagement ($p = .024$) were found; however, in all cases associations were weak, non-significant and in different directions at the two time points.

Parent precursors in young adulthood (2002–2010: 19–20 to 27–28 years): During parents' young adult years, associations were observed between child

Table 2 Pre-pandemic descriptives during parents' preconception childhood, adolescence and young adulthood

	Childhood			Adolescence			Young Adulthood		
Preconception	*M*	*SD*	Missing (%)	*M*	SD	Missing (%)	*M*	SD	Missing (%)
Individual factors									
Female gender (*n*, %)	329	60%	0						
Temperament									
Withdrawal	2.53	0.70	12	2.45	0.64	5	2.64	0.67	17
Reactivity	2.90	0.72	12	2.73	0.68	5	3.20	0.79	17
Low persistence	2.32	0.71	12	2.22	0.58	5	2.06	0.70	17
Activity	2.37	0.77	12	2.56	0.66	7	2.85	0.71	17
Flexibility							3.77	0.65	17
Positive emotionality							4.30	0.63	17
Distractibility							2.92	0.63	17
Personality									
Extraversion				3.52	0.63	14	3.41	0.79	13
Agreeableness				3.63	0.54	14	4.14	0.58	13
Conscientiousness				3.55	0.56	14	3.87	0.66	13
Neuroticism				2.53	0.65	14	2.73	0.77	13
Intellect/Openness				3.36	0.65	14	3.56	0.70	13
Internalising problems-Anxiety[a]	0.42	0.32	5	0.68	0.35	5	3.12	2.16	3
Depression				5.23	3.60	5			
Externalising problems	0.31	0.28	5	0.17	0.22	5	0.03	0.07	3
General health	0.00	0.56	9				4.04	0.65	3
Social skills									
Responsibility	14.51	2.84	12	17.30	2.30	13	4.29	0.43	3
Self-control	12.97	3.71	12	1.09	0.30	13	3.73	0.46	3
Assertion	16.46	2.88	12	1.28	0.30	14	3.70	0.53	3
Cooperation	12.29	3.69	12	1.49	0.29	13			
Empathy				1.49	0.35	13	4.14	0.44	3
Relational factors									
Overall parent–child relationship difficulties	2.29	.76	5	2.09	0.79	5	2.00	0.78	18%
Parent–child relationship difficulties	1.53	0.50	12						
Parenting									
Warmth				4.16	0.49	5			
Harsh discipline				1.90	0.43	5			
Parental attachment									
Communication				2.68	0.60	15			
Trust				3.29	0.47	15			
Alienation				2.15	0.60	16			
Parent-young adult relationship							4.19	0.48	7
Peer relationship	1.82	0.65	12						
Peer attachment									
Communication				2.99	0.67	15			
Trust				3.53	0.47	15			
Alienation				1.75	0.52	15			
Friendship quality							4.16	0.43	7
School bonding				3.02	0.44	14			
Romantic attachment									
Avoidance							2.39	0.95	14
Ambivalence							2.64	1.02	15
Community/contextual factors									
Education	3.29	1.57	5	3.40	1.74	5	3.15	1.70	7
Stressful life events	0.36	0.60	5	0.31	0.47	5	0.52	0.68	6
Parent separation (*n*, %)	63	12%	1	101	19	5			
Financial strain				1.51	0.65	17	1.85	0.68	6
Political civic responsibility				0.50	0.50	14			
Community civic engagement				0.71	0.40	14	17.95	10.51	3
Community bonding				2.26	0.57	15			
Trust and tolerance							63.84	13.03	3
Trust in authorities and organisations							50.52	14.61	3

[a]Measured with the Anxious-Fearful scale from the Child Behaviour Questionnaire in childhood, Revised Children's Manifest Anxiety Scale in adolescence and the combined Depression, Anxiety and Stress scales in young adulthood.

emotional distress during the pandemic and the temperament factors of lower positive emotionality (β = −.07) and lower persistence (β = .06), the personality trait of lower conscientiousness (β = −.13), internalising problems (β = .12), externalising problems (β = .06), poorer general health (β = −.07), and the social skills of lower responsibility (β = −.11), self-control (β = −.07) and assertion (β = −.06). The

Table 3 Pre-pandemic descriptives at 1-year postpartum

1-year Postpartum	*M*	*SD*	Missing (%)
Individual factors			
G3 temperament			
Withdrawal	13.71	4.54	6
Reactivity	29.11	4.44	6
Low persistence	12.83	3.35	5
Cooperation	18.33	4.32	6
Rhythmicity	9.45	2.84	5
Distractibility	16.61	2.65	6
G3 competencies	16.10	2.79	6
G3 health	3.70	0.54	5
G2 internalising problems	4.97	5.16	14
Relational factors			
Parenting			
Warmth	4.41	0.49	14
Hostility	1.87	0.50	14
Anxious	3.02	0.64	14
Self-efficacy	3.23	0.76	14
Parent-offspring bonding	0.01	1.00	15
Social support	4.43	0.47	32
Contextual factors			
G2 education attainment	5.62	1.76	41
G2 financial strain	0.93	0.87	30
G2 marital status (*n*, %)	23	4	31
Family stressful life events	0.35	0.65	14

only relational factor predicting child emotional distress during COVID-19 pertained to romantic attachment insecurity in the form of avoidance (β = .08). At the contextual level, lower trust and tolerance of others (β = −.08) was associated with child emotional distress during the pandemic. Factors that survived FDR correction were lower conscientiousness, internalising, responsibility, romantic attachment avoidance and lower trust and tolerance of others.

Precursors at 1-year postpartum (2012–2019). Figure 3 and Table 5 presents associations between pre-pandemic postpartum factors and child emotional distress during the pandemic, adjusted for pre-pandemic child socio-emotional behaviour problems, COVID wave, G2 sex, G3 sex, time between pre-pandemic and during pandemic assessments, and parent emotional distress during COVID-19. The individual factors most strongly associated with child emotional distress during the pandemic were parent internalising difficulties (β = .09), lower child temperamental persistence (β = .07), lower child cooperation (β = .08), lower child socioemotional competence (β = −.07) and poorer child health (β = −.06). Lower persistence and child ill-health were not retained after FDR correction. Additionally, associations were observed between child emotional distress during the pandemic and the relational factors of lower parental warmth (β = −.08), lower parent-infant bonding (β = −.07) and lower perceived parenting self-efficacy (β = −.07) but the latter two did not survive FDR correction. There was no evidence of associations with contextual factors at 1-year postpartum. An interaction between COVID-19 outcome wave and G3 sex was found (p = .019); however, the association was weak, non-significant and in different directions at the two time points.

When analyses were repeated using available case data, associations between child emotional distress and pre-pandemic factors were consistent with estimates under multiple imputation (see Tables S5 and S6).

Discussion

The COVID-19 pandemic and resulting public health measures constitute multi-faceted stressors predicted to have lasting individual and societal consequences, including for children's health and development (Prime et al., 2020). Here we answer recent calls to identify risk and protective factors to guide health promotion and prevention strategies to support mental health and wellbeing during future health emergencies and other crises (Kauhanen et al., 2022). Capitalising on one of Australia's longest running intergenerational cohort studies, we examined the extent to which pre-pandemic factors predicted children's emotional distress during the COVID-19 pandemic. After taking into account pre-pandemic child socio-emotional behaviour problems, child emotional distress (whether earlier or later in the pandemic) was predicted by a range of factors assessed during the parents' early life course as well as by pre-pandemic factors assessed more proximally, at 1-year postpartum. There was evidence for a broader range of individual and relational precursors than contextual factors.

Strikingly, G2 parent factors assessed during the early life course as far back as 1994 forecast G3 child emotional distress during COVID-19. Prior to parenthood, G2 internalising problems, personality, social skills and relational difficulties predicted G3 child emotional distress during the pandemic. Effects, while generally small, are in line with expectations for several reasons (Funder & Ozer, 2019). Firstly, findings are consistent with evidence that the origins of child behaviour are multifactorial. Associations between a single exposure and outcome in developmental psychology are rarely large. A meta-analysis of associations between parent depression and child functioning, for example, reported similarly small, yet clinically meaningful effect sizes (Goodman et al., 2011). Notably, associations were evident above and beyond prior child socio-emotional behaviour problems and parent mental state at the time of survey completion. Secondly, cohorts such as the ATP typically yield smaller effects than high-risk or clinical samples because they encompass the full population, not just a sub-population within which risks are concentrated (see, e.g., Goodman et al., 2011). Thirdly, the study spanned decades and effect sizes are expected to diminish as time between assessment of the

Table 4 Associations between pre-pandemic factors during parents' childhood, adolescence and young adulthood (1990–2010) and child emotional distress during the COVID-19 pandemic (2020 and 2021)

	Childhood		Adolescence		Young adulthood	
Factors	β	95% CI	β	95% CI	β	95% CI
Individual						
Temperament						
Withdrawal	.03	−0.03, 0.09	.05	−0.01, 0.10	.03	−0.03, 0.09
Reactivity	.03	−0.03, 0.08	.05	−0.01 0.10	.04	−0.01, 0.10
Lower persistence	**.06**	**0.00, 0.12**	**.07**	**0.01 0.14**	**.06**	**0.00, 0.12**
Activity	.02	−0.04, 0.08	.04	−0.02, 0.10	.01	−0.05, 0.07
Flexibility					−.03	−0.09, 0.03
Positive emotionality					**−.07**	**−0.13, −0.00**
Distractibility					.04	−0.02, 0.10
Personality						
Extraversion			−.03	−0.09, 0.03	−.04	−0.10, 0.03
Agreeableness			−.06	−0.12, 0.00	−.05	−0.12, 0.01
Conscientiousness			**−.11**[a]	**−0.17, −0.05**	**−.13**[a]	**−0.19, −0.07**
Neuroticism			**.06**	**0.00, 0.12**	.05	−0.01, 0.11
Intellect/Openness			.01	−0.05, 0.08	.05	−0.02, 0.11
Internalising problems-anxiety[b]	.05	−0.01, 0.11	**.07**	**0.02, 0.13**	**.12**[a]	**0.06, 0.18**
Depression			**.11**[a]	**0.05, 0.17**		
Externalising problems	.05	−0.00, 0.11	.03	−0.03, 0.09	**.06**	**0.01, 0.12**
General health	**−.06**	**−0.13, −0.00**			**−.07**	**−0.13, −0.02**
Social skills						
Responsibility	−.03	−0.09, 0.03	−.01	−0.07, 0.05	**−.11**[a]	**−0.17, −0.05**
Self-control	−.03	−0.09, 0.04	−.05	−0.11, 0.01	**−.07**	**−0.13, −0.01**
Assertion	−.03	−0.08, 0.03	−.03	−0.10, 0.03	**−.06**	**−0.12, −0.00**
Cooperation	−.05	−0.11, 0.01	**−.08**[a]	**−0.14, −0.02**		
Empathy			−.02	−0.09, 0.04	−.05	−0.11, 0.02
Relational						
Overall parent–child relationship difficulties	.04	−0.02, 0.10	.06	−0.01, 0.12	.05	−0.01, 0.10
Parent–child relationship difficulties	**.06**	**0.01, 0.12**				
Parenting						
Warmth			**−.07**	**−0.14, −0.01**		
Harsh discipline			−.03	−0.02, 0.09		
Parental attachment						
Communication			−.01	−0.07, 0.04		
Trust			−.02	−0.08, 0.04		
Alienation			.01	−0.06, 0.05		
Parent–child relationship quality					−.04	−0.10, 0.03
Peer relationship difficulties	**.09**[a]	**0.03, 0.15**				
Peer attachment						
Communication			−.01	−0.07, 0.05		
Trust			−.03	−0.09, 0.03		
Alienation			.04	−0.02, 0.10		
Friendship quality					−.04	−0.09, 0.02
School bonding			−.01	−0.07, 0.05		
Romantic attachment						
Attachment avoidance					**.08**[a]	**0.02, 0.14**
Attachment ambivalence					.05	−0.01, 0.11
Community/contextual						
Education	−.00	−0.06, 0.05	−.02	−0.07, 0.04	−.00	−0.07, 0.06
Stressful life events	−.01	−0.07, 0.06	.04	−0.02, 0.10	.05	−0.01, 0.11
Family separation (binary)	−.02	−0.21, 0.16	−.11	−0.25, 0.03		
Financial strain			.01	−0.06, 0.08	−.01	−0.07, 0.05
Political civic responsibility			.03	−0.03, 0.09		
Community civic engagement			.01	−0.06, 0.08	−.00	−0.06, 0.06
Community bonding			.01	−0.05, 0.07		
Trust and tolerance					**−.08**[a]	**−0.14, −0.03**
Trust in authorities and organisations					−.01	−0.07, 0.05

Models adjusted for pre-pandemic G3 socio-emotional behaviour problems, time between pre-pandemic assessment and COVID-19 assessment, COVID-19 wave, G2 and G3 sex, and parent emotional distress during COVID-19. Bolded values indicate $p < .05$.
[a]Rejection of null hypothesis after false discovery rate correction for multiple testing.
[b]Measured with the Anxious-Fearful scale from the Child Behaviour Questionnaire in childhood, Revised Children's Manifest Anxiety Scale in adolescence and the combined Depression, Anxiety and Stress scales in young adulthood.

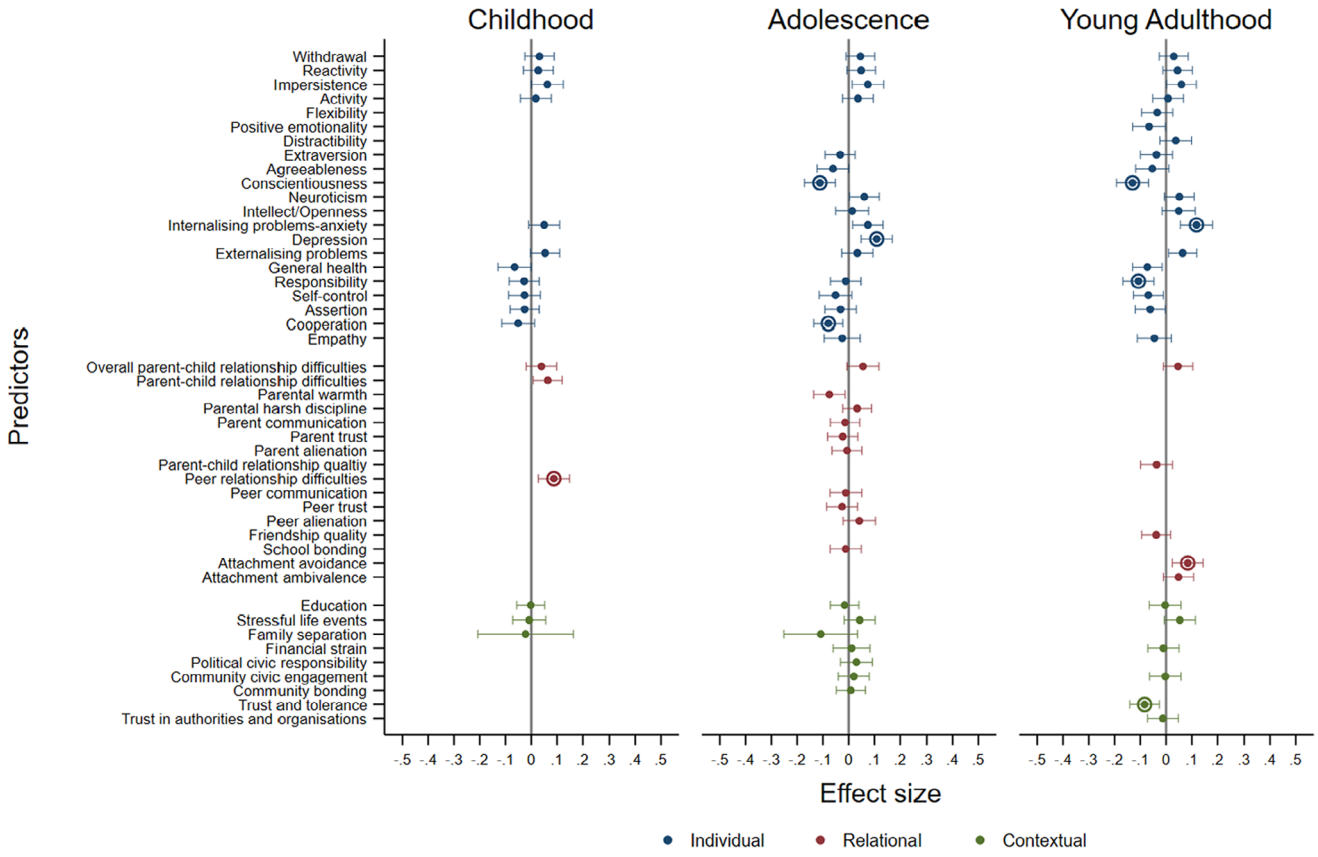

Figure 2 Visualisation of effect sizes for regression models examining the associations between pre-pandemic factors during parents' childhood, adolescence and young adulthood (1990–2010) and child emotional distress during the COVID-19 pandemic (2020 and 2021). Error bars show 95% CI. Larger circles denote rejection of null hypothesis after false discovery rate correction for multiple testing

exposure and outcome increases. Small effects can accumulate and our study did not take into account the way in which traits and behaviours persist or cascade with potential for significant implications over time. Furthermore, interventions based on small effect sizes can have large impacts on population health, benefiting individuals and society as a whole (Funder & Ozer, 2019; Matthay et al., 2021). Key intergenerational and postpartum effects from the present study are considered in turn below according to their ecological domain (individual, relational, or contextual).

Intergenerational individual effects

G2 internalising psychopathology. Consistent precursors of G3 child distress were higher levels of G2 parent internalising difficulties prior to the pandemic, reported during parents' early life course and at 1-year postpartum. This finding is in line with pre-pandemic intergenerational research both internationally (e.g., Pettit, Olino, Roberts, Seeley, & Lewinsohn, 2008) and locally (Letcher et al., 2020). We previously demonstrated that a mothers' history of internalising problems from adolescence to young adulthood predicts higher levels of behaviour problems in her infant (Letcher et al., 2020). The current study extends this to demonstrate internalising difficulties going back to adolescence predict emotional problems assessed in G3 children aged 1–9 years during the pandemic. Notably, in the present study, the magnitude of the association between parent internalising problems and child emotional distress during the pandemic was similar whether assessed in parents' adolescence (β = .11 for depression), adulthood (β = .12) or at 1-year postpartum (β = .09), while internalising assessed during G2 childhood (β = .07) did not survive correction for multiple testing.

Complex interactions amongst (epi)genetic, neurobiological, environmental and psychological factors are likely to be implicated in these intergenerational associations (Patton et al., 2018). Given the observational nature of the current research, it is not possible to ascertain whether the associations detected across generations reflect effects of shared genes, environmental causation, or both. A parental history of internalising difficulties may increase risk of not only genetic transmission but also offspring exposure to negative cognitions, affect and behaviour such as maladaptive parenting (Goodman, 2020). While the present study supports homotypic transmission (parent internalising predicting child internalising), it is acknowledged that heterotypic transmission may have also occurred (e.g., parent internalising predicting child

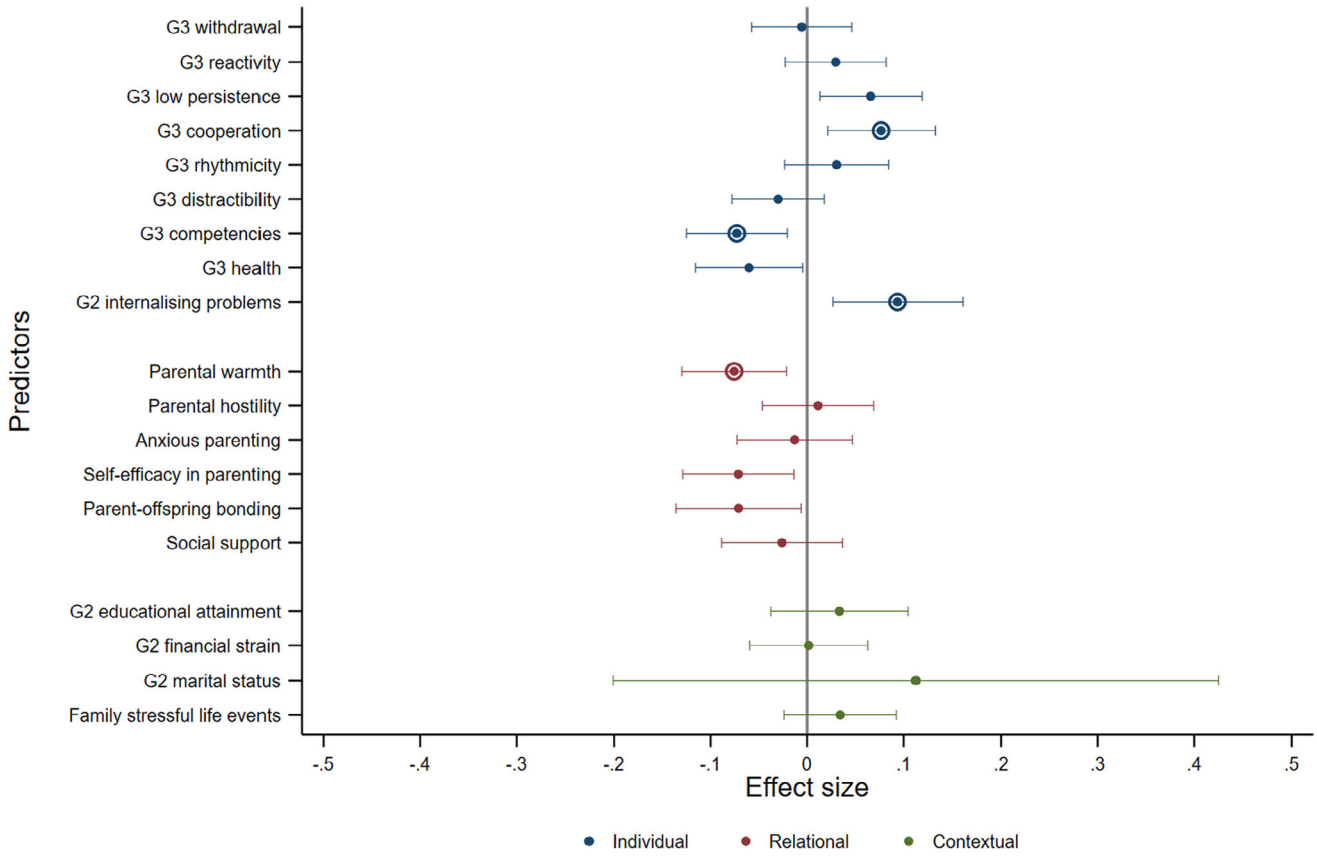

Figure 3 Visualisation of effect sizes for regression models examining the associations between pre-pandemic factors in children and parents at 1-year postpartum (assessed between 2012 and 2019) and child emotional distress during the COVID-19 pandemic (2020 and 2021). Error bars show 95% CI. Larger circles denote rejection of null hypothesis after false discovery rate correction for multiple testing

externalising) but could not be examined in this study. Overall, current findings reinforce the benefits of early intervention for internalising problems to not only alleviate distress at the time but also limit effects on next generation children.

G2 temperament and personality. Individual differences assessed in the parent early life course predicted offspring emotional distress decades later during the pandemic. Lower conscientiousness was a consistent personality precursor, assessed both in adolescence and adulthood. Interestingly, although it did not survive correction for multiple testing, the temperament trait of impersistence was predictive of G3 child distress, commencing as far back as the G2's childhood (7–8 years; G1 report). Notably, temperamental persistence has been reliably identified as a precursor of conscientiousness in adulthood, (Sanson, Letcher, & Havighurst, 2018). The relevance of preconception parent personality has been highlighted in prior intergenerational research indicating a range of parental personality attributes assessed prior to conception are associated with offspring behaviour and the perinatal social ecology (Spry et al., 2022).

G2 social competence. A history of socioemotional skills and capacities is likely to facilitate the provision of nurturing care and management of offspring behaviour problems (Cheng et al., 2016). Of the social skills assessed, lower cooperation during adolescence and responsibility during young adulthood predicted child emotional distress during COVID-19. Difficulties with cooperation (indicated by behaviours such as compliance with rules) and responsibility (including fulfilling obligations, being reliable) during pandemic restrictions could increase risk for emotional distress in families. Prior findings in the ATPG3 cohort have shown the relevance of parents' preconception social competence for offspring behavioural outcomes (Letcher et al., 2023), but the present study extends these findings to highlight specific social skills that may be most relevant to offspring distress during the pandemic.

Intergenerational relational effects

During uncertain times, parents play a crucial role in providing a supportive and secure environment for their children. Our long-term prospective study design allowed us to explore the extent to which parents own relational histories contributed to offspring adjustment during the pandemic. Difficulties in G2 relationships with peers during childhood and romantic partners in young adulthood (in the form of an avoidant attachment style) forecast G3

Table 5 Associations between pre-pandemic factors in children and parents at 1-year postpartum (assessed between 2012 and 2019) and child emotional distress during the COVID-19 pandemic (2020 and 2021)

Factors	β	95% CI
Individual factors		
G3 temperament		
Withdrawal	−.01	−0.06, 0.05
Reactivity	.03	−0.02, 0.08
Low persistence	**.07**	**0.01, 0.12**
Low cooperation	**.08**[a]	**0.02, 0.13**
Rhythmicity	.03	−0.02, 0.08
Distractibility	−.03	−0.08, 0.02
G3 competencies	**−.07**[a]	**−0.13, −0.02**
G3 health	**−.06**	**−0.12, −0.00**
G2 Internalising problems	**.09**[a]	**0.03, 0.16**
Relational factors		
Parenting		
Warmth	**−.08**[a]	**−0.13, −0.02**
Hostility	.01	−0.05, 0.07
Anxious	−.01	−0.07, 0.05
Self-efficacy	**−.07**	**−0.13, −0.01**
Parent-offspring bonding	**−.07**	**−0.14, −0.01**
Social support	−.03	−0.09, 0.04
Contextual factors		
G2 education	.03	−0.04, 0.10
G2 financial strain	.00	−0.06, 0.06
G2 marital status	.11	−0.20, 0.43
Family stressful life events	.03	−0.02, 0.09

Models adjusted for pre-pandemic G3 socio-emotional behaviour problems, time between pre-pandemic assessment and COVID-19 assessment, COVID-19 wave, G2 and G3 sex, and parent emotional distress during COVID-19. Bolded values indicate $p < .05$.
[a]Rejection of null hypothesis after false discovery rate correction for multiple testing.

child emotional distress during the pandemic. Additionally, parent–child relationship difficulties and lower parental warmth showed weak associations which did not survive correction for multiple testing. Attachment theory and research supports the importance of these relational factors for later socioemotional functioning and caregiving (Macdonald et al., 2018, 2021; Sroufe, Carlson, Levy, & Egeland, 1999). Supporting positive relationships during the early life course may help to build the foundation for optimal relational health during parenthood (and during crises in particular), leading to better outcomes for the next generation.

Intergenerational contextual effects

Lower trust and tolerance of others (assessed during G2 adulthood) was the only contextual factor to predict G3 child distress during the pandemic. This measure reflects attachment to community and society and acceptance of people from different backgrounds and cultures. It is possible that parents with a history of lower trust may have been less accepting of pandemic restrictions which may have contributed to stress within the family climate. There was little evidence to support other sociodemographic and contextual factors predicting child distress; however, it is important to note that compared to individual and relational factors, there were fewer contextual factors available in the ATP dataset, particularly in the earliest part of the G2 life course.

Postpartum effects

Individual factors. At one-year postpartum (2012–2019), G2 parents reported on their G3 child's temperament, just as their parents did for them in the 1980s. Less cooperative temperament in G3 children predicted later G3 emotional distress during COVID-19, while other temperament traits assessed (withdrawal, reactivity, distractibility, and rhythmicity) did not. Consistent with G2 temperament findings, lower G3 persistence showed a weak association with emotional distress during the pandemic which did not survive correction for multiple testing. Previous longitudinal research has shown direct links between temperament traits and emotional outcomes (Rothbart & Bates, 2006; Vassallo & Sanson, 2013). Although temperamental facets of withdrawal and negative reactivity have been more commonly associated with internalised distress (Letcher, Sanson, Smart, & Toumbourou, 2012), the current G2 and G3 findings suggest cooperation and conscientiousness may be particularly relevant for child emotional outcomes during times of stress. Adjustment to pandemic restrictions such as remote learning may have been more difficult for those who are less cooperative, diligent and organised. This accords with the concept of goodness of fit, which emphasises the suitability of environments and situations for particular temperament styles, and the importance of supporting those with at-risk temperament profiles (Sanson et al., 2018).

Similarly, lower levels of G3 social–emotional competencies (including compliance, attention skills, mastery motivation and prosociality) reported by G2 parents at one-year postpartum predicted G3 emotional distress during COVID-19. Notably, many of these socio-emotional competencies overlap with self-regulatory capacities, an important facet of conscientiousness (Eisenberg, Duckworth, Spinrad, & Valiente, 2014) and a G2 predictor of G3 emotional distress during COVID-19. The finding that lower levels of child competencies were associated with later emotional distress during the pandemic above and beyond child socio-emotional behaviour problems highlights the need for early identification and intervention of children not just showing high levels of problems but also those demonstrating lower levels of competencies (Briggs-Gowan & Carter, 2006).

Relational factors. Pre-pandemic lower parental warmth at one-year postpartum predicted child

emotional distress during the pandemic. This highlights the central importance of the parent–child relationship for child development (Sroufe et al., 1999). Additionally, poorer quality parent–child bonding and lower perceived parental self-efficacy showed weak associations which did not persist after correction for multiple testing. Fostering warmth in the parent–child relationship at any time (not just during times of crisis) may reduce risk of later child psychopathology (Pinquart., 2017).

Strengths and limitations

Major strengths of this research include its multi-wave prospective intergenerational design, with pre-pandemic risk and protective factors collected from parent's early life course over almost three decades, from childhood to young adulthood. The focus on preschool and primary-school-aged child outcomes is also rare, with most studies assessing older children and adolescents. Pre-pandemic G2 and G3 data was available at one-year postpartum prior to the pandemic, allowing for the adjustment of pre-COVID-19 child socio-emotional behaviour problems in the prediction of child distress during COVID-19. We also accounted for potential reporting biases by including parents' concurrent emotional distress during COVID-19, acknowledging that distressed parents may over-report offspring behaviour problems (Goodman et al., 2011).

However, several methodological limitations are also worth noting. While we included a range of risk and protective factors, we were limited by the study variables available and included a more extensive set of individual and relational factors than contextual factors. We did not directly address mechanisms involved in associations; future work is needed to examine multiple mediators and complex transactional models, including the role of genes and interactions between individual, relational and contextual factors (Bronfenbrenner & Morris, 2006). Future research could also explore the way in which trajectories of the same constructs across time influence outcomes. Results could be inflated by shared method variance, although we used both G1 and G2 reported precursors to minimise such effects. The restricted age range of G2 parents (recruited as infants in 1983) also potentially limits the generalizability of findings. Rates of infection and levels of restrictions varied considerably across the globe and the extent to which results are generalizable outside Australia is unknown.

To reduce respondent burden, the measure of emotional distress during COVID-19 was relatively brief but psychometrically sound (Nikolaidis et al., 2021, 2022). While clinical diagnosis was not possible with this instrument, dimensional measures of psychopathology commonly demonstrate associations with psychosocial impairment (Gotlib, Lewinsohn, & Seeley, 1995). The measure used to adjust for pre-pandemic child behaviour problems (the BITSEA, which was assessed as early as 2012, up to 8–9 years prior to our pandemic) was not the same as the emotional distress scale used during the pandemic. We were limited by the study variables available. Our analysis included two COVID-19 assessment waves (in 2020 and in 2021) but the extent to which levels of emotional distress persisted beyond the two time periods assessed is unknown. Additionally, compared to the original sample, families retained in the study were less ethnically diverse and had higher education levels; selective attrition is common in long-term prospective studies (Fergusson & Horwood, 2001). While potential biases due to non-participation were addressed using multiple imputation, replication across more diverse ethnic and socioeconomic groups is required.

Implications and conclusions

The pandemic has provided a window of opportunity to reflect on social policy and prevention from a life course and intergenerational perspective (Settersten et al., 2020). Children were arguably one of the most disadvantaged population groups during COVID-19 lockdowns due to closures of childcare and educational facilities and physical distancing. Today's children and future generations will also face increasing burdens and more frequent adverse events due to the impacts of climate change (Sanson, Padilla Malca, Van Hoorn, & Burke, 2022). Calls have, therefore, been made to prioritise child health and development (Holmes et al., 2020; Jones et al., 2020; Newlove-Delgado et al., 2023). Childhood is also a critical period of dependence on caregivers for social and emotional development and self-regulation. This positions the emotional and relational health of parents, and the myriad of influences on parent wellbeing well prior to parenthood, as priority areas for investment in promoting child adjustment to future adversities.

Findings highlight that a range of pre-pandemic factors from the parental life course and the postpartum period predicted next generation outcomes during the pandemic, demonstrating the multifactorial and intergenerational origins of child emotional distress. Population-level monitoring of mental health and wellbeing at every age and stage of the life course is now needed to identify those most vulnerable and inform prevention and intervention efforts in the recovery phase and strengthen resilience to future pandemics and crises. Monitoring can assist communities, government bodies and policymakers in allocating resources and guide the selection of universal prevention programs. Targeted child and family level clinical interventions are needed for those presenting with or at risk of adjustment problems. Additionally, investing in youth prior to parenthood has the potential to benefit young people not only at the time but also as they

develop into adults and caregivers of the next generation (Patton et al., 2018).

If replicated in causal models, the present research suggests investing in individual and relational interventions prior to parenthood may have long-term benefits for the next generation. Preventive interventions may be at the population health policy or clinical level, and aimed at promoting strengths, reducing stressors and enhancing resilience (Saxena, Jané-Llopis, & Hosman, 2006). For example, universal school-based programs enhancing social and emotional learning show positive impacts (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). These programs usually include attention to social competencies such as cooperation and responsibility and positive connections with peers which were identified as key precursors in the present research. Well known societal fault lines were exposed during the pandemic, demonstrating gaps in health, social, economic and political systems (Shergold et al., 2022). Opportunity now exists to review system gaps and "build it back better" (Moreno et al., 2020) to reduce negative sequelae of the pandemic and improve resilience in children and families over the longer-term and intergenerationally.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Appendix S1. COVID-19 emotional distress items.

Table S1. Australian Temperament Project pre-pandemic factors across childhood (ages 7–8 to 11–12 years; 1990–1994).

Table S2. Australian Temperament Project pre-pandemic factors across adolescence (ages 13–14 to 17–18 years; 1996–2000).

Table S3. Australian Temperament Project pre-pandemic factors across young adulthood (ages 19–20 to 27–28 years; 2002–2010).

Table S4. Australian Temperament Project Generation 3 Study pre-pandemic factors at 1-year postpartum (2012–2019).

Table S5. Associations between pre-pandemic factors during parents' childhood, adolescence and young adulthood (1990–2010) and child emotional distress during the COVID-19 pandemic (2020 and 2021), using available case data.

Table S6. Associations between pre-pandemic factors in children and parents at 1-year postpartum (assessed between 2012 and 2019) and child emotional distress during the COVID-19 pandemic (2020 and 2021), using available case data.

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Data availability

While study protocols do not permit potentially re-identifiable participant data to be made publicly available, we welcome collaboration with the ATPG3 research team subject to appropriate permissions and ethical approval. Enquiries about collaboration are possible through our institutional data access protocol: https://lifecourse.melbournechildrens.com/data-access/.

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Key points

- Pandemic mitigation measures have challenged emotional and relational health of families.
- Capitalising on one of Australia's longest running intergenerational cohort studies, we examined the extent to which pre-pandemic parent and child individual, relational and contextual factors predicted children's emotional distress during the COVID-19 pandemic.
- A range of pre-pandemic factors assessed in parents' early life course (1990–2010) and in parents and children at 1-year postpartum (2012–2019) predicted next generation child emotional distress during the pandemic, demonstrating its multifactorial and intergenerational origins.
- Population-level monitoring of mental health and wellbeing at every age and stage of the life course is needed.

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