

ATTACHMENT RG 3

This is the attachment marked "**RG 3**" referred to in the witness statement of Rebecca Giallo dated 7th July2015.

Factors associated with trajectories of psychological distress for Australian fathers across the early parenting period

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Abstract

Purpose Little is known about the course of fathers' psychological distress and associated risk factors beyond the postnatal period. Therefore, the current study aimed to: (a) assess the course of distress over 7 years postnatally; (b) identify classes of fathers defined by their symptom trajectories; and (c) identify early postnatal factors associated with persistent symptoms.

Method Data from 2,470 fathers in the Longitudinal Study of Australian Children were analysed using latent growth modelling. Fathers' psychological distress was assessed using the Kessler-6 (Kessler et al. in *Arch Psychiatry* 60:184–189, 2003) when their children were aged 0–1, 2–3, 4–5 and 6–7 years.

Results Overall, distress was highest in the first postnatal year and then decreased over time. Two distinct trajectories were identified. The majority of fathers (92 %) were identified as having minimal distress in the first postnatal year which decreased over time, whilst 8 % had moderate distress which increased over time. Low parental self-

efficacy, poor relationship and job quality were associated with 'persistent and increasing distress'.

Conclusions Early postnatal factors associated with fathers' persistent distress were identified, providing opportunities for early identification and targeted early intervention.

Keywords Australia · Fathers · Postnatal · Mental health · Distress · Latent growth modelling

Introduction

Fathers are at heightened risk of well-being difficulties such as depression, anxiety, stress, and fatigue in the first year after having a baby [1–3]. An Australian population-based study found that 10 % of fathers report significant psychological distress in the first postnatal year [2], and a meta-analysis of 43 international studies estimated that 10 % develop postnatal depression [4]. One large cohort study examining the incidence of parental depression in primary health care settings for 86,957 families, revealed that the incidence of depression was highest in the first year postpartum for both mothers and fathers, and that by 12 years of child age, 21 % of fathers had experienced an episode of depression [5]. The demands of caring for a new baby, changes in the couple relationship and family life, and the increased role strain associated with balancing work and family may predispose some fathers to mental health difficulties as they negotiate this period in their life.

Although scant, evidence suggests that depressive symptoms may persist across the first postnatal year for some fathers. In an Australian study of 157 couples, the proportion of fathers reporting depressive symptoms increased from 2.8 % at 6 weeks postpartum to 3.2 % at

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4 months, and then 4.7 % at 12 months [6]. Similarly, another study of 204 first-time fathers found that 1.9 % scored in the clinical range on the Edinburgh Postnatal Depression Scale at 3 months, 2.1 % at 6 months, and 2.3 % at 12 months postpartum [7]. Whilst these findings from small convenience or clinical samples indicate that depressive symptoms may increase across the first postnatal year for some fathers, little is known about the course, persistence and associated risk factors of mental health difficulties for fathers beyond this time.

A better understanding of the extent to which fathers experience persistent postnatal depressive symptoms is critical. Implications include substantial economic cost to the Australian community and potential short- and long-term effects on couple and parent–child relationships [8], and children’s well-being and development [9–11]. The direct cost of paternal postnatal depression alone to the Australian health care system was estimated to be \$18M in 2012 [12]. The true cost to the health care system and wider economy is likely to be much more when considering the costs incurred through lost employment productivity, and the indirect effects of father’s mental health difficulties on their families and children.

In addition to determining the extent to which fathers experience ongoing postnatal distress, identification of the risk factors that may heighten fathers’ risk of persistent mental health difficulties is needed. Drawing upon a social determinants model of health, the present study sought to identify a range of father-specific characteristics, family, employment and socio-demographic factors associated with fathers’ mental health over time. Cross-sectional studies have identified a range of these factors in these domains associated with fathers’ postnatal mental health difficulties including a past history of depression [10], relationship difficulties [13], having a partner with mental health problems [8, 13], and having a child with a difficult temperament [14]. More recently, in our previous research with a sample of 3,219 fathers participating in the infant cohort of the Longitudinal Study of Australian Children, employment characteristics were the strongest predictors of fathers’ postnatal mental health. Specifically, having limited access to favourable employment conditions such as flexible working hours, parental leave, and autonomy over workload were associated with poor mental health in the postnatal period [2]. Whilst this provides important information about risk factors for fathers’ postnatal mental health, to the best of our knowledge, this work has not been extended to identify what places fathers at risk of mental health difficulties that persist beyond the postnatal period.

Building upon our previous work in this area and taking advantage of the rich data about fathers health, well-being, lifestyle and social contexts collected in a large longitudinal study of Australian children and their families, we sought to

identify whether socio-demographic factors (e.g. father’s age, education level and income), father lifestyle factors (i.e. smoking and alcohol intake), family contextual factors (i.e. partner mental health, relationship quality and child temperament, and employment factors (i.e. employment status and job quality) were associated with fathers’ mental health across the early parenting period. We were particularly interested in the factors present in the first postnatal year. This is a time when fathers are likely to access universal child health services with their children and partners, and might be more willing to discuss their health and well-being. Evidence can inform approaches to the early identification of fathers at risk of long-term mental health difficulties, and those who may benefit most from prevention and early intervention mental health support.

Therefore, this study sought to examine the course of fathers’ mental health difficulties across the early parenting period when children were aged 0–7 years using longitudinal data from a large sample of fathers participating in growing up in Australia: the Longitudinal Study of Australian Children (LSAC). Specifically, the aims were to: (a) report on the course of fathers’ psychological distress across four time points when their children were aged 0–12 months, 2–3, 4–5, and 6–7 years; (b) identify groups of fathers defined by their trajectory of distress over the course of the early parenting period; and (c) identify early postnatal psychosocial factors associated with the identified trajectories of distress.

Methods

Study design and sample

Data from waves 1 (2004), 2 (2006), 3 (2008) and 4 (2011) of the LSAC infant cohort were used in this study. Detailed information about the LSAC study design and sampling information are reported elsewhere [15]. The Australian Institute of Family Studies Ethics Committee approved each wave of the study. Briefly, a two-stage clustered sample design was used. First, approximately 10 % of all Australian postcodes were selected (stratified by state of residence and urban versus rural status). Next, children proportional to population size were randomly selected from each postcode using Australia’s universal health insurance (Medicare) database, which includes over 90 % of all Australian infants.

The infant cohort consisted of 5,107 children aged 3–12 months at wave 1 (54 % response rate). Compared to the Australian population, children from non-English speaking families, single parents and those living in rental properties were slightly under-represented. At wave 2, there were 4,606 2- to 3-year-olds (90 % retention from

wave 1), 4,386 4- to 5-year-olds at wave 3 (86 % retention from wave 1), and 4,242 6- to 7-year-olds at wave 4 (83 % retention rate from wave 1). Retention was lower for children with less highly educated parents, from Indigenous and non-English speaking backgrounds, and for those living in rental properties.

The sample for the current analyses were biological and adoptive fathers who resided with their children as either the primary or secondary carer across all waves, and had data available on the measures of interest across at least three of the four waves.

Measures

Psychological distress was measured by the Kessler-6 (K6) [16] at all four waves. The six items assessed the extent to which fathers' experienced symptoms of psychological distress such as feeling nervous, hopeless, restless or fidgety, extremely sad, and worthless in the last 4 weeks. Items were rated on a five-point scale ranging from 'none of the time' to 'all or most of the time', and summed with higher scores indicating higher psychological distress. This scale has excellent psychometric properties, and is used to screen for mood and anxiety disorders against DSM-IV criteria with high specificity (0.96) and robust total classification accuracy (0.92) [17]. Consistent with other Australian studies [18, 19] two cut points were used to describe the level of severity of distress. The symptomatic cut point was defined as a score of 8 or more, indicating significant psychological distress. The more stringent clinical cut point was defined as a score of 13 or more, indicating probable clinical diagnosis of a mental health condition. Internal consistency for the current sample as measured by Cronbach's α ranged from 0.77 for wave 1 to 0.81 for wave 3.

Potential predictor variables

Several factors which may be associated with fathers' psychological distress were explored. These are listed in Table 1 and are classified as socio-demographic, father, family, and employment characteristics. As summarised in the table, LSAC employed standardised measures from national studies such as the Australian Census where possible.

Data analysis

Analyses were conducted in three stages. First, to report on the course of fathers' depressive symptoms across four time points when the study child was aged 3–12 months, 2–3, 4–5 and 6–7 years, a latent growth model was estimated using MPlus Version 7 [20]. This involved creating latent factors to represent the initial or baseline levels of the variable (i.e. the

intercept) and the trajectory or change in that variable over time (i.e. the slope). The intercept factor was created with a fixed loading of 1.0 at each wave, whilst the slope factor was created with fixed values to each time point (e.g. loadings of 0, 1.0, 2.0 and 3.0 for waves 1, 2, 3 and 4, respectively). The model was estimated using robust maximum likelihood estimation, and assessed using the Chi-square test (χ^2), and other practical fit indices including Tucker–Lewis Index (TLI), the Comparative Fit Index (CFI), and root mean square error of approximation (RMSEA). Indices for the TLI and CFI should exceed 0.90 for an acceptable fit [21], and values close to or below 0.05 for the RMSEA were considered acceptable [22]. The model was tested for cases with complete data, and then re-tested with all cases where missing data were handled using the default Full Information Maximum Likelihood option in MPlus Version 6.0 [20].

Next, latent growth class analysis (LGCA) was conducted to identify distinct subgroups of longitudinal trajectories of fathers' depressive symptoms across the early parenting period. This involves identifying the smallest number of classes starting with a parsimonious 1-class model and fitting successive models with increasing numbers of classes. Model solutions were evaluated by comparing likelihood-ratio statistic (L^2), bayesian information criterion (BIC), Akaike information criterion (AIC) and entropy across the successive models. Better fitting models have lower L^2 , BIC and AIC values, whilst entropy is an index for assessing the precision of assigning latent class membership. Higher probability values indicate greater precisions of classification. The Vuong–Lo–Mendall–Rubin likelihood-ratio test was also used to test for significant differences between the models. Class membership for all cases was saved and used in the logistic regression analyses.

Finally, logistic regression was performed to investigate the associations between the predictor variables and class membership. Only fathers who had data available for all predictor variables were included in these analyses. To select variables for inclusion in the final multivariable model, each predictor variable was examined in a series of bivariate logistic regressions and entered into the final model if significantly associated with class membership at $p < 0.1$. Results are presented as odd ratios with 95 % confidence intervals.

Results

Sample characteristics

Of the 5,107 families recruited into the study, 865 were lost to attrition across the four waves. No father data were available for 1,739 cases at one or more waves. This may be due to no father residing in the family home at one or

Table 1 Potential predictor variables

Construct	Additional information
Socio-demographic characteristics	
Father age	Age last birthday (years) at wave 1
Country of birth	Australia and New Zealand = 0; other = 1
Education level	Completed year 12 or equivalent at wave 1 yes = 0; no = 1
Income	Personal weekly income (\$AUD) at wave 1
Financial hardship (Bray [33])	Eight items assessing whether family went without meals, was unable to heat/cool home, etc., in last 12 months prior to wave 1. No hardship = 1; some hardship = 2; significant hardship = 3
Father characteristics	
Smoking	Assessed at wave 1. no = 0; yes = 1
Alcohol consumption	Self-report measure assessing daily consumption of alcohol assessed at wave 1. Light = 1; abstain = 2; occasional = 3; moderate = 4; hazardous/harmful = 5
Parenting self-efficacy (National Centre for Education Statistics [34])	Four items. Attitudes and beliefs about one's competence as a parent assessed at wave 1. Coded so that higher scores indicate lower self-efficacy
First-time father	First-time father at wave 1. no = 0; yes = 1
Family characteristics	
Child gender	Female = 0; male = 1
Child age	Age in months at wave 1
Temperament (Sanson et al. [35])	Six items assessing the infant's reactions to new situations and people, responsiveness to soothing attempts, and ability to engage in sustained solo play at wave 1. Higher scores reflect high sociability and high cooperation
Mother's mental health (K6) (Kessler et al. [36])	Six items measuring symptoms of anxiety or depression in the last 4 weeks at wave 1. Higher scores indicate more distress. No distress = 0; symptomatic or clinical distress (score >7) = 1
Relationship quality (Sharpley and Rogers [37])	Single item assessing degree of happiness in relationship at wave 1. Happy/very happy = 0; not happy = 1
Stressful life events (Center for Mental Health Research [38])	Number of life stressors at wave 1. No stressors = 0; one or more events = 1
Employment characteristics	
Employment status	Work hours at wave 1. Part-time (1–34 h/week) = 0; full-time (35–44 h/week) = 1; long full-time (45 + h/week) = 3
Job quality (Strazdins et al. [19])	Four items assessing access to paid parental leave, flexible hours, job control, job security at wave 1. Coded so that higher scores indicate lower quality
Occupational prestige (Jones and McMillan [39])	Prestige based on education, income, and social perceptions associated with main occupation at wave 1. Professional skilled = 1; labour and clerical = 2; unskilled labour = 3

more waves, or the father chose not to participate in the study. A further 33 caregivers were not a biological or adoptive father. The final sample consisted of 2,470 fathers, and their demographic characteristics at wave 1 are presented in Table 2. The majority of fathers were born in Australia, spoke English at home, had an educational level of year 12 or above, and were in paid employment. The age of the study child at wave 1 was 8.7 months ($SD = 2.5$).

There were significant differences between fathers in the final sample and those excluded from the analyses (at $p < 0.001$). Fathers who were excluded were younger than fathers in the final sample, and tended to be from non-English speaking and Aboriginal Torres Strait Islander backgrounds. They also tended to have lower educational

attainment, to be in lower quality part-time jobs, and to have lower income than fathers in the final sample.

Data screening and descriptive statistics

After excluding the cases outlined above, approximately 1 % of data were missing across all study variables. There were also 728 fathers in the study with one wave of data missing on the K6 and these were imputed using the Full Information Maximum Likelihood option available in MPlus Version 6.0 [20]. The pattern of results for cases with complete data and those with imputed data was similar, and therefore, only results for cases with imputed data are reported here.

Table 2 Demographic characteristics for the final sample at wave 1 ($n = 2,470$)

Demographic characteristic	n (%)
Father characteristics	
Primary caregiver	44 (1.8)
Age in years ^a	34.5 (5.5)
Born in Australia or New Zealand	2,037 (82.5)
Language other than English at home	222 (9.0)
Aboriginal or Torres Strait Islander	23 (0.9)
Education level—year 12 and above	1,595 (64.6 %)
Employment status	
Unemployed/not in the labour force	16 (0.7)
Work part-time (1–34 h/week)	138 (5.9)
Work full-time (35–44 h/week)	942 (40.2)
Work long full-time (45 + h/week)	1,248 (53.2)
Weekly income from all sources (AUD) ^a	1,069 (75.2)
Infant and family characteristics	
Study child gender—male	1,267 (51.3)
Number of children in household ^a	1.9 (0.9)

^a Mean (SD)

Table 3 Descriptive statistics for depressive symptoms as measured by the K6

	Range	M	SD	Skewness	Kurtosis
Wave 1 (aged 3–12 months)	0–24	3.17	2.98	1.69	4.73
Wave 2 (aged 2–3 years)	0–24	2.92	2.88	1.89	6.37
Wave 3 (aged 4–5 years)	0–24	2.92	3.11	1.82	4.47
Wave 4 (aged 6–7 years)	0–24	2.64	2.82	1.87	5.14

Descriptive statistics for the K6 are presented in Table 3. The observed means for psychological distress suggested a decrease over time. Statistical and graphical measures of normality revealed that distributions for the psychological distress at each wave were generally positively skewed. Therefore, robust maximum likelihood estimation was used to adjust the fit indices and parameter estimates to account for non-normality when conducting the latent growth analyses [20].

Latent growth model for psychological distress across the early parenting period

A two-factor latent growth model for fathers' psychological distress was estimated for the four waves. This model was an acceptable fit to the data, $\chi^2(5, N = 2,470) = 11.10$, $p = 0.049$, CFI = 0.99, TLI = 0.99, RMSEA = 0.022. The mean of the intercept was positive and significantly

Table 4 Model fit indexes for latent classes of psychological distress across the early parenting period

Model	L^2	df	BIC	AIC	Entropy
1-class	-21,554.72	6	43,179.75	43,127.44	–
2-class	-21,206.03	9	42,505.81	42,436.07	0.93
3-class	-21,276.00	12	42,645.74	42,576.00	0.85
4-class	-21,101.80	15	42,320.79	42,233.61	0.85
5-class	-21,004.72	18	42,150.05	42,045.44	0.83

L^2 Likelihood-ratio statistic, BIC bayesian information criterion, AIC Akaike information criterion

different from zero ($\kappa = 3.15$, $p < 0.001$) and the mean of the slope was negative and significantly different from zero ($\kappa = -0.16$, $p < 0.001$). This indicates that in the first postnatal year the average distress score was 3.15, and that on average the distress scores decreased at a rate of 0.16 points each wave. Examination of the variance component for the intercept ($\Phi = 4.80$, $p < 0.001$) and slope ($\Phi = 0.32$, $p < 0.001$) indicated significant individual differences in the initial postnatal levels of distress and change over time. Finally, a significant negative correlation between the intercept and slope factors ($r = -0.35$, $p = 0.004$) indicated that higher average levels of distress at wave 1 were associated with a slower rate of deceleration in distress across time.

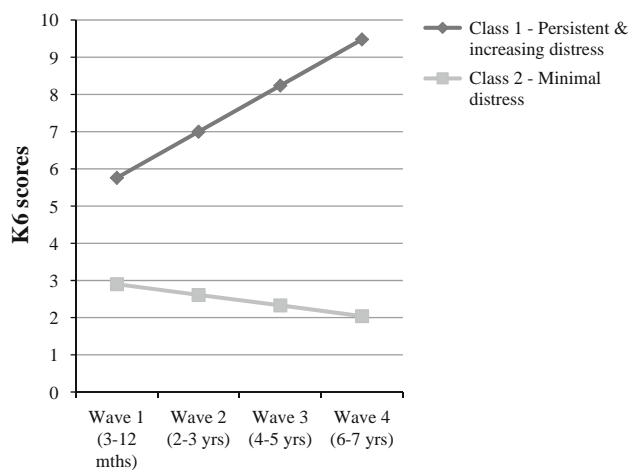
Trajectories of psychological distress across the early parenting period

Latent growth mixture modelling analyses specifying between 1 and 5 classes were conducted and the goodness of fit indexes are presented in Table 4. The 2-class model was accepted as the final model as the model fit indexes were lower than the 3-, 4- and 5-class models, and the entropy value was highest (0.93), suggesting good precision in assigning individual cases to their appropriate class. The posterior probabilities were all reasonably high, nearing 1.0 for Class 1 (0.92) and Class 2 (0.99). Finally, the Vuong–Lo–Mendall–Rubin likelihood-ratio test showed a significant difference between the 1-class and 2-class models ($p < 0.0001$) suggesting that the 2-class model gives significant improvement in model fit over the 1-class model.

Table 5 presents the results for the 2-class model and Fig. 1 depicts the estimated means across the waves for each class. The majority of fathers (92 %) were assigned to Class 2 characterised by low average distress scores (K6 score of 2.90) in the postnatal period (wave 1 when children were aged 3–12 months), which remained consistently low across the early childhood period (waves 2–4 when children were aged 2–3, 4–5 and 6–7 years), and decreasing at a rate of 0.29 points each wave. Class 1 (8 %), on the other hand, had

Table 5 Results of the latent growth mixture modelling for a 2-class model

Parameter	Class 1 persistent and increasing distress	Class 2 minimal distress
Class membership count and proportion	197 (7.9 %)	2,273 (92.1 %)
Class assignment probabilities	0.92	0.99
Estimated means		
Wave 1 (aged 3–12 months)	5.76	2.90
Wave 2 (aged 2–3 years)	7.00	2.61
Wave 3 (aged 4–5 years)	8.24	2.33
Wave 4 (aged 6–7 years)	9.48	2.04
Mean intercept	5.76 (SE = 0.47)***	2.90 (SE = 0.07)***
Mean slope	1.24 (SE = 0.25)***	-0.29 (SE = 0.02)***
Intercept variance	4.07 (SE = 0.36)***	4.07 (SE = 0.36)***
Slope variance	0.14 (SE = 0.07)*	0.14 (SE = 0.07)*
Intercept–slope covariance	-0.65 (SE = 0.12)***	-0.86 (SE = 0.09)***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ **Fig. 1** Estimated means across the four waves for latent classes 1 and 2

higher distress scores in the postnatal period (K6 score of 5.76) which increased markedly at a rate of 1.24 points each wave. Class 1 was referred to as the ‘persistent and increasing distress’ group, and Class 2 was referred to as the ‘minimal distress’ group. Figure 1 shows the trajectories of distress symptoms for the two distinct classes.

Predictors of the latent class reflecting ‘persistent and increasing distress’

To identify predictors of membership in the ‘persistent and increasing distress’ class, bivariate logistic regression analyses were conducted and are presented in Table 6. The variables significantly associated with this class at $p < 0.05$ were having poor or fair general health, low parenting self-efficacy, high maternal psychological distress, being not happy in the couple relationship, and low job quality. Bivariate associations were approaching significance for several variables including experiencing some or significant financial hardship, age of the study child, and maternal general health. These were entered into the final multi-variable model.

The final multivariable model (see Table 6) revealed that the strongest predictors of the ‘persistent and increasing distress’ class were not being happy in the couple relationship, poor job quality, and lower parenting self-efficacy.

Discussion

This is the first population-based study to examine trajectories of psychological distress for Australian fathers from the first postnatal year to when their children were aged 6–7 years. When examining the course of psychological distress for the overall sample, the latent growth model revealed that symptoms were highest during the first postnatal year (wave 1) and then gradually decreased across the early parenting period (waves 2–4). Although this study did not assess fathers’ psychological distress prior to birth of their children, the high levels of distress in the early postnatal period may reflect the high demands of infant care-giving and adjustment that parents undergo during the first postnatal year. Then as infant sleep and feeding demands lessen and families establish more regular work, family and daily living routines, parents’ mental health may improve.

Our results also revealed that there was significant variability in fathers’ distress at wave one, and similarly, in their pattern of mental health symptoms over the life of the study to when their children were 6–7 years of age. These findings suggest distinct groups of fathers characterised by markedly different trajectories of distress. We found that two classes best captured the heterogeneity in fathers’ distress across the early parenting period. The majority of fathers (92.1 %) were classified as reporting ‘minimal distress’, characterised by low distress in the first postnatal year (2.90), which then decreased across the early parenting period. Approximately 8 % of fathers, however, were classified into the ‘persistent and increasing distress’ group.

Table 6 Predictors of the ‘persistently high depressive symptoms’ latent class

	Minimal depressive symptoms <i>n</i> = 1,753–2,273 <i>n</i> (%)	Persistently high depressive symptoms <i>n</i> = 143–197 <i>n</i> (%)	Bivariate <i>n</i> = 1,527 OR (95 % CI), <i>p</i>	Final multivariable <i>n</i> = 1,527 OR (95 % CI), <i>p</i>
Socio-demographic factors				
Paternal age (in years) ^a	34.4 (5.5)	35.2 (6.0)	1.02 (0.98–1.06), 0.251	–
Born in Australia or New Zealand	1,885 (82.9)	152 (77.2)	1.34 (0.80–2.22), 0.264	–
Completed year 12 or above	1,468 (65.2)	127 (65.1)	1.16 (0.76–1.76), 0.493	–
Weekly income from all sources (AUD) ^a	1,079.0 (751.5)	951.3 (748.8)	1.00 (0.99–1.00), 0.232	–
Experiencing some or significant financial hardship	461 (20.3)	60 (30.5)	1.53 (1.00–2.35), 0.050	–
Language other than English at home	197 (8.7)	25 (12.7)	Omitted ^b	–
Aboriginal and/or Torres Strait Islander	20 (0.9)	3 (1.52)	Omitted ^b	–
Father characteristics				
Smoking	436 (20.4)	50 (26.7)	1.35 (0.83–2.17), 0.223	1.39 (0.89–2.17), 0.144
Alcohol consumption				
Light	1,279 (61.1)	110 (59.8)	Reference group	–
Abstain	151 (7.2)	16 (8.7)	0.89 (0.25–3.23), 0.859	–
Occasional	237 (11.3)	33 (17.9)	1.37 (0.80–2.37), 0.252	–
Moderate	343 (16.4)	29 (10.3)	0.55 (0.25–1.21), 0.135	–
Hazardous/harmful	83 (4.0)	6 (3.3)	1.04 (0.44–2.47), 0.927	–
Parenting self efficacy ^a	14.1 (5.8)	15.2 (6.6)	1.05 (1.02–1.09), 0.005	1.04 (1.00–1.07), 0.025
First-time fathers	793 (37.0)	65 (35.0)	0.72 (0.44–1.17), 0.184	–
Family characteristics				
Study child gender—male	1,156 (50.9)	111 (56.4)	0.82 (0.55–1.22), 0.318	–
Age of study child ^a	8.8 (2.5)	8.6 (2.5)	0.92 (0.84–1.00), 0.063	0.92 (0.84–1.01), 0.081
Child temperament (STSI score) ^a	14.6 (4.01)	14.8 (3.9)	1.01 (0.95–1.07), 0.774	–
Maternal mental health (K6 score) ^a	3.1 (3.1)	3.9 (3.5)	1.08 (1.03–1.14), 0.003	1.05 (1.00–1.11), 0.064
Not very happy with relationship	249 (11.6)	49 (26.3)	2.50 (1.52–4.10), <0.001	2.19 (1.33–3.60), 0.002
Stressful life events	1,329 (60.3)	125 (66.5)	1.38 (0.91–2.09), 0.133	–
Employment characteristics				
Employment status				
Work full-time (35–44 h/week)	877 (40.4)	65 (37.4)	Reference group	–
Unemployed/not in the labour force	16 (0.7)	0 (0.0)	Omitted ^b	–
Work part-time (1–34 h/week)	130 (6.0)	8 (4.6)	1.20 (0.42–3.45), 0.735	–
Work long full-time (45 + h/week)	1,147 (52.9)	101 (58.1)	1.10 (0.73–1.66), 0.649	–
Job quality ^a	3.1 (0.8)	2.9 (0.9)	1.32 (1.06–1.65), 0.015	1.24 (1.00–1.55), 0.047
Occupational prestige—professional	1,256 (57.9)	90 (51.4)	1.43 (0.92–2.12), 0.108	–

^a Mean (SD)^b Omitted because numbers are too small

These fathers had relatively low distress (5.76) in the postnatal period, but this increased markedly over time. By wave 3 when their children were aged 4–5 years, these fathers were reporting distress in the symptomatic range (8 or more), indicating significant psychological distress. These findings suggest that most fathers adjust and cope

well to the postnatal period and experience good mental health during the early parenting years. There is, however, a group of vulnerable fathers who are exhibiting a chronic pattern of distress.

The levels of psychological distress seen in the ‘persistent and increasing distress’ group have been associated

with increased rates of anxiety and depression [23] as measured by the Composite International Diagnostic Interview, a detailed structured questionnaire that applies ICD-10 and DSM-IV criteria to diagnose mental disorders. Lawrence et al. [23] also showed the more severe the K6 distress, the more likely that the problem had persisted for a long period of time. This level of persistent psychological distress is of significant concern, given that fathers' psychological distress in the postnatal period is associated with increased parenting hostility (i.e. yelling and frustration directed at children) [24, 25] and decreased engagement in play and learning activities with children as well as poor social, emotional and behavioural development in children [9, 10, 24–26].

To better understand what contributes to fathers' persistent mental health difficulties, we sought to identify a broad range of factors during early postnatal period associated with membership in the 'persistent and increasing distress' class. The strongest predictor variable was perceptions of unhappiness or low satisfaction in the couple relationship. Fathers who reported that they were not happy in their couple relationship were twice as likely to report persistent distress than fathers who were very happy or happy in their couple relationship. This is consistent with previous research establishing couple relationship difficulties as a risk factor for postnatal depression among fathers [2]. For some couples, relationships can become strained after having a baby and already strained relationships may deteriorate further. This is a time when couples undergo significant changes in how they spend time together, how they communicate, their roles, responsibility and intimacy [27]. Our findings suggest that early relationship difficulties and low satisfaction in the couple relationships may have a long lasting impact on fathers' mental health. It is also likely that poor mental health may influence both perceptions of the quality of the couple relationship as well as the ability to engage in behaviours that are important for strengthening couple relationships. These include engaging in effective communication, providing emotional and practical support, intimacy, and enjoying time spent together.

When one parent in the couple relationship experiences significant adjustment and well-being difficulties, this can put strain on the whole family and on their partner, also predisposing them to mental health difficulties. Although significant at the bivariate level, we found that having a partner with postnatal mental health difficulties was not associated with fathers' reporting persistent distress into the early parenting period when considering other risk factors. This is contrary to previous research establishing partner mental health as a risk factor for fathers' mental health difficulties in the postnatal period [2, 4, 8]. These findings suggest that partner postnatal mental health may

not have a long lasting effect on fathers' mental health beyond the postnatal period. Future work is needed to explore the transactional nature or mutual influences of mothers' and fathers' health and well-being beyond the postnatal period to better understand what happens over time as families change as their children get older, infant care demands decrease, and family time and routines become more predictable. Identifying factors that may buffer fathers' from the effects of poor partner mental health such as participation in employment is also important.

Poor job quality was another key factor associated with fathers' persistent and increasing psychological distress across the early parenting period. Fathers reporting the lowest job quality with access to fewest favourable workplace conditions (i.e. job security, control of workload and working hours, and access to paid family leave) in the postnatal period had 1.2 times the odds of reporting persistent distress than fathers with the highest job quality. Poor workplace conditions have long been shown to impact on the mental health and well-being of employees at all life stages [19], including fathers in the postnatal period [2]. The postnatal period is a critical time when parents are making adjustments to respond to the changing needs of their family, negotiating the balance of paid and unpaid labour. Access to conditions such as flexible start and finishing times and paid parental leave at this time may provide fathers with a greater opportunity and support to make these adjustments. Not only does this allow them to be more available to their partner and children, it reduces the likelihood of work–family conflict, known to be high for parents, and itself a risk factor for poorer mental health outcomes [28]. Conversely, fathers with limited access to such conditions are likely to experience poor job satisfaction and high work–family conflict. This predisposes fathers to higher distress during the rapid family transitions occurring in the postpartum period. It might be more difficult for fathers to negotiate flexible time in their job to attend to family demands, putting strain on themselves, and on the couple relationship. As our findings suggest, these difficulties, once established, persist throughout early parenting.

The final factor found to be associated with fathers' persistent distress was low parental self-efficacy. Parental self-efficacy refers to a parent's belief about their ability to parent successfully, and is considered a key determinant of positive parenting behaviours that are important in promoting children's social, emotional and behavioural development [29]. The postnatal period is a critical time in which parents' beliefs about themselves as a parent are forming or being re-evaluated on the basis of their new parenting experiences. It has been posited that self-efficacy cognitions are sensitive to emotional functioning [30],

however, the reverse is also likely to be true. Perceptions of early parenting difficulties and lack of confidence may also contribute psychological distress. Although the relationship was modest ($OR = 1.04$), the findings of the present study extend previous research establishing cross-sectional associations between fathers' postnatal distress and parental self-efficacy [11]. We found that negative beliefs about parenting ability and low satisfaction and confidence in parenting in the postnatal period may contribute to ongoing distress across the early parenting period. It may be that feelings of frustration or seemingly ineffectual attempts to provide infant care might erode fathers' self-esteem, contributing to low mood. When this occurs in the postnatal period, it may set the repertoire of fathers' experience of fathering, and continue to shape their self-perception as a parent, affecting their mental health over time. This is a particularly important finding as both psychological distress and low parental self-efficacy have been associated with coercive discipline and hostile parenting behaviour, which are well-established risk factors for behavioural difficulties in children [29, 31].

Finally, it is worth noting that none of the socio-demographic characteristics such as fathers' age, education level, or income, or other characteristics such as being a first-time father or stressful life events, were associated with the 'persistent and increasing distress' class. Some of these, in particular stressful life events and being a young and/or first-time father, have been associated with postnatal mental health difficulties in previously conducted studies with clinical or small convenience samples [32]. The findings of this large population-based study, however, highlight the relative importance of contextual factors (i.e. job quality and couple relationship) to fathers' persistent mental health difficulties, over and above structural socio-demographic characteristics. These factors are potentially modifiable targets for intervention and support. We also acknowledge, in interpreting these results, that there may be other factors, personal or contextual, that may have sustained poorer mental health for fathers in the intervening years. However, it was not the within the scope of this study to address repeated or new predictor variables emerging over time. Rather, we focus on the postnatal period—a critical transition period for fathers and families, and a time when contact with health services is relatively high.

Limitations and future research directions

Before discussing the implications of the study, there are several limitations to note. First, although this study utilises data from a very large sample of Australian fathers, there was attrition across the data collection points and under-representation of fathers from lower socioeconomic, non-

English speaking and Aboriginal and Torres Strait Islander backgrounds. These groups may be at greater risk of psychological distress, and therefore the study findings may potentially underestimate associations between the investigated factors and trajectories of distress among fathers in the general population. Further to this, only fathers in couple relationships who were living with their children during the study period were included in this study, and the findings may not generalise to single fathers or fathers not living with their children. Emerging research shows that fathers not living with their children are at increased of mental health difficulties during the early parenting period [2]. Future research is needed to better understand the specific risk factors associated with distress for these fathers.

Second, a past history of mental health difficulties is a known risk factor for postnatal distress, but was not assessed for non-primary caregivers in LSAC, who were mostly fathers. This is also likely to be a risk factor for ongoing and increasing distress across the early parenting period, but this is yet to be confirmed. Fourth, the measures used in LSAC are necessarily brief and may not fully capture the complexity of some of the predictor variables of interest, such as parental self-efficacy and quality of the couple relationship. Similarly, although the Kessler-6 is a well-established screening tool for psychological distress and is well-correlated with anxiety and depression [23] and serious mental illness [16], it is brief and does not differentiate amongst the broad range of mental health difficulties experienced by fathers.

Lastly, although the present study has utilised data across four waves to examine fathers' psychological distress over time, causality between the predictor variables and trajectories of distress cannot be inferred. Whilst self-reporter bias whereby distressed fathers may have more negative perceptions about their relationships and parenting, complex transactional, interrelationships are likely to exist between fathers' persistent mental health difficulties and all of the identified predictor variables. A detailed analysis of the factors maintaining distress across the early parenting period is needed. Specifically, exploration of the mutual influences of distress, relationship quality and parental self-efficacy is required, along with research into the long-term effects of persistent distress on employment, family relationships, parenting and child well-being is needed.

Implications and conclusions

This is the first study to examine the course of Australian fathers' psychological distress beyond the postnatal period. It reveals approximately 7 % of fathers experience worsening mental health across the early parenting period. This

is of concern given the potential impact on families, partners and children, as well as the burden to the Australian health care system. This provides evidence to inform policy development and investment in strengthening health care and early childhood services to identify and respond to the specific needs of fathers as well as mothers during the postnatal period.

This is a time when fathers may be more likely to access universal child health services with their children and partners, and also a time when they might be more amenable to discussing their health and well-being. We report on factors associated with persistent distress that are identifiable during the first postnatal year. A psychosocial assessment of fathers' mental health that focuses on their current employment situation, couple relationship, and thoughts about parenting, may assist health professionals to identify fathers at risk of ongoing and increasing distress. This may also inform clinical decisions about fathers who may require follow-up across the early parenting period or benefit from early mental health interventions and support to promote their postnatal health and prevent ongoing difficulties. This is an important step to promoting the well-being of fathers during the critical early years of their children's development.

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Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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