Finding the Power Within: Is Resilience Protective Against Symptoms of Stress, Anxiety, and Depression in Australian Parents During the COVID-19 Pandemic?

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Abstract

The present study utilised a strengths-based approach to investigate the association between resilience and indicators of mental health in a large sample of Australian parents at the time of the COVID-19 pandemic. The study was nested within a large longitudinal cohort study of Australian parents of a child aged 0-18 years. Hierarchical regression models were run to examine the relationship between the variables of interest. Of 2,110 respondents included, 1701 (80.6%) were female. Higher resilience was associated with lower levels of stress, anxiety, and depression. Loneliness was a key contributor to mental health outcomes. An increase in extraversion was associated with improved resilience. The relationship between resilience and depression was influenced by the level of partner support. Interventions targeting mental health of parents at the time of pandemics should focus on reducing loneliness while working with the constraints of imposed social isolation, and to include partners.

Keywords: anxiety; COVID-19; depression; families; parents; resilience; stress

Introduction

COVID-19 Pandemic and Mental Health

The World Health Organization (WHO) has declared novel coronavirus (2019-nCoV) a public health emergency of international concern, with >700,000 deaths to date (ECDC, 2020). While in Australia the response to the pandemic has been more successful than in many other countries, with the total number of cases over 24,000 and 450 deaths (Australian Government, 2020), Australians have been and will continue to be affected by the pandemic. Nearly 30% of the workforce have experienced unemployment or under-employment (Roy Morgan, 2020), with associated socio-economic stressors, such as housing and economic uncertainty, and threats to family wellbeing (Conger, Conger, & Martin, 2010; Ensminger, Fothergill, Bornstein, & Bradley, 2003).

Between March and May 2020, the federal and state governments introduced a range of measures to slow the rate of infection by isolating members of the community (Department of Health, 2020). While effective in mitigating the spread of the virus, these measures may present risks for adult mental health, family relationships and conflict, and child health and development. In early reports from China (n=1210), over 50% of general public respondents reported moderate to severe psychological impact of the pandemic (Wang et al., 2020), and higher distress in comparison to pre-COVID-19 rates was also noted in the New Zealand population (n=1,003) (Sibley et al., 2020). Worry about loved ones, prolonged isolation, increase in the rates of domestic violence, rising unemployment, and home schooling combined with occupational demands are common contributors to the mental health burden of the COVID-19 pandemic (IASC, 2020). However, centuries of learnings and research from disasters and crisis events have shown that there are individual differences in how people adapt in response to adversity, such as the COVID-19 pandemic (Green, 2002; Mendonca, Amorim, & Kagohara, 2019; Preston, 2016; Southwick et al., 2016; Tiernan et al., 2019). The success

of adaption has often been associated with an individual's resilience, influenced by internal and external resources (Norris et al., 2002). Given that resilience is a malleable trait that is responsive to psychological interventions, understanding the factors that strengthen adult resilience in the face of major disasters, such as the current COVID-19 pandemic, will assist in designing treatments to reduce the long-term impact of the current pandemic, as well as the impacts of future crises.

What is Resilience?

Resilience is the ability to cope effectively with, and bounce back from, adversity (Rutter, 1985). All humans have a capacity for resilience, however, individuals' levels of resilience are determined by an interplay between individual and intraindividual factors (e.g., environmental), with a number of identified protective factors (e.g., skills, abilities) boosting resilience (Dyer & McGuinness, 1996). The socioecological model provides a useful framework to conceptualise the complex interplay between these factors and to understand the personal and intrapersonal characteristics that protect individuals in the face of adversity (Bronfenbrenner, 1977). The socioecological model posits that behaviours are shaped by the environment, and therefore, a supportive environment enables people to adopt healthy behaviours, consequently expanding their resilience capital. A strengths-based approach focusses on identifying and building on people's strengths, specifically seeing them as resourceful and resilient when they are in adverse conditions (McCashen, 2005). In the following sections, we describe how a strengths-based resilience approach might hold promise in the context of the COVID-19 pandemic.

Within a socioecological framework, at the individual level, resilience involves cognitive, behavioural, emotional, and physiological processes. For example, at a physiological level, recent neurobiological research has shown that resilience can offset catecholaminergic and cortisolergic responses associated with stress and trauma immediately after experiencing

adversity, and can also offer protection against the long-term impact of these stress hormones on the body (Bowirrat et al., 2010). However, at the same time, resilience is very much a developmental process shaped by the environment, including factors such as social support and family dynamics (Brownlee et al., 2013). When considering environmental influences as key determinants of one's resilience, prior studies have proposed the important role of informal and formal social capital in promoting resilience (Ungar, 2011). Such social capital has focused on personal and social competence, family coherence, social support, and personal structure (Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003), or combined social support with public policy influences (Reich, Zautra, & Hall, 2010). In an attempt to counteract the historically overemphasized role of individual characteristics in understanding resilience in favour of the broader context, it seems useful to frame resilience in socio-ecological terms; for example, by considering the combination of social inclusion, family attachment and support, as well as cultural identity, spirituality, and individual competencies (Liebenberg & Moore, 2016).

Resilience at the Time of Disasters

The protective role of resilience has been observed in a variety of contexts, frequently in relation to unexpected events, including natural disasters, such as fires, floods, and volcanic eruptions, as well as human-orchestrated disasters, such as terrorism (Norris et al., 2002). Resilience is changeable over time and influenced by protective factors (Dyer & McGuinness, 1996). In adult samples, resilience has been shown to be higher in those with minimal exposure to the disaster, male sex, older age, higher income and education, not being a member of ethnic minorities, free from secondary stressors, good prior mental health and personality trait of harm avoidance, among other factors (Bonanno, Galea, Bucciarelli, & Vlahov, 2007; Norris et al., 2002). Several modifiable and often inter-correlated protective factors have also been identified in disaster research, such as use of multiple coping strategies (as opposed to only problem- or emotion-based), higher perceived social support, high self-efficacy, mastery or self-esteem,

higher perceived control, hopefulness, higher acceptance, sense of coherence, and high levels of resilience (McFarlane, 2005; Norris et al., 2002). However, in the case of children and adolescents, family factors – such as the presence of emotionally responsive caregiving – may bolster the child’s internal coping resources more than any other characteristics (Egeland, Carlson, & Sroufe, 1993; Norris et al., 2002). Therefore, to improve family wellbeing, it is essential to focus on understanding and promoting resilience in parents / carers.

Understudied Post-Disaster Resilience Boosters

Certain individual-level parental strengths are particularly worthy of exploration in the context of the COVID-19 pandemic. Positive affect has been shown to be associated with increased resilience in the context of chronic pain populations (Zautra, Johnson, & Davis, 2005). Emotion regulation is also an established predictor of resilience in adolescents (Mestre, Núñez-Lozano, Gómez-Molinero, Zayas, & Guil, 2017). Neither have been investigated in relation to disasters, but they may well be relevant, given evidence showing that other related individual constructs, such as optimism, are associated with resilience post-disasters (Norris et al., 2002). Additionally, high neuroticism has been associated with distress post-disaster, however, little is known about other personality traits, such as intro- and extraversion as moderators of response to trauma (Norris et al., 2002).

While social connectedness, stronger network ties and perceived supportive communities have been studied and found to be protective in promoting resilience post-trauma (Machisa, Christofides, & Jewkes, 2018) and post-disasters (Norris et al., 2002), partner support has not been widely investigated in the context of resilience. Further, economic stress, such as that caused by the rising unemployment due to COVID-19, is known to adversely affect couple relationship quality (Johnson & Booth, 1990), marital stability (Conger et al., 1990) and is associated with negative communication and conflict. (Dew & Yorgason, 2010; Hardie & Lucas, 2010; Williamson, Karney, & Bradbury, 2013). Little is known, however, about

couples' resilience to financial adversity, such as the pandemic-related economic crisis. Of relevance, loneliness, considered the opposite of social connectedness, has received much attention in a variety of contexts (Wang, Mann, Lloyd-Evans, Ma, & Johnson, 2018; Winterton et al., 2020) but has not been extensively examined as a correlate of resilience post-disaster. COVID-19 has been associated with increased loneliness in older people and linked with deteriorating mental health (van Tilburg, Steinmetz, Stolte, van der Roest, & de Vries, 2020), though its impact on mental health of families has not been examined to date.

Moreover, while there is little doubt that parent-child relationships determine children's developmental outcomes in the face of significant stress (Wyman et al., 1992). Family expressiveness, as well as parenting type, have not been extensively studied as correlates of post-pandemic resilience. This avenue might prove promising, as family expressiveness has been found to promote resilience to the stress associated with child's bone marrow transplant (Phipps & Mulhern, 1995). Similarly, mindful parenting has been proposed as a resilience booster when caring for children with chronic conditions (Cousineau, Hobbs, & Arthur, 2019) and may be another novel protective factor in the face of adversity that is amenable to intervention. On the other hand, emotion-focused parenting has become increasingly popular in interventions aiming to improve parent-child communication (Kaminski, Valle, Filene, & Boyle, 2008), but again, has not been examined as a factor in building resilience in parents or children post-disasters.

The Current Study

The current study examined resilience in context of the COVID-19 pandemic. Since the long-term mental health of parents and children living through the COVID-19 pandemic is likely to be boosted by promoting parent resilience (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020), it is timely to examine parental personal and intrapersonal traits associated with resilience. The present study utilised a strengths-based approach to investigate the association

between resilience and indicators of mental health in a large sample of Australian parents. This investigation was framed in the socioecological model, and therefore, sought to identify potential protective factors across individual (e.g., positive affect) and interpersonal levels (e.g., social support) of the socioecological model that may modify the relationship between resilience and indicators of parental mental health.

Specifically, the study aims to:

- 1) Explore whether higher resilience levels are associated with lower levels of stress, anxiety, and depression at the time of the COVID-19 pandemic in Australian parents;
- 2) Explore the unique associations between individual and interpersonal positive qualities and distress (stress, anxiety and depression), while accounting for the influence of resilience;
- 3) Explore whether the association between resilience and distress (stress, anxiety and depression) is associated with partner and external social supports.

Materials and Methods

Design

This cross-sectional study was nested within a large longitudinal cohort study of Australian parents of a child aged 0-18 years (see study protocol, Westrupp et al., 2020).

Selection Criteria

Participants were currently residing in Australia and speaking English, were 18 years or over, and a current parent of a child aged 0-18 years. Participants were under no obligation to participate and free to withdraw from the study at any time without consequences.

Recruitment

Families were recruited via social media advertisements and paid online recruitment platforms, e.g. Facebook, Twitter, Instagram. A range of methods were used to target specific groups to

increase the representativeness of the sample (e.g., targeting postcodes and demographic factors).

Measures

1. Dependent Variables

Symptoms of stress, anxiety and depression were measured on the Depression and Anxiety Scale (DASS) 21-item version (Lovibond & Lovibond, 1995). The DASS includes three subscales: Depression ($\alpha=0.89$), Stress ($\alpha=0.82$), Anxiety ($\alpha=0.87$), 7 items each. The DASS is rated on a 4-point scale from ‘did not apply to me at all’ to ‘applied to me very much, or most of the time’. Example item: “I found it hard to wind down.”

2. Independent Variable

Resilience was measured on the Brief Resilience Scale (BRS) (Smith et al., 2008). The BRS has 6 items and is rated on a 5-point scale from ‘strongly disagree’ to ‘strongly agree’ ($\alpha=0.88$). Example item: “I tend to bounce back quickly after hard times.”

3. Covariates / Factors

3a. Individual factors

Positive affect was measured on the Positive Affect Subscale (PANAS) from the Positive and Negative Affect Schedule Short Form (Thompson, 2007). The PANAS is a 5-item scale rated on a 5-point scale from ‘very slightly or not at all’ to ‘extremely’ ($\alpha=0.80$). Example item: “Thinking about yourself in the past four weeks, about how often did you feel... alert?”

Emotion regulation was measured on the Difficulties in Emotion Regulation Scale-16 Item Version (Bjureberg et al., 2016). This is a 16-item scale rated on a 5-point scale from ‘almost never’ to ‘almost always’ ($\alpha=0.95$). Example item: “I have difficulty making sense out of my

feelings.” *We will interpret the data using the strengths-based approach with a low score on difficulties regulation considered a strength.*

Introversion/Extraversion was measured on the investigator’s developed scale. This is a 1-item measure: “Do you consider yourself an introvert?” rated on a 7-point scale from ‘introvert’ to ‘extrovert’.

3b. Interpersonal Factors

Couple relationship quality measured on the *Perceived Relationships Quality Component* (PRQC) Questionnaire (Fletcher, Simpson, & Thomas, 2000). The PRQC is a 6-item measure rated on a 7-point scale from ‘not at all’ to ‘extremely’ ($\alpha=0.89$). Example item: “How satisfied are you with your relationship?”

Social support measured on the following items:

External social support (1 item) from the Longitudinal Study of Australian Children (LSAC) (Soloff, Lawrence, & Johnstone, 2005). It is rated on a 4-point scale from ‘I get enough help’ to ‘I don’t get any help at all’; and ‘I don’t need any help’. Item: “Overall how do you feel about the amount of support or help you get from family or friends living elsewhere?”

Partner social support was from the Social Provisions Scale (Cutrona & Russell, 1987) (1 item selected). It is rated on a 7-point scale from ‘strongly disagree’ to ‘strongly agree’. Item: “When I am feeling stressed about a new or unknown situation, I can rely on my partner to comfort me.” This variable is further measured on the Secure Base Characteristics Scale (Feeney & Thrush, 2010) (1 item selected). It is rated on a 7-point scale from ‘strongly disagree’ to ‘strongly agree’. Item: “My partner encourages me to draw on my skills and abilities to deal with challenges”.

Loneliness was measured using the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) (6 items). It is rated on a 4-point scale from ‘never’ to ‘always’ ($\alpha=0.83$). Item: “Indicate how often each of the statements below is descriptive of you. I lack companionship.”

Positive family expressiveness was measured on the Adapted short-form of the Self-Expressiveness in the Family Questionnaire (Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995) (11 items were selected according to a consensus of three independent expert ratings evaluating item relevance in relation to the COVID-19 pandemic) ($\alpha=0.87$). It is rated on a 9-point scale from ‘not at all frequently in my family’ to ‘very frequently in my family’, with two subscales: Positive and negative expressiveness. Example item: “Showing contempt for another’s actions.”

Mindful parenting was measured on the Interpersonal Mindfulness in Parenting (IEM-P), non-reactivity sub-scale (Duncan, 2007). It is a 3-item scale rated on a 5-point scale from ‘almost never’ to ‘almost always’ ($\alpha=0.75$). Example item: “When I’m upset with my child, I notice how I am feeling before I take action.

Emotion-focused parenting was measured on the emotion-focussed parenting scale (Duncan, Coatsworth, & Greenberg, 2009). It is a 3-item scale rated on a 5-point scale from ‘almost never’ to ‘almost always’ ($\alpha=0.85$). Example item: “When my child experiences strong emotions (sad, angry, scared), I connect with them and provide comfort and support.”

Other variables: socio-demographic characteristics. Income was measured in five bands: less than \$36400pa, \$36401 to \$52000 pa, \$52001 to \$90000pa, \$90001 to \$140000, \$140001+.

Analysis and Data Preparation

A hierarchical multiple linear regression was run to assess Aim 1, with parent resilience entered as the dependent variable. In the first level, a set of control variables (age, gender, number of children, and self-assessed introversion) were entered as independent variables. At a second

level, we controlled for social and education variables (relationship status, self-reported loneliness, completion of high school). At a third level, we controlled for economic variables (employment prior to the pandemic, a change in employment following COVID-19, money shortages in the previous 12 months, income and its source). Source of income was dummy coded for four categories (wages, government pension, business, family). At the fourth level, we tested for the effects of mental health: parent depression, anxiety, and stress.

We tested Aims 2 and 3 via three hierarchical regression models, each with one of the indicators of mental health (depression, anxiety, stress) entered as dependent outcome variables. At the first level, we entered personal variables (age, gender, born overseas, number of children, self-reported introversion). At a second level we controlled for social and educational variables (relationship status, self-reported loneliness, completion of high school). At a third level we controlled for personal resources: positive affect and emotional regulation. At a fourth level we controlled for family resources (perceived relationships quality, positive and negative aspects of self-expressiveness in the family, and mindful parenting). At a fifth level we controlled for resilience, external social support, and partner social support. At a sixth level we controlled for the interactions between resilience and external social support and partner social support, after centring these effects to remove covariance with their constituent variables.

Inclusion Criteria and Approach to Missing Data

Data analyses were conducted using Stata 16 and SPSS 26. The data consisted initially of 2365 cases. Parents were included in the analysis if they had complete data on variables of interest and 253 had to be dropped due to missing data. Further, Little's MCAR test was undertaken on variables of interest for the analysis, and was found to be significant, indicating the bias was present in the missing data, and needed replacement ($\chi^2_{(29)}=150.30, p<.001$). Variables ranged from no missing data to 16.1%. All missing data were replaced using multiple imputation with

Markov Chained Monte Carlo procedures, with 500 case draws, 500 parameter draws, and up to 7000 model parameters across 100 imputed data sets. All reported results are from the multiply imputed data sets.

Ethical Approval

The current study was approved by the Deakin University Human Ethics Advisory Group (Project number: HEAG-H 52_2020). Participants indicated their consent to participate in the study at the start of the online questionnaire.

Results

Of 2110 respondents included, 1701 (80.6%) were female. The mean age was 38 years old ($SD=7$), ranging from 19 to 69. Overall, 380 (18%) were born outside Australia and 4% spoke language other than English at home, 40 (2%) were Aboriginal or Torres Strait Islander Peoples. Ninety-one per cent ($n=1918$) completed high school, with 68% reporting a university degree. In terms of family structure, 1901 (91%) reported having a partner. The majority had more than one child, with 46% reporting having two, 18% having three, and 7% having more than three living in the household. On average the children were 8.6 ($SD=5.1$) years old.

Table 1 shows that social variables (relationship status, self-reported loneliness, completion of high school) were the strongest correlates of resilience (11% of variance, 95% CI 10.7-11.2%), followed by mental health variables (8.4% of variance, 95% CI 8.3-8.6%) and, to a small degree, personal variables (age, gender, number of children, and self-assessed introversion) (3.1% of variance, 95% CI 3.0-3.1%).

Table 2 reports that an increase in extroversion and a reduction in loneliness was associated with increased resilience while depression, anxiety and stress were all associated with reduced resilience. A marginally significant effect was found for the presence of a partner in a respondents' life. In summary, personal variables (mostly introversion/extroversion), social

variables (mostly loneliness), and mental health variables predict up to 22% of the variance in resilience.

Table 3 reveals that social and educational variables (self-reported loneliness, completion of high school) accounted for a further 12.1% of anxiety, 24.6% of depression, and 13.1% of stress while personal variables (age, gender, born overseas, number of children, self-reported introversion) had only a minor contribution to mental health variables.

Level of education and loneliness were both important to anxiety and depression (see Table 4), but only loneliness impacted significantly upon stress. Personal resources (positive affect, and difficulties in emotional regulation) added considerably to the explanation of anxiety ($\Delta R^2=20.7\%$), depression ($\Delta R^2=29.6\%$), and stress ($\Delta R^2=24.9\%$), with both positive affect and difficulties in emotional regulation significantly contributing to the model (see Table 4).

The level of external social support received did add significantly to stress, with increased assistance associated with reduced stress and the interaction of resilience with partner support was evident (Table 4). Even though at mean levels social support did not add to the proportion of variance explained, we decided to explore the simple main effects at $\pm 1SD$ as it was a significant correlate and to ensure this remained the case at all ranges. The interaction remained significant at the mean for partner support and $\pm 1SD$ for resilience, and at $\pm 1SD$ for partner support at the mean of resilience with no change in result for each value ($b=.664$, $se=0.180$, $p<.001$ $sr=.06$). This remained the case for $\pm 2SD$ and $\pm 5SD$ as well (see Figure 1). As resilience increased depression decreased, but the amount of decrease was contingent upon the level of partner support.

The relationship between resilience and mental health was examined for useful higher order effects. A quadratic model added 0.8% ($p<.001$) to anxiety, 1.4% ($p<.0001$) to depression, and 0.2% to stress ($p<.05$). This added significantly to the model ($\Delta R^2=0.00161$ [0.00158-0.00164],

$\Delta F(1, 1999)=7.83, p<.01$; see Figure 2). These results suggest that there is a greater benefit in depression management with interventions focused on resilience at lower levels than higher. No significant quadratic effects were found for anxiety or for stress.

Discussion

These baseline survey from a large longitudinal cohort of Australian families explored the relationship between resilience and mental health at the time of the COVID-19 pandemic. The study made several original and important observations on resilience in the context of post-disaster trauma.

First, we showed that higher resilience levels are associated with lower levels of stress, anxiety, and depression at the time of the COVID-19 pandemic in Australian parents. The relationship between resilience and symptoms of depression post-disasters has been previously documented by an American survey ($n=294$) of people living through Hurricane Katrina in 2005 and the Deepwater Horizon Oil Spill in 2010 (Blackmon et al., 2017). However, our findings come from a larger sample and are relevant to families specifically. Similar observations have also been made in a recent COVID-19 related study with 761 participants (Kimhi, Eshel, Marciano, & Adini, 2020) where higher resilience was related to lower levels of distress and anxiety. Resilience is a modifiable trait that is highly responsive to psychological interventions, with properly designed resilience-building therapies likely to improve mental health (Chmitorz et al., 2018). Thus, resilience-boosting interventions are likely to be useful in counteracting the long-term effects of disasters on mental health.

Secondly, we demonstrated that loneliness was a key contributor to mental health outcomes, over and above the influence of resilience. There has been a growing body of evidence linking loneliness with poor health such as increased rates of coronary heart disease and stroke (Valtorta, Kanaan, Gilbody, Ronzi, & Hanratty, 2016), increased all-cause mortality, and poor

mental health (Leigh-Hunt et al., 2017). People who are lonely tend to report more symptoms of depression (Wang et al., 2018). However, the studies on loneliness and health are largely conducted with older cohorts, with very few studies focused on young adults or families with young children and our study is original in describing that parents can feel lonely even in the presence of others (family members and children). Further, in the context of disasters, loneliness has been found to be associated with resilience in one small study (n=216) (Lee, Blackmon, Lee, Cochran, & Rehner, 2019). However, the COVID-19 pandemic has been unique in terms of enforced isolation, with people living in Melbourne, Victoria, currently entering their sixth month of isolation. Documenting the relationship between loneliness, mental health and resilience is particularly important for future pandemics. Interventions targeting mental health at this time should focus on reducing the sense of loneliness while working with the constraints of imposed social isolation. This could be achieved by drawing on the services which remain open throughout isolation such as sports clubs, social clubs, mothers' groups but also workplaces which have the capacity to hold social gatherings online. Further, an increase in extraversion was associated with improved resilience. Extraversion has been associated with quality of life in a variety of contexts (Huang et al., 2017). It is considered a health protecting personality trait predicting longevity, subjective wellbeing and life satisfaction, as well as social connectivity (DeNeve & Cooper, 1998; Lopes, Salovey, Côté, & Beers, 2005; Schimmack, Oishi, Furr, & Funder, 2004; Terracciano, Löckenhoff, Zonderman, Ferrucci, & Costa, 2008). Extraverts have been found to be at lower risk of loneliness, chronic stress, anxiety and depression (Kong et al., 2015; Naragon-Gainey, Watson, & Markon, 2009; Uliaszek et al., 2010). Interestingly, extraversion has been repeatedly shown to be susceptible to change as a result of cognitive, behavioural, psychodynamic or psychoanalytic therapy, and psychopharmacological treatment (Roberts et al., 2017). Due to the association between

extraversion and resilience identified in the present study, future interventions might be targeted towards introverted adults.

Finally, the presence of a partner in a respondents' life had only a marginally significant effect on resilience. However, we showed that the relationship between resilience and depression was associated with the level of partner support while other family / parenting variables were not significant correlates of this relationship. Partner support has been previously found to promote resilience in pregnant and postpartum women at the time of hurricane Katrina (n=514) (Harville, Xiong, Buekens, Pridjian, & Elkind-Hirsch, 2010). Therefore, it may be important to include partners in any future resilience-boosting interventions, particularly in the context of parenting and caring for young children during a crisis.

Strengths and limitations

This large study was nested within an existing prospective cohort which utilised multiple sampling strategies to increase representativeness. However, while documenting a large cohort, the present data are cross-sectional and thus it was not possible to determine the directionality of the assessed associations. In order to reduce the study burden, we had to limit the number of questions in our survey. While many scales have been previously used and validated, some constructs (e.g. personality, social support) were measured using 1-item questionnaires developed by our team or derived from other scales. Further, all the scales we used in the study were based on self-report and thus prone to reporting bias. Nevertheless, psychological studies usually rely on subjective measures as objective measures in this context are very limited. In addition, our primary outcome measure of mental health was measured using a screening measure rather than a psychological interview. This was done for practical reasons, to avoid delays in capturing mental health of our population of interest during the COVID-19 pandemic but means that we can only comment about symptoms of mental illness rather than refer to specific diagnoses.

Conclusion

Our study showed that higher resilience levels are associated with lower levels of stress, anxiety, and depression at the time of the COVID-19 pandemic in Australian parents. Loneliness was a key contributor to mental health outcomes, over and above the influence of resilience. Interventions targeting mental health of parents at the time of pandemics should focus on reducing loneliness, while working with the constraints of imposed social isolation. Interventions promoting extraversion may also be able to improve resilience. As the relationship between resilience and depression is associated with the level of partner support, it may be important to include partners in any future resilience-boosting interventions, particularly in the context of parenting and caring for young children during a crisis.

Declaration of interest

We have no interests to report. There is no funding to report.

Data Availability Statement

The data that support the findings of this study are available on request from the senior author, EW. The data are not publicly available due to restrictions.

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Tables

Table 1: Model summary output from imputed data for the analysis of resilience together with 95% confidence intervals at each model step.

<i>Mode l</i>	R^2	<i>95% CI</i>	<i>Adj'd R²</i>	<i>95% CI</i>	ΔR^2	<i>95% CI</i>	ΔF	<i>df1</i>	<i>df2</i>	<i>p</i>
1	0.031	0.030 - 0.031	0.028	0.028 - 0.029	0.031	0.030 - 0.031	13.25 0	5	2099	9.8E-13
2	0.140	0.138 - 0.142	0.137	0.135 - 0.139	0.110	0.107 - 0.112	89.11 7	3	2096	2.8E-54
3	0.145	0.142 - 0.147	0.139	0.137 - 0.141	0.004	0.004 - 0.005	1.795	6	2090	0.092
4	0.229	0.227 - 0.230	0.223	0.221 - 0.224	0.084	0.083 - 0.086	76.06 8	3	2087	1.1E-46

Table 2: Coefficients, correlations, and semi-partial correlations for the fourth level of the model for resilience.

Entr y		<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>r</i>	<i>sr</i>
	Constant	4.405	0.395	11.160	<0.001		
1	Age	0.001	0.003	0.283	0.777	0.082	0.006
1	What is your gender? (0: F, 1: M)	0.081	0.043	1.874	0.061	0.063	0.037
1	Was the participant born overseas? (0: N, 1: Y)	-0.009	0.043	-0.197	0.843	0.017	-0.004
1	Children living in the household (count)	0.018	0.019	0.983	0.325	0.022	0.020
1	Do you consider yourself to be an introvert or extrovert? (1: I, 7: E)	0.043	0.011	3.986	<0.001	0.145	0.082
2	Do you currently have a partner? (0: N, 1: Y)	-0.135	0.069	-1.969	0.049	0.048	-0.040
2	Highest level of schooling (0: Completed high school, 1: Did not complete)	0.014	0.059	0.234	0.815	-0.058	0.005
2	UCLA Loneliness Scale total score (high=high loneliness)	-0.036	0.006	-5.745	<0.001	-0.351	-0.147
3	Have you had any money shortages in the last 12 months (0: N, 1: Y)	-0.006	0.047	-0.136	0.892	-0.120	-0.003
3	Has your work situation changed since the pandemic? (0: N, 1: Y)	0.013	0.035	0.385	0.701	-0.020	0.008
3	Income (0<\$52K, 1>=\$52k)	-0.035	0.064	-0.556	0.578	0.070	-0.011
3	Wages (0: N, 1: Y)	-0.281	0.333	-0.845	0.398	0.067	-0.018
3	Pension (0: N, 1: Y)	-0.389	0.347	-1.119	0.263	-0.077	-0.024
3	Business (0: N, 1: Y)	-0.289	0.365	-0.791	0.429	-0.006	-0.017
4	DASS Depression (high=high depression)	-0.037	0.006	-5.794	<0.001	-0.415	-0.124
4	DASS Anxiety (high=high anxiety)	-0.025	0.008	-3.282	0.001	-0.359	-0.072
4	DASS Stress (high=high stress)	-0.019	0.006	-3.163	0.002	-0.366	-0.066

Table 3: Model summary output from imputed data for the analysis of mental health together with 95% confidence intervals at each model step.

<i>Model</i>	R^2	95% <i>CI</i>	<i>Adj'd</i> R^2	95% <i>CI</i>	ΔR^2	95% <i>CI</i>	ΔF	<i>df1</i>	<i>df2</i>	<i>p</i>
<i>Anxiety</i>										
1	0.037	0.037 - 0.037	0.035	0.034 - 0.035	0.037	0.037 - 0.037	16.045	5	2099	1.51E-15
2	0.157	0.156 - 0.159	0.155	0.153 - 0.156	0.121	0.119 - 0.122	150.256	2	2097	1.04E-61
3	0.365	0.363 - 0.366	0.362	0.360 - 0.363	0.207	0.205 - 0.209	341.485	2	2095	4.32E-129
4	0.369	0.368 - 0.370	0.365	0.364 - 0.366	0.004	0.004 - 0.005	3.606	4	2091	0.006
5	0.373	0.372 - 0.374	0.368	0.367 - 0.369	0.004	0.004 - 0.005	2.907	5	2086	0.013
6	0.375	0.373 - 0.376	0.368	0.367 - 0.370	0.001	0.001 - 0.001	2.050	2	2084	0.129
<i>Depression</i>										
1	0.023	0.023 - 0.024	0.021	0.021 - 0.021	0.023	0.023 - 0.024	10.023	5	2099	1.70E-09
2	0.269	0.267 - 0.271	0.267	0.265 - 0.269	0.246	0.244 - 0.248	353.112	2	2097	6.71E-133
3	0.565	0.563 - 0.567	0.563	0.561 - 0.565	0.296	0.293 - 0.298	712.513	2	2095	8.58E-237
4	0.568	0.566 - 0.569	0.565	0.563 - 0.566	0.003	0.002 - 0.003	3.219	4	2091	0.012
5	0.570	0.568 - 0.571	0.566	0.564 - 0.567	0.002	0.002 - 0.002	1.969	5	2086	0.080
6	0.574	0.572 - 0.575	0.569	0.568 - 0.571	0.004	0.004 - 0.004	9.563	2	2084	7.34E-05
<i>Stress</i>										
1	0.045	0.044 - 0.045	0.042	0.042 - 0.043	0.045	0.044 - 0.045	19.576	5	2099	4.19E-19
2	0.175	0.174 - 0.177	0.173	0.171 - 0.174	0.131	0.130 - 0.132	166.322	2	2097	9.01E-68
3	0.424	0.422 - 0.426	0.422	0.420 - 0.424	0.249	0.247 - 0.251	453.106	2	2095	2.96E-164
4	0.437	0.435 - 0.440	0.434	0.432 - 0.436	0.013	0.013 - 0.014	12.294	4	2091	0.000
5	0.442	0.440 - 0.444	0.437	0.435 - 0.439	0.005	0.004 - 0.005	3.593	5	2086	0.003
6	0.443	0.440 - 0.445	0.437	0.435 - 0.439	<0.001	<0.001 - <0.001	0.648	2	2084	0.523

Table 4: Coefficients, correlations, and semi-partial correlations at the sixth level of the model for model health.

Entry	Variable	<i>Anxiety</i>			<i>Depression</i>			<i>Stress</i>		
		<i>b</i>	<i>SE</i>	<i>sr</i>	<i>b</i>	<i>SE</i>	<i>sr</i>	<i>b</i>	<i>SE</i>	<i>sr</i>
1	Constant	-2.371*	1.049		-1.402	1.152		4.001**	1.433	
1	Age	-0.017	0.009	-0.032	0.013	0.010	0.021	-0.039**	0.011	-0.058
1	What is your gender? (0: F, 1: M)	-0.410*	0.160	-0.045	0.286	0.168	0.025	-0.329	0.203	-0.028
1	Was the participant born overseas? (0: N, 1: Y)	-0.194	0.159	-0.022	0.137	0.164	0.012	-0.458*	0.195	-0.039
1	Children living in the household (count)	0.084	0.069	0.022	0.048	0.071	0.010	0.091	0.085	0.018
1	Do you consider yourself to be an introvert or extrovert? (1: I, 7: E)	-0.023	0.041	-0.010	0.020	0.045	0.007	0.073	0.054	0.025
2	Highest level of schooling (0: Completed high school, 1: Did not complete)	0.845***	0.215	0.070	0.633**	0.220	0.042	-0.124	0.263	-0.008
2	UCLA Loneliness Scale total score (High=high loneliness)	0.075**	0.025	0.063	0.200***	0.028	0.135	0.092*	0.036	0.060
3	Positive Affect Subscale (PANAS) (High=High Positive Affect)	-0.068**	0.020	-0.066	-0.297***	0.022	-0.231	-0.163***	0.029	-0.121
3	Difficulties in Emotion Regulation Scale (DERS) (High=High Difficulties)	0.125***	0.007	0.343	0.160***	0.009	0.356	0.163***	0.011	0.348
4	Perceived Relationships Quality PRQC (High=High Quality)	0.010	0.015	0.014	0.017	0.015	0.020	0.014	0.019	0.015
4	Family expressiveness SEFQ Negative (High=High Negative Express)	0.072	0.042	0.034	0.035	0.045	0.013	0.246***	0.054	0.089
4	Family expressiveness SEFQ Positive (High=High Positive Express)	0.072	0.050	0.029	-0.021	0.054	-0.007	0.209**	0.069	0.065
4	Mindfulness IM-P (high=high mindful)	0.064	0.035	0.043	0.063	0.045	0.035	-0.011	0.058	-0.005
5	Resilience BRS (high=low resilience)	-0.231*	0.094	-0.046	-0.027	0.103	-0.004	-0.160	0.130	-0.025
5	Partner Support (High=High Support)	0.009	0.061	0.003	-0.042	0.060	-0.012	-0.049	0.076	-0.013
5	How much support or help you get from family or friends living elsewhere? (0=none, 1=get help)	-0.278	0.158	-0.034	-0.117	0.168	-0.011	-0.476*	0.208	-0.044
5	Attachment-Related Avoidance ECR-RS (high=high avoidance)	-0.025	0.060	-0.009	-0.032	0.081	-0.009	-0.019	0.121	-0.005
5	Attachment-Related Anxiety ECR-RS (high=high anxiety)	0.019	0.049	0.008	0.083	0.054	0.028	0.042	0.071	0.014

6	Interaction BRS with External Social Support	0.040	0.048	0.016	0.012	0.050	0.004	-0.016	0.064	-0.005
6	Interaction BRS with Partner Support	0.233	0.167	0.026	0.664***	0.180	0.060	0.124	0.219	0.011

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figures

Figure 1: Plot of the interaction between resilience (BRS) and partner support for depression.

Figure 2: Plot of the data for resilience and depression showing both linear and quadratic components.