

# More to lose? Longitudinal evidence that women whose social support declines following childbirth are at increased risk of depression

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Postpartum depression (PPD; also known as postnatal depression) is the most prevalent mood disorder associated with childbirth, affecting more than one in ten childbearing women.<sup>1</sup> Around one in four people experience a depressive disorder in their lifetime, but the postnatal period is a time of elevated risk for women. Between 45% and 65% of women who ever experience depression have their first occurrence of depression in the year following childbirth, with a 17% prevalence among mothers with no prior history of depression.<sup>2,3</sup> PPD can critically impair maternal wellbeing and functioning, which in turn has serious detrimental consequences for the health of both the mother and her infant. For this reason, PPD is widely recognised as a significant public health issue.<sup>4</sup>

Research has demonstrated that social factors can be protective in the context of PPD. For example, the perceived availability of social support influences women's postnatal adjustment and depression.<sup>5-7</sup> Indeed, limited social support has been found to be one of the strongest predictors of PPD across several meta-analyses of risk factors.<sup>8,9</sup>

Pregnancy and childbirth are stressful major life events in their own right,<sup>8,10</sup> and these stressors can contribute to women's higher risk of mental illness during this period. Accordingly, one model that is particularly relevant when it comes to understanding the protective benefits of social support after the birth of a child is the *stress-buffering*

## Abstract

**Objective:** We examined the dynamic relationship between life changes (pregnancy and childbirth) and social support during the postpartum period.

**Methods:** A large, nationally representative sample of Australian women (N=806) who completed the Household Income and Labour Dynamics in Australia Survey (HILDA) in the year immediately before and immediately after giving birth to a child reported on measures of perceived social support and mental health.

**Results:** Analyses indicated a decrease in both social support and mental health after having a baby. Social support during the postpartum period – controlling for social support and mental health prior to the birth of a baby – predicted better mental health in women. However, for women who experienced a decline in social support, prenatal social support was a risk factor for a decline in mental wellbeing rather than a protective factor.

**Conclusions:** Women who have 'more to lose' are at increased risk of mental ill-health if they cannot maintain existing sources of social support.

**Implications for public health:** Loss of social support during pregnancy and the postpartum period should be considered as a significant risk factor for postpartum depression in its own right and one that warrants screening and intervention.

**Key words:** postpartum depression, maternal health, social support

*hypothesis* (SBH).<sup>11</sup> In simple terms, the SBH argues that social support acts as a buffer against the harmful effects of stressful situations on mental health. More precisely, it predicts that social support will moderate the relationship between stressful life events (in this case, giving birth) and the onset of mental illness.

In line with this proposition, social support seems to be particularly protective against depression among pregnant and postpartum women who are experiencing additional stressors.<sup>12,13</sup> For instance, having meaningful social relationships has been found to protect mothers against depressive

symptoms associated with challenging infant temperament.<sup>14</sup> In seminal work by Cutrona,<sup>15</sup> several dimensions of perceived social support during pregnancy negatively predicted postpartum depressive symptoms. Surprisingly, the strongest predictor was not the quality of intimacy with the mother's husband, but rather, the availability of companionship and a sense of belonging to a group of similar others. Similar findings have been replicated in more recent studies<sup>16,17</sup> and highlight the interactive effects of stress and supportive relationships on maternal mental health consistent with the stress-buffering hypothesis.

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However, to our knowledge, no research to date has examined whether: a) there is a *change* in social support during pregnancy and the postpartum period; or b) whether such change has a role to play women's mental health. This is the focus of the present study. Given that many women cease recreational activities and employment either during or immediately following pregnancy, it may be difficult, if not impossible, for many women to maintain the interpersonal and group ties from which they were previously deriving social support. For example, pregnancy often precludes participation in certain activities, such as sports and alcohol-oriented socialising. A woman who is required to cease recreational activities and chooses to take maternity leave from employment will potentially lose access to several important sources of social support – such as acquaintances from her local gym and work colleagues – who might otherwise have buffered her during the stressful life event of pregnancy and becoming a mother. We therefore propose that one's degree of social support often changes during the transition to motherhood, with implications for maternal mental health.

As such, our argument differs somewhat from the stress-buffering hypothesis, which has tended to conceptualise social support as a fixed, time-invariant protective factor, rather than as a process that is potentially affected by the stressor itself. Instead, it aligns with recent evidence that stressful life events negatively affect the availability of social support. This has been observed in the context of other populations, including people transitioning into retirement<sup>18</sup> and students moving overseas to study.<sup>19</sup> One conceptual framework that may explain this dynamic relationship is the *social identity model of identity change*.<sup>20</sup> This model makes the point that life change affects social group memberships, and the social support that is received from them, with consequences for wellbeing.

We propose that part of the reason why pregnancy is a high-risk time for mental health is that it has the capacity to reduce the availability of social support. We further propose that this is an overlooked reason why the transition to parenthood is associated with the onset of PPD. Speaking to this point, previous research has demonstrated that a decrease in women's social group memberships (from which social support would come) predicts poorer mental health in

the postpartum period, and that *maintaining* social group memberships is protective against PPD.<sup>21</sup> Following this reasoning, any social support that is available to a woman prior to having a baby would only be expected to be beneficial to the extent that it is maintained during and after pregnancy; otherwise, a mother may be at risk of mental health decline.

The current study therefore aims to examine the *dynamic* relationship between life stressors (in this case, pregnancy and childbirth) and social support during pregnancy and the postpartum period. To this end, we examined a large, nationally representative longitudinal sample of Australian women before and after they gave birth, with a focus on how social support and mental health change across pregnancy and childbirth. In line with the above arguments, we hypothesised that:

Hypothesis 1: Women will, on average, experience a decrease in their: a) social support and b) mental health across the course of pregnancy and the postpartum period.

Hypothesis 2: Postpartum social support will be a more important predictor of women's postpartum mental health than prenatal social support.

Hypothesis 3: Prenatal social support will only be protective to the extent that it is maintained; in the absence of such continuity, initial social support will offer no protective benefit to mental health.

## Method

### Participants and design

Participants were Australian women who completed the Household Income and Labour Dynamics in Australia Survey (HILDA) in the year immediately before (the prenatal timepoint, henceforth Time 1) and immediately after (the postpartum timepoint, henceforth Time 2) giving birth to a child. This study utilised HILDA data from Wave 1 (2001) to Wave 11 (2011). HILDA is an ongoing longitudinal panel survey commissioned and funded by the Australian Government Department of Family and Community Services and conducted by the Melbourne Institute at the University of Melbourne. Ethical approval was granted by the Human Ethics Advisory Committee at the University of Melbourne. These analyses of existing data were approved by the ethics committee at

the researchers' university (#2017001606). The HILDA is recognised internationally for the quality of its methodology and retention,<sup>22–24</sup> and has tracked a nationally representative sample of approximately 20,000 individuals annually since 2001. HILDA uses a stratified three-stage clustered design and samples all members of selected households on an annual basis. The household response rate at Wave 1 was 66%, with approximately 85–90% of respondents retained wave-on-wave thereafter. Participants respond to questions about a wide range of economic, social, demographic and wellbeing factors via interview and self-complete questionnaire. Because it is nationally representative, HILDA allows inferences made from the sample to be generalised to the Australian population as a whole.

Eligibility criteria for our analyses were that women: a) reported having experienced (in at least one time point across Waves 2–11 of HILDA) pregnancy and childbirth within the previous 12 months; and b) reported in the subsequent year of data collection that they had a child who was under twelve months old in their residence and care. This meant that women who indicated that they had experienced pregnancy, but not childbirth (i.e. potentially indicating either miscarriage or abortion), or had experienced both pregnancy and childbirth, but did not have subsequent care of a young child (i.e. potentially indicating that the baby was deceased or adopted, or that the mother was a surrogate) were excluded from data analysis. Women who had more than one eligible birth during the study period were included for their first birth only.

### Measures

Social support was assessed using a 10-item scale that measured individuals' perceptions of current social support (primarily emotional support).<sup>25</sup> This social support scale has been used successfully in other research,<sup>26–28</sup> including research involving mothers.<sup>29,30</sup> Previous research has indicated that social support is best measured subjectively (i.e. the *perception* of social support is more important theoretically than objective tangible support<sup>26</sup>), and that emotional support, in particular, has been recognised as having an important effect on mental health.<sup>31</sup> Participants indicated their perceived social support on a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). Sample items included: "When I need someone to

help me out, I can usually find someone" and "I seem to have a lot of friends". Five items were reverse scored so that higher scores reflected better social support, for example, "I often need help from other people but can't get it" and "I often feel very lonely". Items were averaged to yield a reliable scale ranging from 1 to 7, with higher scores indicating greater perceived social support ( $\alpha=0.85$ ).

Mental health was assessed using the mental health subscale of the Short Form-36 (SF-36) Health Survey.<sup>32</sup> This five-item scale assesses subjective feelings of distress on a six-point Likert scale (1 = all of the time; 6 = none of the time). The SF-36 has been validated as a measure for depression using clinical interviews as the gold standard.<sup>33</sup> This measure has been used successfully across different populations, including mothers.<sup>34,35</sup> Participants indicated how often they felt a certain way, for example, "Felt so down in the dumps nothing could cheer you up". Items were averaged to yield a reliable scale ranging from 1 to 6, with higher scores reflecting better mental health ( $\alpha=0.80$ ).

In order to describe the sample, data were also extracted for age, country of birth, marital status (legally married or defacto = 1; single, widowed or other = 2), highest level of education (1 = completed Year 12 or higher; 0 = did not complete Year 12 or equivalent), SES (1 = lowest decile; 10 = highest decile), and parity (1 = primiparous [first birth]; 2 = multiparous [subsequent birth]).

### Analysis plan

To test Hypothesis 1a (that women will report a decrease in social support between Time 1 and Time 2), a paired-samples *t*-test was conducted to compare women's perceived

social support before and after having a baby. To test Hypothesis 1b (that women will report a decrease in mental health between Time 1 and Time 2), a paired-samples *t*-test was conducted to compare women's mental health before and after having a baby. To test Hypothesis 2, we ran a hierarchical regression analysis, with Time 2 mental health as the dependent variable, and Time 1 mental health, Time 1 social support and Time 2 social support as predictors. At Step 1, Time 1 mental health was entered as a control for baseline (prenatal) levels; at Step 2, Time 1 social support was added. At Step 3, Time 2 social support was added to determine if Time 2 social support was a more important predictor and could explain additional variance over and above Time 1 social support.

To investigate Hypothesis 3, we tested a mediation model using PROCESS, with estimates based on 5,000 bootstrap samples.<sup>36</sup> In this, Time 1 social support was the predictor, Time 2 social support was the mediator, and Time 2 mental health was the outcome, with Time 1 mental health added as a covariate. However, one limitation of the mediation analysis assessing Hypothesis 3 is that participants with more Time 1 support may have a greater chance of losing support at Time 2, not due to true risk, but rather due to regression to the mean. One statistical approach that is able to address this potential multicollinearity issue is to use a latent change score as the mediator in a structural equation model (SEM) consistent with prior research.<sup>37,38</sup> We used this approach as a sensitivity analysis; Supplementary File 1 discusses this technique in detail.

## Results

The final sample included 806 women who were aged from 16 to 45 at their postpartum wave of survey completion ( $M=30.25$ ;  $SD=5.40$ ). Participants were mostly married or in a de facto relationship (93%). The majority of participants were born in Australia (83%) and had completed Year 12 or equivalent education (84%). Socioeconomic status was diverse, with all ten deciles represented approximately equally. Approximately half (51.6%) of the sample were primiparous. Table 1 presents the descriptive demographics and correlation matrix for the sample.

As can be seen from Table 1 and consistent with prior research,<sup>9</sup> mothers who were older, more educated, in a relationship, and higher SES tended to be in better mental health at both timepoints. These same variables were also associated with social support at both timepoints in the same direction. Although the associations were less consistently significant, women who were primiparous tended to have more social support and be in better mental health than women who were multiparous.

### Hypothesis 1

There was a marginal difference between Time 1 social support ( $M=5.74$ ,  $SD=0.92$ ), and Time 2 social support ( $M=5.69$ ,  $SD=0.96$ );  $t(805)=1.86$ ,  $p=0.063$ , Cohen's  $d=0.05$ , tentatively indicating that, overall, women experience a slight decline in social support over the postpartum period (consistent with Hypothesis 1a). There was a significant difference in the scores for Time 1 mental health ( $M=4.82$ ,  $SD=0.31$ ), and Time 2 mental health ( $M=4.76$ ,  $SD=0.76$ );  $t(805)=2.16$ ,  $p=0.031$ , Cohen's  $d=0.08$ , suggesting that

Table 1: Descriptive characteristics of the sample and their correlations (N = 806).

Variable	Sample Mean (Standard Deviation)	Sample range on each variable	1	2	3	4	5	6	7	8
1. Time 1 social support	5.74 (0.92)	2–7	–							
2. Time 2 social support	5.69 (0.96)	2–7	0.66**	–						
3. Time 1 mental health	4.82 (0.73)	1–6	0.47**	0.36**	–					
4. Time 2 mental health	4.76 (0.76)	1–6	0.36**	0.51**	0.52**	–				
5. Age (Time 2)	30.25 (5.40)	16–45	0.09**	0.09*	0.11**	0.09*	–			
6. Parity			-0.15**	-0.12**	-0.11**	-0.06	0.21**	–		
7. Education			0.22**	0.17**	0.13**	0.07*	0.29**	-0.15**	–	
8. Marital Status			-0.20**	-0.20**	-0.16**	-0.15**	-0.31**	-0.04	0.24**	–
9. SES	5.61 (2.78)	1–10	0.23**	0.21**	0.16**	0.11**	0.31**	-0.07*	-0.22**	0.24**

Note:

\* $p < .05$ , \*\* $p < .01$ . Parity (1 = primiparous; 2 = multiparous), Education (1 = completed Year 12 or higher; 0 = did not complete Year 12 or equivalent), Marital Status (married or defacto = 1; single, widowed or divorced = 2) were categorical variables, therefore means and standard deviations are not included.

women typically experience a small but significant decline in mental health over the pregnancy and postpartum period (consistent with Hypothesis 1b).

### Hypothesis 2

At Step 1 of the regression model, Time 1 mental health significantly accounted for 27% of the variance in Time 2 mental health,  $F(1, 804)=299.01, p<0.001$ . Unsurprisingly, Time 1 mental health was a significant positive predictor of Time 2 mental health,  $\beta=0.52, p<0.001$ . At Step 2, Time 1 social support accounted for an additional 2% of variance in Time 2 mental health,  $F_{change}(1, 803)=20.44, p<0.001$ . Time 1 social support was a significant positive predictor of Time 2 mental health,  $\beta=0.15, p<0.001$ . At Step 3, Time 2 social support was added to determine if it was a more important predictor than Time 1 social support. Time 2 social support accounted for an additional 11% of variance over and above Time 1 social support,  $F_{change}(1, 802)=140.86, p<0.001$ . Time 2 social support was a significant positive predictor of Time 2 mental health,  $\beta=0.43, p<0.001$ . The overall model was significant,  $F(3, 802)=174.81, p<0.001$ , explaining 40% of the variance in women's postpartum mental health. In line with Hypothesis 2, social support at Time 2 was a more important predictor of mental health at Time 2 than social support at Time 1.

However, it is important to note here that, at Step 3, Time 1 social support was a significant *negative* predictor of Time 2 mental health ( $\beta=-0.12, p=0.002$ ), while Time 2 social support was a significant positive predictor.

This indicates that Time 1 social support only positively predicts mental health if Time 2 social support is not accounted for. Indeed, when Time 2 social support is included in the regression model, Time 1 social support offered no protective benefit (and in fact became a risk factor) for women's mental health. This also provided indicative support for Hypothesis 3, as we explore further below.

### Hypothesis 3

In the mediation model, the total effect of Time 1 social support on Time 2 mental health was positive and significant ( $b=0.13; 95\%CI=0.07, 0.18$ ). The indirect (mediated) effect was also positive and significant, at  $b=0.22 (CI=0.17, 0.28)$ . However, once the mediation pathway was entered into the model, the direct effect of Time 1 social support on Time 2 mental health was significant and *negative*,  $b=-0.10 (CI=-0.16, -0.03)$ . In other words, as indicated in Figure 1, the positive effect of Time 1 social support on Time 2 mental health was fully attributable to the mediation via Time 2 social support.

Thus, while social support is generally associated with better mental health for women during the postpartum period, this is only true to the extent that women are able to *maintain* this social support into the postpartum period. Indeed, the negative direct effect that only emerged when Time 2 social support was included in the model (indicative of a suppressor effect) points to the fact that high Time 1 social support actually predicted a *decline* in mental health for those women who were not able to maintain it at Time 2.

### Sensitivity analyses

The effects remained unchanged using a more complex approach to testing Hypothesis 3 (see Supplementary File 1). Time 1 social support was protective only to the degree that it predicted Time 2 social support – such that women who experienced a decline in social support (regardless of the absolute level of Time 2 social support) showed a decline in mental health.

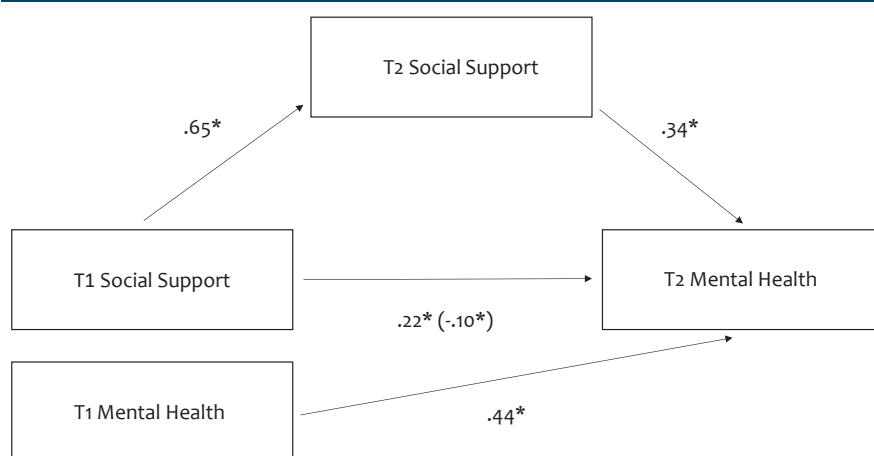
### Discussion

This study examined the dynamic relationship between social support and mental health during pregnancy and the postpartum period. Specifically, we assessed social support change among women during pregnancy and childbirth in a large, nationally representative sample of Australian women, with a view to exploring its impact on women's postpartum mental health.

Broadly consistent with Hypothesis 1a, women reported a marginal decline in social support during pregnancy and the postpartum period. This is in line with our argument that pregnancy and childbirth are life transitions that can bring with them the risk of losing social support. In this context, there was also clearer support for Hypothesis 1b, such that women tended to experience a significant decrease in their mental health across the pregnancy and postpartum period. This is also consistent with previous research that shows that the stress of pregnancy potentially makes women vulnerable to mental illness over the course of their transition to parenthood.<sup>8</sup>

In line with Hypothesis 2, postpartum social support was found to be a more important predictor of women's postpartum mental health than prenatal social support. This supports our argument that stressful life events negatively affect the amount of social support available to an individual. In this case, then, pregnancy and childbirth can directly impact the amount of social support to which a mother has access. Furthermore, when postpartum social support was accounted for, prenatal social support became a *negative* predictor of women's postpartum mental health. This, in turn, provided evidence consistent with Hypothesis 3 – that social support prior to childbirth will only be protective of mental health to the extent that it is maintained during the postpartum period.

Figure 1: Standardised coefficients for direct and indirect effects of Time 1 social support on Time 2 mental health, as mediated by Time 2 social support.



Note: \* $p < .05$ .



Given that previous research has consistently shown that social support is a significant protective factor against postpartum depression,<sup>5-7</sup> it is perhaps unsurprising that a decrease in social support over the course of pregnancy and childbirth was associated with a decrease in mental health. What was more surprising, although consistent with Hypothesis 3, was that having greater prenatal social support actually became a risk factor for mental health when it was not maintained into the postpartum period. This reflected the fact that women with high levels of support before childbirth experienced the most precipitous decline in the availability of support after their child was born. Although counterintuitive, this finding aligns with the theoretical reasoning underpinning Hypothesis 3: during pregnancy and transition to motherhood, these women most likely relinquished activities (whether by choice or not) that had previously provided them with access to valued social support. This meant that although social support that was present in the period prior to pregnancy and childbirth was protective against a decline in mental health, this was only true to the extent that this support was *maintained* during the postpartum period. This finding is in line with other research examining social networks in postpartum mothers that shows that continuity of group networks during pregnancy and postpartum is a protective factor against depression.<sup>21</sup> This speaks to the fact that women who have 'more to lose' are at increased risk of mental ill-health in the context of life transitions (such as giving birth) that compromise their capacity to maintain existing sources of social support.

### Theoretical and applied implications

This study adds to other empirical literature on postpartum depression that indicates that a woman's access to social support is important for her mental health and wellbeing in the postpartum period.<sup>7,29</sup> Consistent with this point, this study indicates that loss of social support during pregnancy and the postpartum period should be considered as a significant risk factor in its own right – and one that warrants screening and intervention. Our study shows that, even when overall levels of social support remain within the normal range, women who experience a decrease in social support after having a baby are at elevated risk for the onset of mental ill-health during the postpartum period. Theoretically, this

evidence supports theoretical assertions that social support is not a static factor, but rather a variable that changes in response to the life events that individuals experience – in this case, pregnancy and childbirth. This also indicates that the dominant theoretical model for explaining the relationship between life transitions, social support and mental health (the stress-buffering hypothesis) may not account for the dynamic effect of these factors.<sup>39</sup> Indeed, our study adds to a growing body of research on the interplay of stress, social support and mental health that indicates that social support is affected by life stressors.<sup>18,19</sup>

A practical implication of these findings is that supporting mothers throughout pregnancy and the postpartum period is not simply a matter of ensuring they have access to social support as they embark on this life transition. Instead, they speak to the importance of *maintaining* existing sources of social support throughout the pregnancy and the postpartum period. This also speaks to the importance of identifying potential barriers to the maintenance of existing sources of social support, and of helping women to cultivate new sources of social support after having a baby. This is because our results indicate that social support prior to childbirth will have little benefit – and may even become a risk factor – if a mother is unable to access those sources of support after having a baby. For maternal healthcare workers, this research also provides evidence of the value of: a) closely monitoring pregnant women and new mothers for any decline in social support; b) emphasising the importance of maintaining sources of valued social support; and c) providing opportunities for women to form new social support networks during their pregnancy and the postpartum period.

### Strengths and limitations

As with all research, this study is not without limitations. In particular, our analyses do not shed light on the reasons *why* some women experienced a decrease in social support (e.g. when they took maternity leave from the workplace, or when they needed to recover physically from birth). Future research might explore this question more closely and also benefit from efforts to understand the specific sources of social support most likely to be compromised in this period.

A strength of the current study is its use of a large national representative sample. The

Melbourne Institute, which manages the HILDA survey, uses a variety of techniques to ensure that the people they sample are as similar as possible to the Australian population as a whole.<sup>22-24</sup> In addition, the longitudinal design means that perceived social support is not dependent on retrospective recall – which is a limitation of many other studies in this area. And while this design does still not allow causal inferences to be made and relied on using the available measures included in the HILDA, it nevertheless allows for a robust analysis of the changing circumstances of Australian women and their levels of social support after having a baby.

### Conclusions

This study has demonstrated that changes in social support – in particular, the decrease in social support that can occur during pregnancy and after becoming a mother – are meaningfully related to women's postpartum mental health. Pregnancy and childbirth are a risky time for women's mental health as a result of the loss of social support that this life transition entails for many women. By examining more closely the dynamic relationship between social support and mental wellbeing in the postpartum period, we gain insight not only into the way that changes in social support can impact women's postpartum mental health, but also into how efforts to assist new mothers can best be targeted.

### References

- Milgrom J. Depression in pregnancy and the postpartum period. *InPsych* [serial online]. 2017;39(1).
- Moses-Kolko E, Roth EK. Antepartum and postpartum depression: Healthy mom, healthy baby. *J Am Med Women Assoc*. 2004;59(3):181-91.
- Shorey S, Chee CY, Ng ED, Chan YH, San Tam WW, Chong YS. Prevalence and incidence of postpartum depression among healthy mothers: a systematic review and meta-analysis. *J Psych Res*. 2018;1(104):235-48.
- Hahn-Holbrook J, Cornwell-Hinrichs T, Itzel A. Economic and health predictors of national postpartum depression prevalence: A systematic review, meta-analysis, and meta-regression of 291 studies from 56 Countries. *Front Psychiatry*. 2018;8:248.
- Collins NL, Dunkel-Schetter C, Lobel M, Scrimshaw SC. Social support in pregnancy: Psychosocial correlates of birth outcomes and postpartum depression. *J Pers Soc Psychol*. 1993;65(6):1243-58.
- Dagher R, McGovern P, Alexander B, Dowd B, Ukestad L, McCaffrey D. The psychosocial work environment and maternal postpartum depression. *Int J Behav Med*. 2009;16(4):339-46.
- Webster J, Nicholas C, Velacott C, Cridland N, Fawcett L. Quality of life and depression following childbirth: Impact of social support. *Midwifery*. 2011;27(5):569-749.
- Beck CT. Predictors of postpartum depression: An update. *Nursing Res*. 2001;50(5):275-85.

9. Ghaedrahmati M, Kazemi A, Kheirabadi G, Ebrahimi A Bahrami M. Postpartum depression risk factors: A narrative review. *J Educ Health Promot.* 2017;6:60.
10. Holmes TH, Rahe RH. The Social Readjustment Rating Scale. *J Psychosom Res.* 1967;11:213-21.
11. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull.* 1985;98:310-57.
12. Ortega CCL, Reio TG Jr. Interventions for women with postpartum depression symptoms: an integrative literature review for human resource development. *Hum Resource Dev Rev.* 2016;15(2):131-50.
13. Glazier RH, Elgar, FJ, Goel V, Holzapfel S. Stress, social support, and emotional distress in a community sample of pregnant women. *J Psychosom Obstet Gynaecol.* 2004;25(3-4):247-55.
14. Cutrona CE, Troutman BR. Social support, infant temperament, and parenting self-efficacy: A mediational model of postpartum depression. *Child Dev.* 1986;57(6):1507-18.
15. Cutrona CE. Social support and stress in the transition to parenthood. *J Abnorm Psychol.* 1984;93:378-90.
16. Letourneau NL, Duffett-Leger L, Stewart M, Hegadoren K, Dennis C, Rinaldi C, et al. Canadian mothers' perceived support needs during postpartum depression. *J Obstet Gynecol Neonatal Nurs.* 2007;36(5):441-9.
17. Masood Y, Lovell K, Lunat F, Atif N, Waheed W, Rahman A, et al. Group psychological intervention for postnatal depression: A nested qualitative study with British South Asian women. *BMC Women Health.* 2015;15:109.
18. Steffens NK, Cruwys T, Haslam C, Jetten J, Haslam SA. Social group memberships in retirement are associated with reduced risk of premature death: Evidence from a longitudinal cohort study. *BMJ Open.* 2016;6(2):e010164.
19. Praharso NF, Tear MJ, Cruwys T. Stressful life transitions and wellbeing: A comparison of the stress buffering hypothesis and the social identity model of identity change. *Psychiatry Res.* 2017;247:265-75.
20. Haslam C, Jetten J, Cruwys T, Dingle G, Haslam SA *The New Psychology of Health: Unlocking the Social Cure.* London (UK): Routledge; 2018.
21. Seymour-Smith M, Cruwys T, Haslam SA, Brodribb W. Loss of group memberships predicts depression in postpartum mothers. *Soc Psychiatry Psychiatr Epidemiol.* 2017;52:201-10.
22. Watson N, Wooden M. *The Household, Income and Labour Dynamics in Australia (HILDA) Survey: Wave 1 Survey Methodology 2002.* HILDA Project Technical Paper Series No.: 1/02. Melbourne (AUST): University of Melbourne Institute of Applied Economic and Social Research; 2002.
23. Watson N, Wooden M. *Assessing the Quality of the HILDA Survey Wave 2 Data 2004.* HILDA Project Technical Paper Series No.: 5/04. Melbourne (AUST): University of Melbourne Institute of Applied Economic and Social Research; 2004.
24. Watson N. *Longitudinal and Cross-sectional Weighting Methodology for the HILDA Survey.* HILDA Project Technical Paper Series No.: 2/12. Melbourne (AUST): University of Melbourne Institute of Applied Economic and Social Research; 2012.
25. *HILDA Survey Annual Report 2002.* Melbourne (AUST): University of Melbourne Institute of Applied Economic and Social Research; 2003.
26. Berry HL, Walsh JA. Social capital and health in Australia: An overview from the household, income and labour dynamics in Australia survey. *Soc Sci Med.* 2010;70:588-96.
27. Cruwys T, Haslam C, Steffens NK, Haslam SA, Fong P, Lam BCP. Friendships that money can buy: Financial security protects health in retirement by enabling social connectedness. *BMC Geriatr.* 2019;19(1):319.
28. Milner A, Krnjacki L, Butterworth P, Lamontagne AD. The role of social support in protecting mental health when employed and unemployed: A longitudinal fixed-effects analysis using 12 annual waves of the HILDA cohort. *Soc Sci Med.* 2016;153:20-6.
29. Crosier T, Butterworth P, Rodgers B. Mental health problems among single and partnered mothers: The role of financial hardship and social support. *Soc Psychiatry Psychiatr Epidemiol.* 2007;42:6-13.
30. Robinson LD, Magee CA, Caputi P. Social support, work hours and health: A comparative study of sole and partnered Australian mothers. *Womens Stud Int Forum.* 2014;42:19-27.
31. McDowell TL, Serovich JM. The effect of perceived and actual social support on the mental health of HIV-positive persons. *AIDS Care.* 2007;19(10):1223-9.
32. Ware J, Snow K, Kosinski M, Gandek B. *SF-36 Health Survey Manual and Interpretation Guide.* Boston (MA): New England Medical Center; 1993.
33. Rumpf HJ, Meyer C, Hapke U, John U. Screening for mental health: Validity of the MHI-5 using DSM-IV Axis I psychiatric disorders as gold standard. *Psychiatry Res.* 2001;105(3):243-53.
34. White MK, Yarlas A, Ingham M, Han C. Cognitive debriefing of the SF-36v2 with moderate-to-severe Crohn's disease patients. *Value Health.* 2016;19:A316.
35. Holden L, Hockey R, Ware RS, Lee C. Mental health-related quality of life and the timing of motherhood: A 16-year longitudinal study of a national cohort of young Australian women. *Qual Life Res.* 2018;27(4):923-35.
36. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-based Approach.* New York (NY): Guilford Publications; 2017.
37. Burt KB, Obradović J. The construct of psychophysiological reactivity: Statistical and psychometric issues. *Dev Rev.* 2013;33(1):29-57.
38. Webb H, Lin H, Jones BM, McNeill, K, Lim L, et al. Smoke signals: The decline of brand identity and smoking behaviour following the introduction of plain packaging. *Addict Behav Rep.* 2017;5:49-55.
39. Burton E, Stice E, Seeley JR. A prospective test of the stress-buffering model of depression in adolescent girls: No support once again. *J Consult Clin Psychol.* 2004;72:689-97.

## Supporting Information

Additional supporting information may be found in the online version of this article:

**Supplementary File 1:** Sensitivity analyses.