**Poor but not more distressed: greater financial hardship is not associated with increased psychological distress among adults living in remote Australia**

**Supplementary materials**

**1. Consistency of the association between hardship and alternative measures**

Table Supp1 presents the results from a series of multilevel negative binomial models regressed number of hardships onto alternative measures of socioeconomic position/financial circumstances and considered the interaction of each with locations and assessing whether the inclusion of the interaction between area and measure of socioeconomic position improves model fit and thereby indicates that this association differs between regional and remote areas.

**Table Supp1: Incidence Rate Ratios from multilevel negative binomial models (and 95% Confidence Intervals) assessing the association between measures of socio-economic circumstances and number of reported hardships, and improvement in model fit accompanying inclusion of interaction between area and each key covariate**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Model A** | | **Model B**  **Inclusion of interaction with area** | |
|  | **IRR** | **95% CI** | **Likelihood ratio statistic (df)** | **P value** |
| **Self-rated prosperity**  **(ref = not poor)** | 6.78 | 5.63 – 8.16 | 0.74 (1) | 0.389 |
| **Household income**  **Ref = Higher tertile**  **Medium income**  **Low income**  **Not report income** | 1.00  3.17  7.55  4.72 | 2.38 – 4.23  5.23 – 10.89  3.04 – 7.33 | 1.32 (3) | 0.724 |
| **Area disadvantage**  (deciles increasing disadvantage) | 1.19 | * 1. – 1.29 | 0.03 (1) | 0.872 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

The results suggest the relationship between hardship and alternative measures of socioeconomic position does not differ for individuals residing in regional and remote areas.

**2. Influence of salient remote stressors**

An alternative explanation for the current results is that people living in remote locations are exposed to a greater range of stressors than those living in more urban centres and, therefore, the impact of hardship may be (relatively) reduced. Table Supp2 initially presents the results from a series of multilevel generalized linear models (based on normal, poisson and logit distributions) for three potential indicators of such stressors (community distress, life events, and living on a farm).

**Table Supp2: Coefficient, Incidence Rate Ratio and Odds Ratio (with 95% Confidence Intervals) from Multilevel Generalized Linear Models to assess area differences in the prevalence of potential stressors**

|  |  |  |  |
| --- | --- | --- | --- |
| **Stressor** | **Model** | **Result** | |
|  |  |  |  |
| **Concerns about community infrastructure (scale score)** | **Linear regression – coefficient** | 1.22 | 0.72 – 1.72 |
| **Stressful life events (number)** | **Poisson regression –IRR** | 0.93 | 0.85 – 1.02 |
| **Living on farm (binary)** | **Logit regression – OR** | 5.81 | 2.84 – 11.85 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

Results suggest those respondents living in remote areas were more concerned about community infrastructure and more likely to live on a farm than those living in more urban locations. Therefore Table Supp3 presents the results of a series of multilevel logistic regression models in which psychological distress is regressed upon number of hardship and each of these potential stressors separately (with other covariates also included) and subsequently considering whether the interaction between area and each of these measures improved model fit (indicating that the strength of association between hardship and distress may vary due to this potential confounder).

**Table Supp3: Odds Ratios from multilevel logistic regression models (and 95% Confidence Intervals) assessing the association between psychological distress and remote stressors, and improvement in model fit accompanying inclusion of interaction between hardship and each stressor**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Model A** | | **Model B**  **Inclusion of interaction with hardship** | |
|  | **IRR** | **95% CI** | **Likelihood ratio statistic (df)** | **P value** |
| **Hardship (number)**  **Concerns about community infrastructure (scale score)** | 1.41  1.19 | 1.23 – 1.62  1.16 – 1.23 | 0.07 (1) | 0.794 |
| **Hardship (number)**  **Living on farm (binary)** | 1.82  0.84 | 1.57 – 2.11  0.59 – 1.19 | 0.04 (1) | 0.835 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

Although respondents who lived in remote locations were more concerned about community infrastructure and were more likely to live on a farm than those residents living in more urban areas, these factors did not moderate the association between hardship and psychological distress, suggesting these factors could not explain the area-level differences.

**3. Seeking help from welfare or community organisations**

While the analysis of the individual hardship items presented in the main manuscript (Table 1 and Table 2) showed the that respondents from remote locations had similar or lower risk of experiencing most hardships than residents of more urban areas, this was not the case for the item asking whether respondent had ever received financial help from a welfare or community organisation. Respondents from remote areas reported significantly higher likelihood of using such forms of assistance (OR = 1.80, 1.09 – 2.96). It may be, therefore, that the weaker association between hardship and psychological distress for those living in remote areas reflects lower stigma associated with the use of such services and the moderating influence of these forms of assistance on the association between other aspects of hardship and psychological distress.

To test this possibility, Table Supp4 presents the results from a multilevel logistic regression model in which psychological distress is regressed upon the sum of hardship items (excluding receiving financial help from welfare/community organisations) and this item separately (and other relevant covariates), and subsequently assesses whether the interaction between these two measures improved model fit.

**Table Supp4: Odds Ratios from multilevel logistic regression models (and 95% Confidence Intervals) assessing the association between psychological distress and remote stressors, and improvement in model fit accompanying inclusion of interaction between hardship and each stressor**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Model A** | | **Model B**  **Inclusion of interaction with hardship** | |
|  | **IRR** | **95% CI** | **Likelihood ratio statistic (df)** | **P value** |
| **Hardship (number – excluding financial help)**  **Financial help from welfare/ community organisations** | 1.85  4.20 | 1.56 – 2.21  1.40 – 12.61 | 1.36 (1) | 0.244 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

The lack of significant interaction provides no support for the hypothesis that those who are more likely to seek financial assistance from welfare or community organisation are less likely to experience psychological distress associated with their experience of other hardships.

**4. Potential personal, interpersonal and community risk and protective factors**

An initial series of regression models, using robust variance estimators to adjust for the lack of independence amongst observations, regressed each of these measures of interest on location of residence (Table Supp5).

**Table Supp5: Coefficients (with 95% Confidence Intervals) from regression models using robust variance estimators to assess area differences in the potential risk and protective factors**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Item** | **Area effect**  **(ref = regional)** | |
|  |  | **Coef** | **95% CI** |
| **Personal** | Sense of control | 0.11 | 0.05 – 0.17 |
|  | Neuroticism | -0.17 | -0.35 - 0.01 |
|  | Dispositional optimism | 0.06 | -0.01 – 0.14 |
| **Interpersonal** | Social support | 0.08 | -0.04 – 0.20 |
|  | Social network strength | 0.13 | 0.05 – 0.21 |
|  | Relationship quality | 0.07 | -0.01 – 0.15 |
|  | Relationship stress | 0.01 | -0.08 – 0.10 |
| **Community** | Sense of place | 0.58 | 0.14 – 1.01 |
|  | Sense of community | 0.42 | 0.21 – 0.52 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

Results suggest those respondents living in remote areas reported greater sense of control, social network strength, sense of place and sense of community than those living in more urban locations. The area level differences in neuroticism approached significance (p = .07) and was also considered in the next series of analyses.

Table Supp6 presents the results of a series of multilevel logistic regression models in which psychological distress is regressed upon number of hardship and each of these potential proactive factors separately (with other covariates also included) and subsequently considering whether the interaction between area and each of these measures improved model fit.

**Table Supp6: Odds Ratios from multilevel logistic regression models (and 95% Confidence Intervals) assessing the association between psychological distress and potential protective factors that differ in prevalence across remote and regional areas, and improvement in model fit accompanying inclusion of interaction.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Model A** | | **Model B**  **Inclusion of interaction with hardship** | |
|  | **IRR** | **95% CI** | **Likelihood ratio statistic (df)** | **P value** |
| **Hardship (number)**  **Sense of control** | 1.50  0.17 | 1.30 – 1.73  0.13 – 0.23 | 0.78 (1) | 0.377 |
| **Hardship (number)**  **Neuroticism** | 1.77  2.09 | 1.53 – 2.04  1.86 – 2.35 | 0.36 (1) | 0.551 |
| **Hardship (number)**  **Optimism** | 1.56  0.24 | 1.32 – 1.85  0.18 – 0.33 | 0.05 (1) | 0.825 |
| **Hardship (number)**  **Social Network** | 1.76  0.61 | 1.52 – 2.03  0.51 – 0.72 | 0.04 (1) | 0.837 |
| **Hardship (number)**  **Sense of place** | 1.88  0.96 | 1.62 – 2.18  0.93 – 0.99 | 0.21 (1) | 0.650 |
| **Hardship (number)**  **Sense of community** | 1.82  0.82 | 1.57 – 2.11  0.78 – 0.87 | 0.92 (1) | 0.338 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and presence of chronic health conditions

Although each of these risk or protective factors was significantly associated with levels of psychological distress, these factors did not moderate the association between hardship and psychological distress suggesting these factors could not explain the area-level differences.

**5. Assessing generalizability with data from wave 13 of the Household, Income and Labour Dynamics in Australia Survey**

The initial analysis considered the mean number of hardships reported by respondents in major city, regional and remote locations (Table Supp7) and assessed with negative binomial regression. The results show the same pattern of results as was observed with the ARMHS data. If anything, the mean number of hardships and IRRs indicate a more extreme difference between regional and remote area in the HILDA Survey data, however the results fail to reach statistical significance. It is interesting that the results from major cities fall midway between the regional and remote results.

**Table Supp7: Mean number of hardships and coefficients (with 95% Confidence Intervals) from multivariate negative binomial regression models assessing association between area and number of hardships**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Number of hardships** | **Negative binomial regression** | |
|  |  | **IRR** | **95% CI** |
| **Major city** | 0.34 (.31 - .36) | 0.93 | 0.84 – 1.02 |
| **Regional area (ref)** | 0.42 (.39 - .45) | 1.00 |  |
| **Remote area** | 0.32 (.20 - .44) | 0.79 | 0.56 – 1.11 |

Models control for area (remote vs regional), gender, partner status, baseline age, wave, and socio-economic indicators.

Finally, a set of stratified analysis were conducted to replicate the analysis between number of hardships and psychological distress reported for the main ARMHS results (Table Supp8). The results, again, are broadly consistent with the ARMHS results. While each additional hardship was associated with a (statistically significant) doubling or greater in the odds of psychological distress for respondents from major cities and regional areas, the association was much weaker and non-significant for respondents from remote areas. Again, the magnitude of the Odds Ratio for regional respondents was greater in the HILDA data than was observed in the ARMHS data. For this analysis, so too was the association amongst respondents from remote locations. However, the pattern of results is consistent.

**Table Supp3: Odds Ratios from multilevel logistic regression models (and 95% Confidence Intervals) assessing the association between number of hardships and psychological distress across major city, regional and remote areas.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Major city** | | **Regional area** | | **Remote area** | |
|  | **OR** | **95% CI** | **IRR** | **95% CI** | **IRR** | **95% CI** |
| **Hardship (number)** | 2.12 | 1.81 – 2.49 | 2.51 | 2.14 – 2.94 | 1.49 | 0.66 – 3.37 |